Transaction Utility and Consumer Choice

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Abstract

This paper investigates 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). My experiments isolate transaction utility from product quality inference and quantify the value of transaction utility in dollar terms. Results show that consumers experience transaction utility and will sacrifice monetary payoffs. Participants gain utility from perceived discounts, disutility from perceived mark-ups, and utility from using more of a coupon. Consumers are willing to pay 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.

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1 Introduction

Economist traditionally model an individual's decision to purchase a good by comparing the perceived value of a good to its buying price. In practice, people think 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 lower prices by using coupons and seeing discounts than when they simply faced low prices.

While seeing discounts appears to encourage consumers to 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. Firms implicated in such lawsuits range from department stores to high-end luxury brands providing a wide range of products including furniture, clothing, shoes, art supplies, tools and equipment, and wine. Furthermore, to the best of my knowledge, known settlement amounts for these allegations sum to over $190 million (see Table 1).[1]

Thaler (1985, 1999, 2008) proposed adding the value consumers get from a deal into the standard economic model. That is, consumers get two kinds of utility from a purchase: consumption utility, the value of the good obtained relative to its price, and transaction

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[1]See Morrow v. ANN Inc. (No. 1:16-cv-3340-JPO), 2016; Knapp v. Art.com, Inc. (No. 16-CV-00768-WHO), 2016; Burlington Coat Factory Song-Beverly Cases (No. JCCP 4681), 2015; Park v. Cole Haan, LLC. (No. 17-cv-01422-LAB-BGS), 2017; Rubenstein v. The Neiman Marcus Group LLC (No. 2:14-cv-07155-SJO-JPR), 2018; Coladonato v. The Gap, Inc; Gap (Apparel) LLC; Gap International Sales, Inc.; Banana Republic, LLC; and Banana Republic (Apparel) LLC, (No. 1:17-cv-11998-JHR-KMW), 2017; In re Guess Outlet Stores Pricing (No. 4883), 2018;Jerey Beck v. Harbor Freight Tools USA Inc. (No. 15-cv-000598), 2016; Marcrum v Hobby Lobby Stores, Inc. (No. 3:18-cv-01388-RV-CJK), 2018; Rougvie, et al. v. Ascena Retail Group, Inc., et al. (No. 2:15-cv-724-MAK), 2015; Le v Kohl's Corporation and Kohl's Department Stores, Inc. (No. 15-1171), 2015; Seegert v Lamps Plus, Inc. (No. 3:17-cv-01602-BAS-JMA), 2017; Haley v Macy's Inc. and Bloomingdale's, Inc (No. 15-cv-06033-HSG), 2016; Tressa Gattinella v. Michael Kors (USA), Inc. (No. 1:14-cv-05731-WHP), 2014; Rael, Hedrick v. RTW Retailwinds, Inc. f/k/a New York & Company, Inc., et al., (No. 37-2019-3850-CU-MC-CTL), 2019; Covell v Nine West Holdings, Inc. (No. 3:17-cv-01371-H-JLB), 2017; Munning v Nordstrom, Inc (No. 2:19-cv-01810-RSL), 2019; Nunez v Saks Incorporated (No. 15CV2717 JAH WVG), 2017; McDuee v. Sports Warehouse (No. 37-2017-00001781-CU-BT-NC), 2017; Fliegelman v The Talbots Inc (No. 2:17-cv-04576), 2017;Chester, et al. v. The TJX Companies, Inc., et al. (No. 5:15-cv-01437-DDP-DTBx), 2017; Olmedo v Tommy Hilfiger Wholesale, Inc. (No. 3:18-cv-01373-BEN-JLB), 2018; Poteat v. Visionworks of America Inc. (No. 1:15-cv-02306), 2016; Cannon v. Ashburn Corporation (No. 16-1452 (RMB)(AMD)), 2016; Golden, et al., v. ContextLogic Inc. d/b/a Wish.com (No. 17PH-cv-01741), 2017; Berkoff v. Homegoods Inc., (No. 5:15-cv-01480), 2015; Berkoff v. Marshalls of CA, LLC, (No. 5:15-cv-01475), 2015; Munning v. The Gap, Inc., (No. 3:16-cv-03804-TEH), 2016; Anderson v. Kate Spade and Company, (No. 1:16-cv-07300), 2016; Holter (2011); Kang (2015).

Table 1: Class-action lawsuits related to "ficticious" sales

Ann Taylor ($6.1M)	Hobby Lobby	Nordstrom Rack
Art.com	J.Crew	Ralph Lauren
Banana Republic	JCPenney ($50M)	Ross
Bloomingdale	Justice Store ($50.8M)	Saks OFF 5th
Burberry	Kohl's ($6M)	Sears
Burlington Coat Factory ($29.4M)	Lamps Plus	Sports Warehouse ($3M)
Cole Haan	Macy's	Talbots
DSW	Michael Kors ($4.9M)	TJ Maxx ($8.5M)
Gap	Michaels ($1.8M)	Tommy Hilfiger
Guess	Neiman Marcus ($2.9M)	Visionworks ($4.2M)
Gymboree	New York & Company	Wines 'Til Sold Out
Harbor Freight Tools ($23M)	Nine West	Wish.com

Notes: Known settlement amount in parentheses. See footnote 1 for sources.

utility, the perceived value of the "deal."[2] Consistent with transaction utility theory, marketing research over the past 20 years has shown that "comparative price advertising," such as providing an original price, can distort consumers' purchasing intentions (for reviews, see Compeau and Grewal (1998); Krishna et al. (2002)). However, prior literature suffer from two major concerns.

First, prior work does not isolate a key confound: inference of product quality from price comparisons.[3] That is, consumers may use a reference price to update their valuation of the quality of a good (Rao and Monroe, 1989).[4] 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) because the same reference price could be influencing one or both channels and it is unclear if the effect seen in prior research is due to transaction utility at all.

Second, this literature relies primarily on scenario studies and as such does not provide

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[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]Generally, these studies will ask people what is the likelihood they will buy a hypothetical product such as a mug priced at $10 and compared it to their likelihood to buy the same mug priced at $10 but with an original price of $20. They find that consumers report a higher likelihood to buy in the latter case and have attributed this difference to transaction utility.

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

incentive compatible evidence. 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 from a rational economics perspective.[5] As such, I question how seriously to take this evidence. In addition, by using monetary incentives, one can price and know how much consumers value transaction utility.

The contribution of this paper is to investigate the relevance of transaction utility in economic transactions. To do this, my experiments isolate transaction utility from product quality inference and quantify the value of transaction utility in dollar terms. My two incentivized experiments mirror the shopping experience using discounts and mark-ups (Study 1) and coupons (Study 2) and (i) test whether consumers respond to irrelevant original prices, (ii) whether consumers are willing to suffer a monetary loss to capture transaction utility, and (iii) how much consumers are willing to sacrifice for transaction utility. In both studies, 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 thereby shut down the quality inference channel. Because the products are virtual, one might think the impact of transaction utility is muted. Nevertheless, the experiments reveal that participants are willing to suffer a substantial monetary loss in exchange for transaction utility.

The *Discount and Mark-up Game* (Study 1) mirrors the shopping experience of receiving a discount or facing a mark-up. It allows participants to compare the buying 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 are endowed with a valuation for the virtual product, a buying 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 buying 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 buying price, suggesting a discount, and significantly less likely to purchase the virtual product if the "irrelevant" original price is below the buying price, suggesting a mark-up. In addition, the rate of purchasing is in-

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[5]For example, see Compeau and Grewal (1998); Krishna et al. (2002). While intentions to purchase provides a "proxy" for actual purchasing behavior, various studies have shown that there is a large gap between actual and intended purchases (Morrison, 1979; Rimal et al., 1999; Zinn and Liu, 2008). As such, intentions to purchase are not always predictive of actual purchasing behavior.

creasing in the size of the discount and decreasing in the size of the mark-up. I stress-test this result by displaying participants' potential earnings on their decision screen. I find that participants continue to 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 buying 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. That is, I can calculate the marginal rate of substitution between study earnings and transaction utility. In the *Discount and Mark-up Game*, I use the randomly assigned variation between earnings and the perceived markup. In the *Coupon Game*, I use the randomly assigned variation between earnings and the 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.[6] Estimates from the *Coupon Game* suggest participants are willing to pay 37–57 cents to gain a dollar of *perceived* discount.

A simple framework of consumer choice incorporating transaction utility, built off from the insights in Thaler (1985), shows that a consumer's willingness to pay for a product is not only a function of the value of the good but also the reference price. In this framework, I use the marginal rates of substitution between consumption and transaction utility obtained in Study 1 and Study 2 and find that changing the reference price by a dollar increases consumers' willingness to pay for a product by 36–44 cents.

These findings have important implications for firm pricing strategy and consumer

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[6]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.

protection policy. Results suggest that transaction utility is an important component of demand and therefore should influence firm pricing. Not only can firms provide large discounts in order to increases sales but those firms in industries with weak reference prices have an incentive to inflate original prices and then provide hefty discounts in order to capture larger demand. However, such 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).[7] It also adds to a large set of marketing studies exploring the effect 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).[8] 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).[9]

The rest of the paper proceeds as follows. Section 2 provides a review of Thaler's theory of transaction utility and a simple framework to fix ideas. Section 3 presents the

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

[8]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.

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

Discount and Mark-up Game (Study 1) to demonstrate that an "irrelevant" original price can distort purchasing behavior due to transaction utility. Section 4 presents the *Coupon Game* (Study 2) to provide additional evidence of transaction utility and to show that coupons can trap consumers into purchasing the "wrong" product. For each study, I also present heterogenous effects and rule out alternative mechanisms. Section 5 provide a discussion on why consumer may value transaction utility. Section 6 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 buying 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 price is fairness, which depends in large part on the cost to the seller.[10]

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:

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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 buying 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 $U_1(P, O; \alpha) \geq 0$.

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[10]Adding transaction utility into consumers' purchase decisions 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).

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

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 buying 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.[11]

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

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

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).[12] Furthermore, note that a dollar increase in the reference price leads to *less* than a dollar increase in willingness to pay. If empirically relevant, consumers might be more price sensitive because buying price alters both consumption and transaction utility — that is, increasing willingness to pay reduces both consumption and transaction utility. This suggest that transaction utility could have large effects on consumer behavior and firm pricing strategy.[13]

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[11]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 buying 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.

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

[13]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

Note that these hypotheses deviate from the neoclassical rational model in which consumers make purchasing decisions to maximize consumption utility alone.[14] 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.[15] 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 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 buying price and an original price and make comparisons between them to obtain a perceived discount or mark-up.

I ran two treatments 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

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consumption and transaction utility as buying 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.

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

[15]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.

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 treatments.[16] All participants received a \$10 show-up fee for completing the 25-minute study.[17]

In this game, all participants were assigned the role of buyers and decided whether to buy a virtual product at a randomly assigned buying 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.[18] All buyers valued each virtual product at \$9 and the seller had 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 buying price (\$9 − P), and the seller's earnings were the buying 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.[19]

The *Discount and Mark-Up Game* leverages a 4 × 8 within-subject design where a participant's buying price (which took one of 4 levels) and original price (which took one of 7 levels conditional on buying price or was absent) were randomly assigned to each transaction to create variation in two dimensions: the earnings and perceived discount or mark-up from purchasing (see Figure 1 for examples of decision screens with the same buying price but different original prices).[20]

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[16]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.*

[17]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).

[18]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.

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

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

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In total, participants saw four different buying 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}.[21] 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 buying 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 decision without a discount or mark-up decision, and three mark-up decisions for each payoff level.[22]

All participants saw each buying 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.[23]

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).[24] This ensured that all participants understood the game, and 97% of participants passed both comprehension questions on the first try.[25]

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 buying price if they

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[21]The buying 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).

[22]Note, the original prices were selected such that the buying 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.

[23]While all participants made decisions as a buyer, we randomly picked one to be in a passive role of seller for the randomly selected decision. 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.

[24]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.

[25]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.

FIGURE 1: EXAMPLES OF PARTICIPANT'S DECISION SCREEN
Study 1A: Discount and Mark-up Game (Baseline)

(A) PERCEIVED DISCOUNT: $\frac{P}{O} = 60\%$

Game A: Item 1

Your value of Item 1 is $9.00
Seller's cost of Item 1 is $6.00

Your Price: $8.42
Original Price: $14.03
(This original price was offered to other participants in this study.)

(B) NO DISCOUNT/MARK-UP: $\frac{P}{O} = 100\%$

Game A: Item 1

Your value of Item 1 is $9.00
Seller's cost of Item 1 is $6.00

Your Price: $8.42
Original Price: $8.42
(This original price was offered to other participants in this study.)

(C) PERCEIVED MARK-UP: $\frac{P}{O} = 140\%$

Game A: Item 1

Your value of Item 1 is $9.00
Seller's cost of Item 1 is $6.00

Your Price: $8.42
Original Price: $6.01
(This original price was offered to other participants in this study.)

(D) NO ORIGINAL PRICE (CONTROL)

Game A: Item 1

Your value of Item 1 is $9.00
Seller's cost of Item 1 is $6.00

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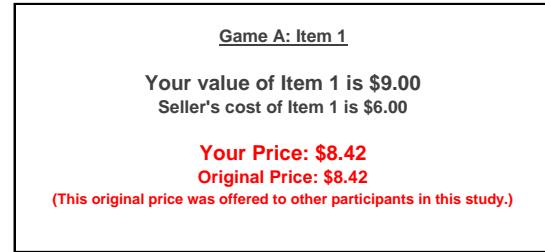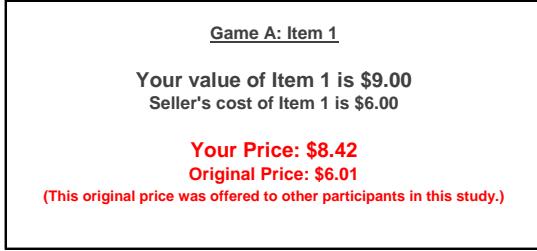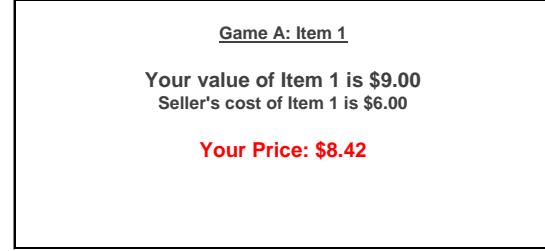
Note: In each decision of the *Discount and Mark-up Game*, participants were shown their assigned values of the virtual product and the seller's cost, which were always constant at $9 and $6. They were also shown the buying prices and the original prices which were randomly assigned. The four panels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

chose to purchase the virtual product. Thus, in terms of payoff, the original price provided irrelevant information.

3.1.1 Difference between Baseline and With Earnings Displayed treatments

In both treatments, *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 treatments was that participants' earnings were displayed before making their decisions in *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

(A) STUDY 1A: BASELINE   (B) STUDY 1B: WITH EARNINGS DISPLAYED

Game A: Item 1

Your value of Item 1 is $9.00
Seller's cost of Item 1 is $6.00

Your Price: $8.42
Original Price: $14.03
(This original price was offered to other participants in this study.)

Game A: Item 1

Your value of Item 1 is $9.00
Seller's cost of Item 1 is $6.00

Your Price: $8.42
Original Price: $14.03
(This original price was offered to other participants in this study.)
(If you choose to purchase this item your earnings are $0.58)

Note: In both treatments 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.

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 treatments. *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.

Below, 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.

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 buying 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 includes all data from *Study 1A: Baseline* and shows the average purchase rate when no original price was shown (control) and when the buying price appeared discounted, equaled, or marked-up compared to the original price. Purchase rates are nearly identical in the control decisions and when the buying price equals the original price (82.7% in control and 82.1% when the buying price equals the original price, $p = 0.696$). This result suggests that in the absence of an original price, buyers behave as if the buying 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 inequity aversion. Different buying prices lead to different buyer-seller splits of the $3 surplus. Figure A1 in the Appendix presents the average purchase rate across conditions by buying 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).

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 buying price appears discounted. Providing an original price above the buying price leads to an average 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 buying price appears marked-up, and the larger the mark-up, the bigger the distortion. Providing an original

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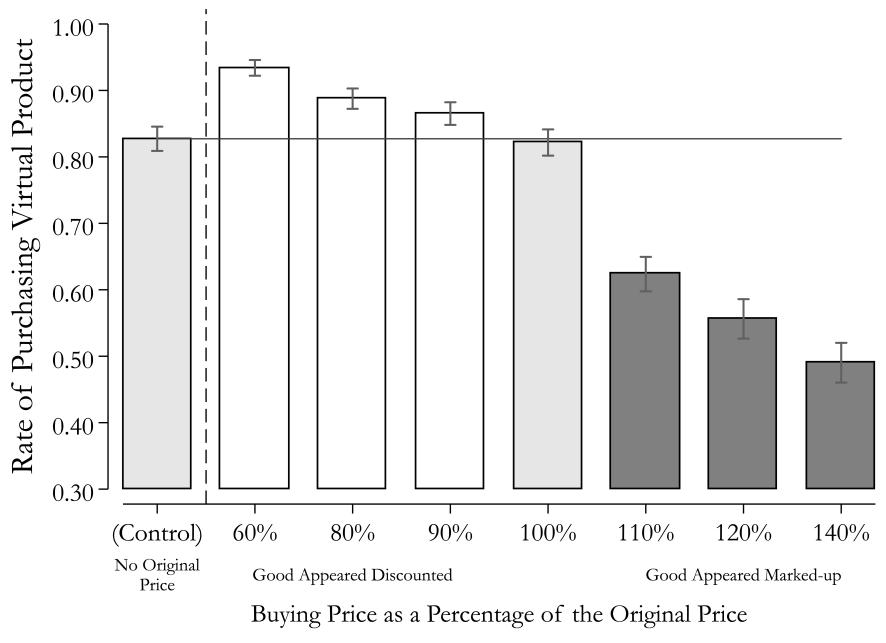
(A) STUDY 1A: BASELINE

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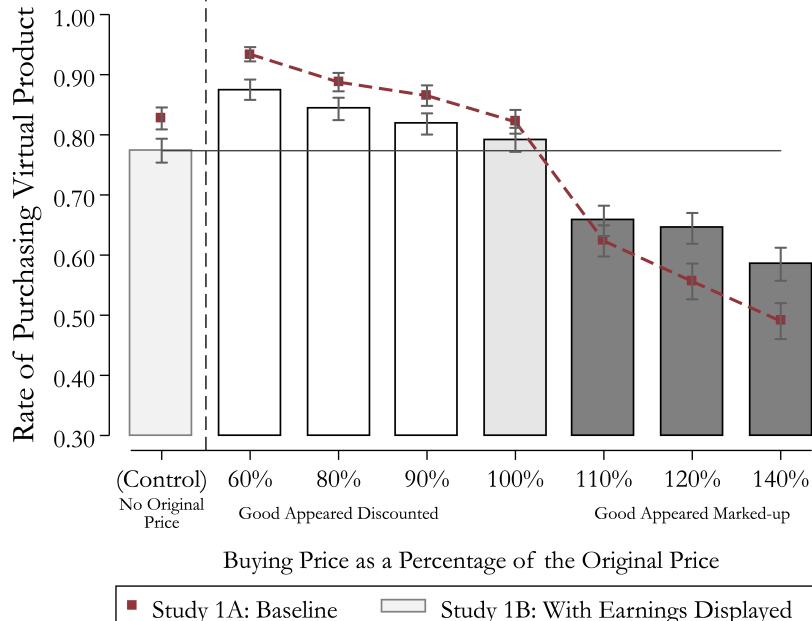
Notes: Participants' average purchasing rate of the virtual product by buying price as a percentage of the original price. Panel A shows results for *Study 1A: Baseline* and Panel B shows results for *Study 1B: With Earnings Displayed*. Robust standard error bars clustered at the individual level are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

price below the buying price leads to 27.1 percentage point decrease in the purchasing rate on average, a 33% difference on a base of 82.7% (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, $p < 0.01$).[26] These results are robust and significant with or without controlling for buying price and decision order.[27]

These results suggest that 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.[28] This pattern 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).

The prior results average across all buying prices. However, one may be concerned about the interaction between transaction utility and the inequity aversion arising from the buyer-seller split of the $3 surplus. I estimate how the purchase rate responds to discounts and mark-ups across treatment decisions for each buying price separately and find that buyer-seller split of the pie causes a level shift in the purchase rate; however, the slope with respect to the discount and mark-up rate is stable across the different splits of the pie.[29] The one exception is when the buyer receives 76% of the buyer-seller earnings split—that is, the buying 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 buying

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[26]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 buying price on participants' purchasing decisions. Also see Table A2 Panel A regressions (1) and (2) in the Appendix.

[27]Table A3 in the Appendix tests the marginal effect of a perceived percentage change between the buying 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).

[28]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.

[29]See Table A2 Panel A sand Figure A1 in the Appendix.

price is equal to the original price, purchase rates are nearly identical to the control decisions and participants are more likely to purchase when the buying price appears discounted and less likely to purchase when the buying price appears marked-up compared to the control decisions.

Next, I explore the trade-off between participants' earnings and perceived levels of discounts and mark-up (in dollars) on probability of purchase. I apply the framework from Section 2. I note there was no trade-off when the participants observed a perceived discount, as purchasing lead to both positive earnings and transaction utility. However, when deciding whether to purchase the virtual product while facing a perceived mark-up, participants were trading off higher earning and negative transaction utility. Thus, I used rounds with a perceived mark-up for this analysis. 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, at the individual level.

Table 2 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 2 to quantify the willingness to pay for transaction utility in Section 3.5.

Table 3 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.[30] Regression (2) shows the trade-

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[30]Sub-setting the data provides an "upper" bound for the effect on earnings because decreasing the buying

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TABLE 2: 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 clustered at the individual level in parentheses. Significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

off between earnings and perceived mark-up when the buying 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 buying price is \$8.03 or \$8.42. This comparison reduces the effect of decreasing inequality when the buying 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 3 regressions (1) to (3), estimates of coefficients may contain loss aversion over *transaction utility*. Regressions (4) to (6) "removes" loss aversion by examining the trade-off between earnings and perceived mark-up using perceived mark-ups of 10%, 20%, and 40% only. This eliminates the kink observed from 0% to 10% mark-up. 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 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*.[31] Regressions (8)

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price increases earnings and reduces buyer-seller inequality.

[31]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).

and (9) mimic the sample selection of regressions (2) and (3) and show consistent results.

TABLE 3: 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		
Buying Price:	All	≥ $7.51	≥ $8.03	All	≥ $7.51	≥ $8.03	All	≥ $7.51	≥ $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 clustered at the individual level in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1.

3.3 How robust are transaction utility effects?

While participants can calculate their earnings by subtracting the buying 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 (i.e., earnings) more salient. Finding evidence of transaction utility in this study would show the robustness of transaction utility and provide a lower bound for its emperical relevance.[32]

Figure 3 Panel B shows the average purchasing rate by buying 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

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[32] *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 an economist 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."

to the control decisions.[33] 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.[34]

Table 2 Panel B presents the trade-off between earnings and perceived mark-up in *Study 1B: With Earnings Displayed* (mirroring Table 2 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 3). 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.

3.4 Heterogeneity of transaction utility effect

While my 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 buying price

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[33]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.

[34]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 buying 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).

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 evidence supporting this hypothesis. Each 10 percentage point increase in the buying 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.[35] Effects are consistent when participants were shown their potential earnings in *Study 1B: With Earnings Displayed*.[36]

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.[37]

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 (e.g., on ride share apps) on a 5-point Likert scale.[38] I find that 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.[39]

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

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

[37]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.

[38]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".

[39]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

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 2 Panel A and compare the coefficients between earnings and perceived mark-up to estimate a marginal rate of substitution between consumption and transaction (dis)utility. I find that participants are willing to pay 78 cents to avoid a dollar of perceived mark-up.[40] I use Table 2 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 framework 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.[41] This suggests that firms that are able to manipulate the original price of a product (e.g. by providing an 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 earnings prior to making a decision. Consumers appear to care about the terms of the deal *separately* from the value of the product and buying 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.

Table A6 Panel B regression (3) and (4) in the Appendix).

[40]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. I note his estimate is for perceived discounts and could potential contain a quality inference confound.

[41]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.

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 buying 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 buying 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.[42]

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).[43]

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

[43]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).

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.[44]

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.[45] 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.[46] I find no significant differences by this median split in either *Study 1A: Baseline* or *Study 1B: With Earnings Displayed*.[47]

Moreover, in the spirit of de Quidt et al. (2018), where experimenter demand can be

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

[45]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.

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

[47]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.

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.[48]

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 find significant heterogeneity effects consistent with our expectations. Moreover, quantifying participants' 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.[49]

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).

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, might it seem silly to use a $5 coupon on a product that was

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[48]Participants were also asked to rate their buying 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 buying 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 buying 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. See discussion in Section 5.3.

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

priced at \$1? But 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.[50] 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.

I ran two treatments 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.[51] In addition to earning a \$10 show-up fee, one decision and one participant were randomly selected for payment in each session.[52]

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 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.[53] 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

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[50]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/)

[51]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*.

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

[53]If a buyer chose to purchase Item Y, his earnings were \$6 value - $max\{0, O_Y - $"\$5 coupon"\}$ and if a buyer chose to purchase Item Z, his earnings were \$8 value - $max\{0, O_Z - $"\$5 coupon"\}$.

FIGURE 4: PARTICIPANT'S DECISION SCREEN WITH AND WITHOUT EARNINGS
DISPLAYED
Study 2A & 2B: Coupon Game

(A) STUDY 2A: BASELINE

Game B: Item 1

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 $6.00	Your value of Item Z is $8.00
Original Price of Item Y: $1.00	Original Price of Item Z: $8.00

Would you like to use the "$5.00 off the original price" discount coupon to
purchase item Y or item Z?

(B) STUDY 2B: WITH EARNINGS DISPLAYED

Game B: Item 1

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 $6.00	Your value of Item Z is $8.00
Original Price of Item Y: $1.00	Original Price of Item Z: $8.00

(Note: If you choose to purchase item Y, your earnings are $6.00. If you choose to
purchase item Z, your earnings are $5.00.)

Would you like to use the "$5.00 off the original price" discount coupon to
purchase item Y or item Z?

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.*

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).[54] On the other hand, choosing to purchase item Z leads to $5 in earnings, but $5 of transaction utility (i.e., a $5 discount).[55]

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 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 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 (i.e., transaction utility).

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

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[54]Earnings from item Y: $6 value - [$1 - "$5 coupon" = $0] = $6; discount gained is $1.
[55]Earnings from item Z: $8 value - [$8 - "$5 coupon" = $3] = $5; discount gained is $5.

payment in each session. At the end of the laboratory session, 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).[56] 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.[57] 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 buying price they would be paying after applying the coupon.[58] Then, participants had to subtract the buying 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.[59] 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.[60]

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 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 buying price. By construction, if participants only care about consumption utility, they should always purchase the *alternative* good, leading to higher earnings.

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[56]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.

[57]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.

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

[59]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.

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

4.1.1 Difference between Study 2A and Study 2B

In both treatments, *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 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*.

Below, I present results from the *Coupon Game*. First, I show 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

Figure 5 Panel A shows participants' average purchase rate of the *coupon-trap* good by the extra discount gained 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 framework

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

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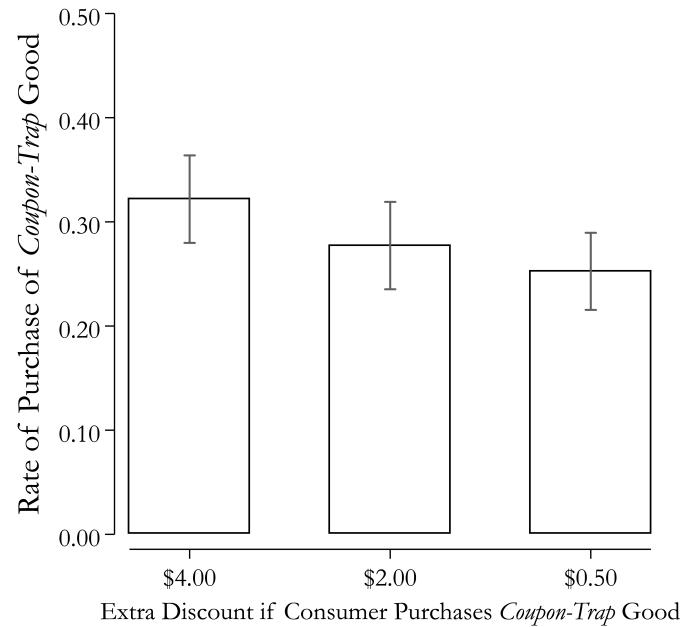
(B) STUDY 2B: WITH EARNINGS DISPLAYED
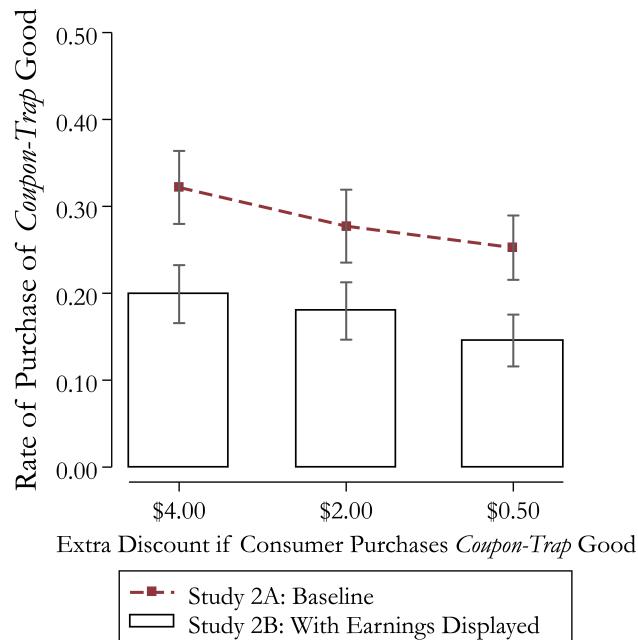
Note: Purchase rate of the *coupon-trap* good by extra discount from purchasing the *coupon-trap* good. The *coupon-trap* good is the virtual product that led to a $5 discount which, by design, led to lower earnings. Panel A shows results for *Study 2A: Baseline* and Panel B shows results for *Study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

with transaction utility, I exploits the variation in extra earnings and extra discount gained if a consumer purchases the *coupon-trap* compared to the *alternative* good. 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 at the individual level.

Table 4 Panel A presents the results in *Study 2A: Baseline.* 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 Probit model and presents marginal effects (holding all other independent variables constant at their means) and shows consistent results.[61]

Conditional on earnings, results suggest individuals are responding to changes in extra discount gained. Notably, this was a within-subject design. Thus, 16% of 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.[62] 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 participants new information, as they can calculate their earnings with the value, coupon, and original price provided. However, we should expect smaller transaction utility effects in this setting since showing potential earnings may encourage participants to think about their payoffs, making consumption utility more salient.

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[61]See Table B2 regressions (1) and (2) in the Appendix for estimates using only participants who passed the comprehension questions on the first try.

[62]Results vary by the amount of earnings participants are leaving on the table. When earnings lost was $1, 21% of participants switched from buying the *alternative* good to the *coupon-trap* good as the extra discount increased. When earnings lost was $3, 12% of participants switched.

TABLE 4: 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)
Extra Earnings (in $)	-0.033***	-0.033***
	(0.011)	(0.011)
Extra Discount (in $)	0.019**	0.019**
	(0.009)	(0.009)
Constant	0.336***	
	(0.052)	
Ind. Clusters	101	101
Order Control	Yes	Yes
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)
Extra Earnings (in $)	-0.022**	-0.021**
	(0.010)	(0.010)
Extra Discount (in $)	0.015	0.015
	(0.010)	(0.010)
Constant	0.229***	
	(0.054)	
Ind. Clusters	103	103
Order Control	Yes	Yes
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 clustered at the individual level in parentheses. Significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

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 to 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).[63]

Table 4 Panel B presents the trade-off between extra earnings and extra discount if a consumer purchases the *coupon-trap* good (mirroring Table 4 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 significant. Regression (2) uses a Probit model, and reports marginal effects (holding all other independent variables at their mean), and shows a consistent story.[64]

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 B3 in the Appendix).

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

[64]See Table B2 regressions (1) and (2) in the Appendix for estimates using only participants who passed the comprehension questions on the first try.

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 4 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 4 Panel B are noisy. As such, I use coefficients from the cohort of participants who passed the comprehension questions on the first try in Table B2 to estimate a lower bound for the marginal rate of substitution: participants are willing to pay a minimum 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 to avoid 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.[65] 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

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[65]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.

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 more difficult, with only 50% of participants passing both comprehension questions on the first try, participants had to pass to proceed. As such, they are capable of doing the correct earnings calculations. 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 participants who passed the comprehension questions on the first try.[66] 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 coupon value as a 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, there is no difference in transaction utility effects between rookie and veteran lab experiment participants.[67]

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

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[66]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.

[67]See Table B3 regression (5) in the Appendix.

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).[68]

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.[69]

5 Why do consumer value transaction utility?

The goal of this paper is to isolate, measure, and quantify transaction utility. In prior sections, I ruled out potential alternative drivers of consumers' behavior — game experience, anchoring, signaling, expectations, and experimenter demand — and demonstrate the robustness of transaction utility. While the channels behind *why* consumers may value transaction utility is outside the scope of this paper, this section presents potential mechanisms. This leaves opportunities for future work to identify the underlying channels why consumers care about transaction utility. To help guide this future work, I provide additional results from the data. This section highlights potential mechanisms that might drive the consumers to value transaction utility.

5.1 Wrong counterfactual comparison?

One potential reason consumers may value transaction utility is they may be making the wrong counterfactual comparison, thus believing they are saving or spending extra money.

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[68]Furthermore, focusing on only the 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)).

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

This may arise when consumer are unable to process multiple states of the world in order to make the right utility comparisons. For example, given a product that you value at $15, has an original price of $20, but is currently selling at $16 (a 20% discount), the consumer has to decide whether to buy the product or not. In this case, consumers are getting negative consumption utility ($15-$16 = -$1) but this is offset by larger positive transaction utility ($20 - $16 = $4), they choose to buy the product and may think: "I'm *saving* $4, otherwise I would have had to pay $20 (compared to $16)!" Notice that in this case, the consumer assumes they would purchase the good at the original price, but this may be the wrong assumption, thus the wrong utility comparison. Perhaps a better comparison would be to first realize that if the original price was equal to the buying price, that is, if no discount was offered, they would *not* have chosen to buy the product. As such, choosing to buy under a discount leads to "losing" $1 — not "saving" $4 — which they could otherwise have used for a different purchase.

The comprehension questions in Study 1 and Study 2 showed that participants are able to calculate their consumption utility (i.e., payoffs), but the above example shows that in order to properly compared utilities they have to understand their decision under two states of the world: choosing to purchase under the discounted buying price and choosing to purchase in the absence of a discount, that is, when the original price is equal to the buying price. Importantly, one of these states — when the original price is equal to the buying price — is not actually available at the point of sale.

Results from Study 1 shows that consumers do make different purchasing decisions under these two states of the world, however, each decision is made in isolation in their respective game periods. As such, this could suggest that it may be difficult for consumers to imagine their decision choices under multiple states, specially when one state is not available in that specific point in time, or there is uncertainly about what buying price they would have received. This could be consistent with recent work by Martínez-Marquina et al. (2019) showing failures in contingent reasoning. This may also be related to myopic decision making and narrow framing.

5.2   Social-image and reputation concerns?

Perhaps consumer value transaction utility due to social image and reputation concerns. It is possible that they want to appear as savvy shoppers compared to others or are able to get bragging rights for paying a price below what others paid. While these are valid reasons in practice, notice that social image and reputation are mitigated in my laboratory

studies. First, while participants are told that others in this experiment were offered the original prices, they were not told if they actually transacted and paid that price. Second, purchasing decisions are not revealed to the rest of the participants, thus social image and reputation concerns are limited.[70]

5.3 Self-image concerns?

What about self-image concerns? Perhaps, consumers want to self-signal that they are savvy shoppers not only compared to others but compared to themselves in a different state of the world (Bénabou and Tirole, 2002, 2006). A heterogeneity and mediation analysis suggest that self-image concerns may only explain part of why consumers respond to transaction utility.

If consumers indeed cared about self-image concerns it would make sense for those with stronger views to exhibit a stronger response to changes in transaction utility. Recall, participants were asked to self-report how important discounts were to them and how averse they were to surge pricing.[71] In the *Discount and Mark-Up Game* participants who stated that they care more about discounts or are more averse to surge pricing displayed a higher sensitivity to discounts and mark-ups compared to participants who stated they did not care about discounts or mark-ups, a difference that is significant at the 1% level.[72]

Furthermore, for both treatments of the *Discount and Mark-Up Game*, I also asked participants to rate their buying price on a scale from 1-5 where 1 is a "very bad deal" and 5 is a "very good deal".[73] 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 the perceived discount or mark-up is a significant predictor of the participants' perception of the deal. In the baseline study, as the buying price as a percentage of the original price $(\frac{P}{O})$ increases, participant's rating of the price decreases by 2.77 points and this is significant. Moreover, including participant's rating of the deal reduces the direct effect of buying price as a percentage of the original price $(\frac{P}{O})$ to -14 percentage points (compared to -64 percentage points in a regression without the mediator).[74]

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[70]It is unobserved if participants bragged to their friends about their decision choices outside the lab.

[71]See footnote 38 for exact question asked to participants.

[72]Results from *Study 1A: Baseline* are shown in Table A6 Panel A regression (3) and (4) in the Appendix. *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).

[73]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.

[74]Also see Table A7.

Surprisingly, it may not be enough to only state that a price is a good or bad deal but consumers have to follow through, even at the detriment of their consumption utility. By asking participants to rate the deal, it allowed them to tell the experimenter and themselves that they know a particular buying price was a bad deal and *still* choose to purchase the virtual product to get positive earnings without feeling foolish. This would attenuate the transaction utility effect.[75] I find that conditional on rating a buying price as "bad" or "very bad" participants only purchased the item about 40% of the time. That is, 60% of the time participants "followed through" and leave money on the table.

6   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.[76] Moreover, using these estimates, I calculate 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 product quality based on the original price, then updating of beliefs may play a role in explaining distortions. However this is not possible in my studies because participants are making decisions over virtual products with assigned valuations. Results are not driven by math mistakes or lack of understanding. Finally, effects persisted to varying degrees even after displaying potential earnings before participants made their

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[75]Indeed, 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.

[76]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.

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.[77] 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 (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 for these products. On the other hand, consumers may be less likely to be fooled by "irrelevant" original prices for products they purchase everyday.[78]

Distortions in purchasing behavior due to transaction utility may only if the "irrelevant" original prices are believable. Extremely high discounts and consistent sales may lead consumers to believe that the transaction utility gained is "fake," thus destroying its utility. Further research is needed to estimate consumers' sensitivity to consistent sales, the credibility of "fictitious" original prices, and understanding the "half-life" of transaction utility. That is, how permanent is transaction utility? What is its depreciation rate?

In general, understanding how transaction utility can affect demand has important implication for firm pricing strategy, consumer's welfare policy, and litigators looking to establish economic harm. First, virtually every retail firm engages in some form of discount or sales tactic and may want to know what is the most effective strategy. 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).

Second, policymakers and regulators will want to understand how firms can manipulate transaction utility to exploit consumers and implement policies and regulations to protect consumer welfare. 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.[79]

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[77]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.

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

[79]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

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). A large set of class action lawsuits allege that firms are using fake prices to trick consumers into purchasing. If such is the case, then showing evidence that "fictitious" original prices distort consumer behavior and lead to material losses is highly relevant. Moreover, quantifying participant's willingness to pay for a dollar of perceived discount or avoid a dollar of perceived mark-up provides a benchmark for economic harm.

consumers about vendors and service providers (see http://www.checkbook.org).

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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 buying price on buyer's purchasing decision. The basic regression specification is:

$$Purchase_i = \alpha + \sum_{n=1}^{7} \beta_n \times \textit{Buying Price as \% of Original Price Dummies}_{n,i}$$

$$buyingprice + \sum_{j=1}^{4} \beta_{n+j} \times \textit{Buying Price Dummy}_{j,i} + \epsilon_i$$

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

TABLE A1: RATE OF PURCHASING GOOD BY BUYING 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)
Buying Price: $7.51		-0.086***		-0.084***		-0.083***		-0.074***
		(0.012)		(0.012)		(0.014)		(0.013)
Buying Price: $8.03		-0.221***		-0.222***		-0.276***		-0.259***
		(0.021)		(0.021)		(0.024)		(0.023)
Buying 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 buying price. I control for game period. Robust standard errors clustered at the individual level in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Figure A1 and Figure A2 presents the average purchasing rate by buying price as a percentage of the original price by 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*.

TABLE A2: BUYER'S PURCHASE RATE BY BUYING PRICE
Study 1A & 1B: Discount and Mark-up Game

Panel A: Study 1A Baseline

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

Panel B: Study 1B With Earnings Displayed

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

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

FIGURE A1: BUYER'S PURCHASE RATE BY BUYING PRICE
Study 1A: Discount and Mark-up Game (Baseline)
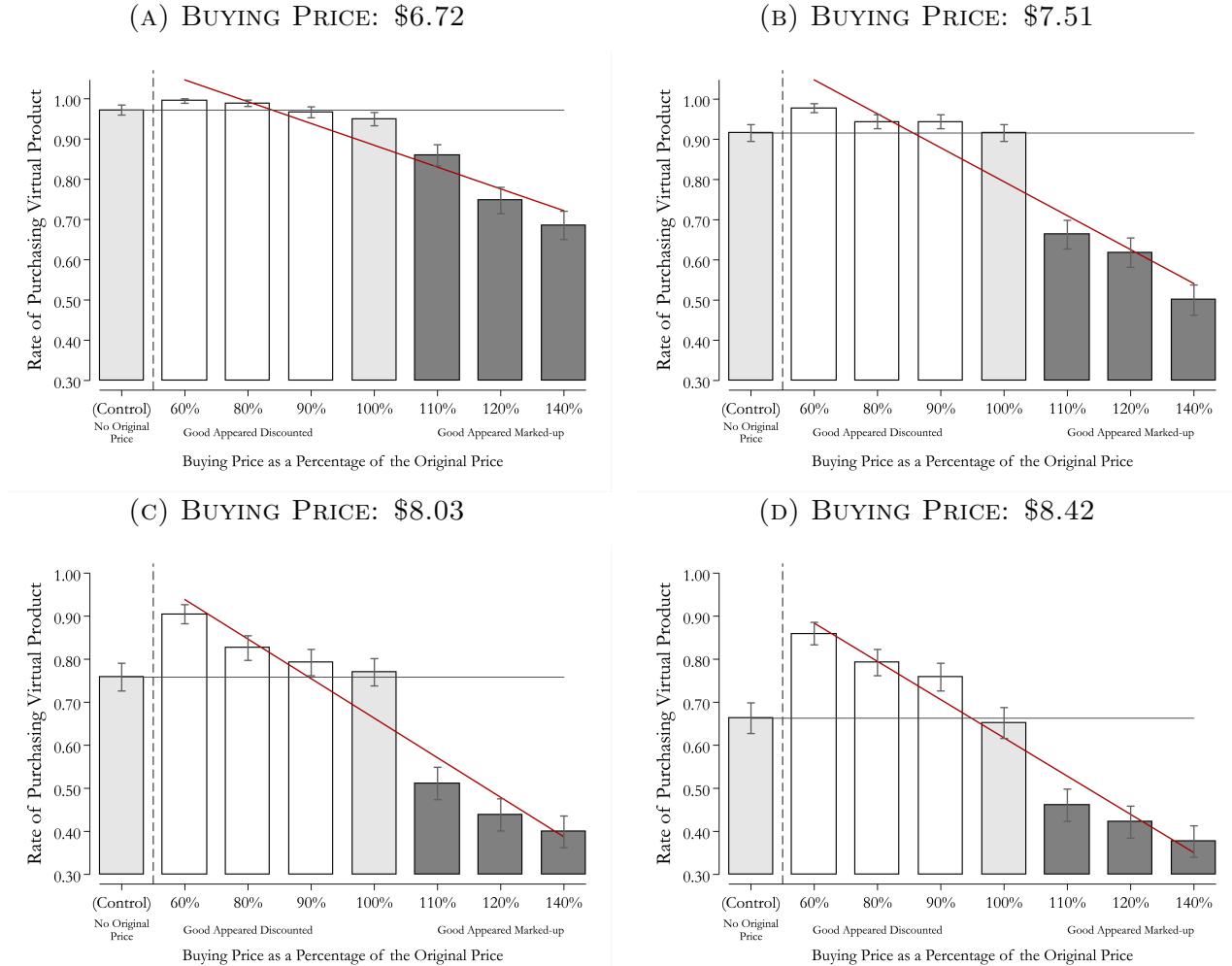
(A) BUYING PRICE: $6.72

(B) BUYING PRICE: $7.51

(C) BUYING PRICE: $8.03

(D) BUYING PRICE: $8.42

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

FIGURE A2: BUYER'S PURCHASE RATE BY BUYING PRICE
Study 1B: Discount and Mark-up Game (With Earnings Displayed)

(A) BUYING PRICE: $6.72
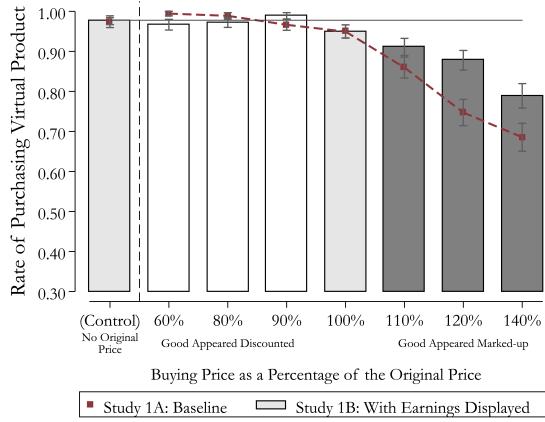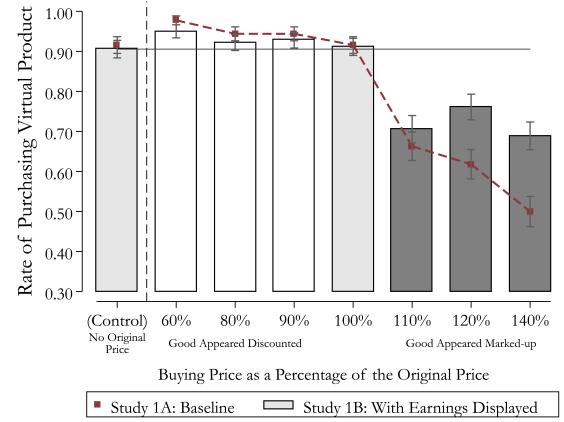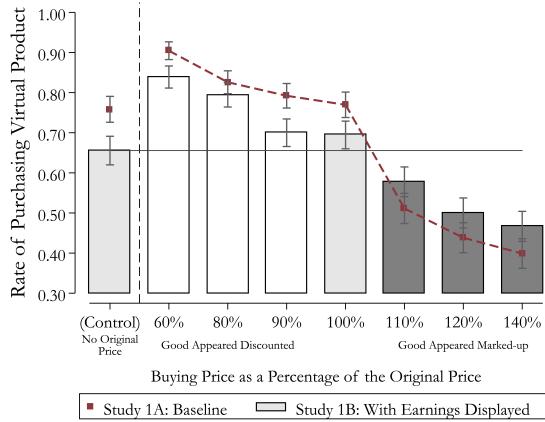
(B) BUYING PRICE: $7.51

(C) BUYING PRICE: $8.03

(D) BUYING PRICE: $8.42
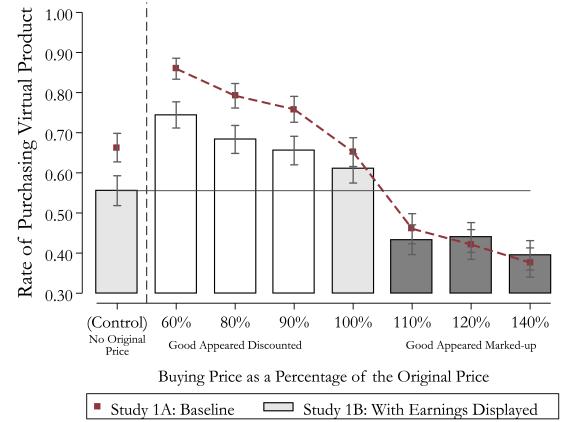
Note: Participants' average purchase rate of the virtual product conditional on earnings. Robust standard error bars clustered at the individual level are shown around each mean.

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 buying price and the original price on the purchasing rate. The regression specification is:

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

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 × Mark-up$_i$* is the perceived mark-up (in percentage). I control for the game period and use dummies to control for the buying price. I cluster the random error, ϵ_i at the individual level.

TABLE A3: PERCEIVED PERCENTAGE CHANGE EFFECT ON PURCHASING RATE
Study 1A: Discount and Mark-up Game (Baseline)

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

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 buying price. Robust standard errors clustered at the individual level in parentheses. Significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

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 regression specification is:

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

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

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

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 buying price. Robust standard errors clustered at the individual level in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1.

TABLE A5: ROBUSTNESS CHECK: LOWER BOUND OF TRADE-OFF BETWEEN
EARNINGS AND PERCEIVED MARK-UP
Study 1B: Discount and Mark-up Game (With Earnings Displayed)

	Dependent Variable: Purchase Virtual Product								
	Mark-up 0-40%			Mark-up 10-40% Only			Loss Aversion Adjusted		
Buying Price:	All	≥ $7.51	≥ $8.03	All	≥ $7.51	≥ $8.03	All	≥ $7.51	≥ $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 clustered at the individual level in parentheses. 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 3 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 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)).[80]

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 buying 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, exhibiting 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.

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[80]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 3 regression (7) and Table A5 regression (7) in the Appendix.

A.4 Heterogeneity of Transaction Utility Effect

<div align="center">

TABLE A6: HETEROGENEITY OF BUYER'S PURCHASE RATE

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

</div>

Panel A: Study 1A Baseline

Group:	Dependent Variable: Purchase Virtual Product					
	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

Group:	Dependent Variable: Purchase Virtual Product					
	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 buying price. Robust standard errors clustered at the individual level in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1.

A.5 Mediation: Participants' Perception of the Deal

In *Study 1A: Baseline* and *Study 1B: With Earnings Displayed*, I also asked participants to rate their buying price on a scale from 1-5 where 1 is a "very bad deal" and 5 is a "very good deal".[81] 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 buying 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

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[81]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.

(A) Study 1A: Baseline
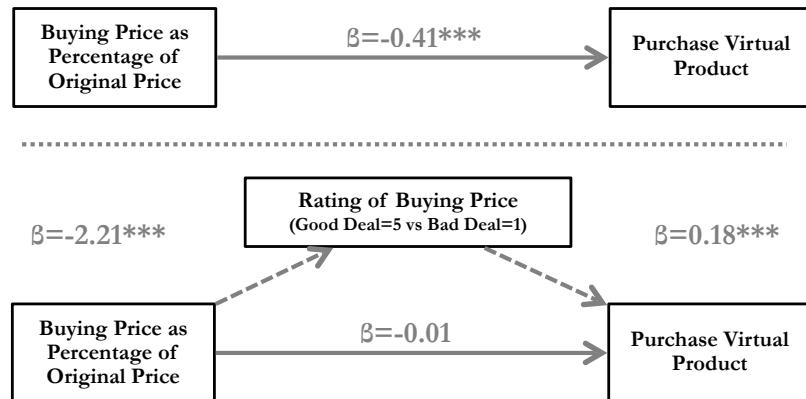
(B) Study 1B: With Earnings Displayed
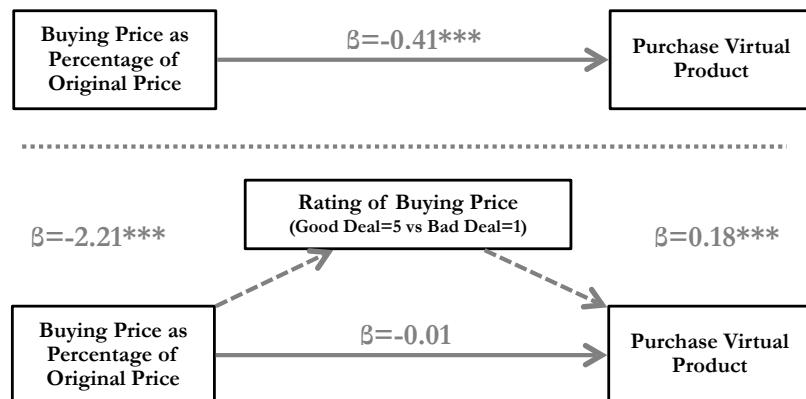
Note: Mediation analysis: using participant's rating of the buying price. I control for game period and buying price. Robust standard errors clustered at the individual level in parentheses. Significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

-2.77 and coefficient in *Study 1B: With Earnings Displayed* is -2.21).[82] Moreover, including participant's rating of the deal reduces the effect of buying 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

Dependent Variable:	Study 1A Baseline			Study 1B Earnings Displayed		
	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 buying price. Robust standard errors clustered at the individual level in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1.

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[82]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:

$$Purchase_i = \alpha + \beta_1 \times \textit{\$4.00 Extra Discount Dummy}_i$$
$$+ \beta_2 \times \textit{\$2.00 Extra Discount Dummy}_i$$
$$+ \beta_3 \times \textit{-\$3.00 Extra Earnings}_i + \epsilon_i$$

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 Comprehension | | All Participants | | Pass Comprehension | |
	(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 clustered at the individual level in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1.

FIGURE B1: RATE OF PURCHASING THE *COUPON-TRAP* GOOD
(By Extra Earnings Lost from Purchasing the *Coupon-Trap* Good)
*Study 2A & 2B: Coupon Game*

(A) STUDY 2A: BASELINE
EARNINGS LOST: $1
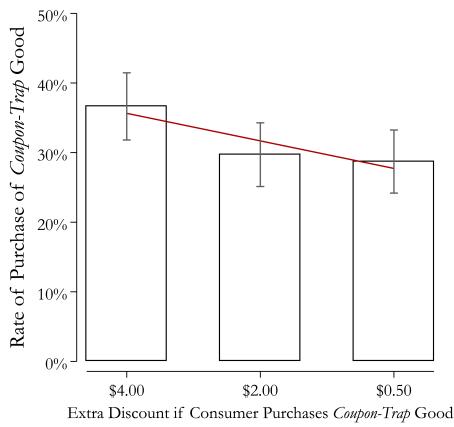
(B) STUDY 2A: BASELINE
EARNINGS LOST: $3
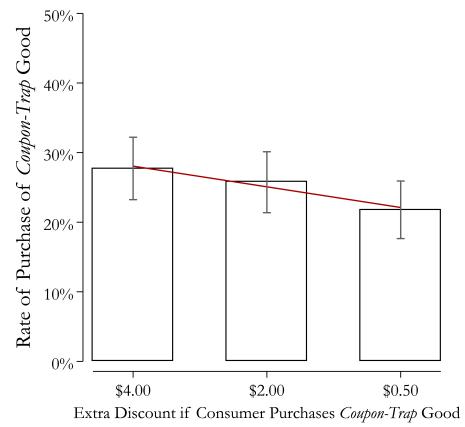
(C) STUDY 2B: EARNINGS DISPLAYED
EARNINGS LOST: $1
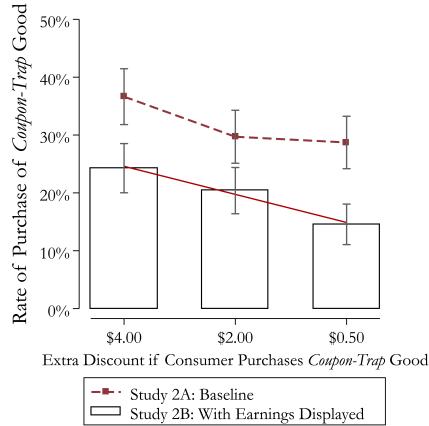
(D) STUDY 2B: EARNINGS DISPLAYED
EARNINGS LOST: $3
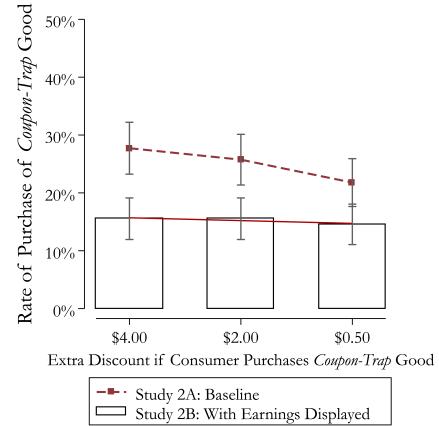
Note: Rate of purchasing the *coupon-trap* good, the virtual product that led to a $5 discount gained which, by design, led to lower earnings, by extra earnings lost. Robust standard error bars clustered at the individual level are shown around each mean.

B.2 Robustness Check: Cohort of participants who passed the comprehension questions on the first try

Participants who passed the comprehension check on the first try may be more motivated or may be paying more attention. Figure B2 presents the average purchase rate of the *coupon-trap* good for individuals who passed the comprehension questions on the first attempt. Table B2 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.

FIGURE B2: RATE OF PURCHASING THE *COUPON-TRAP* GOOD
(PARTICIPANTS WHO PASS COMPREHENSION ON FIRST TRY ONLY)
Study 2A & 2B: Coupon Game
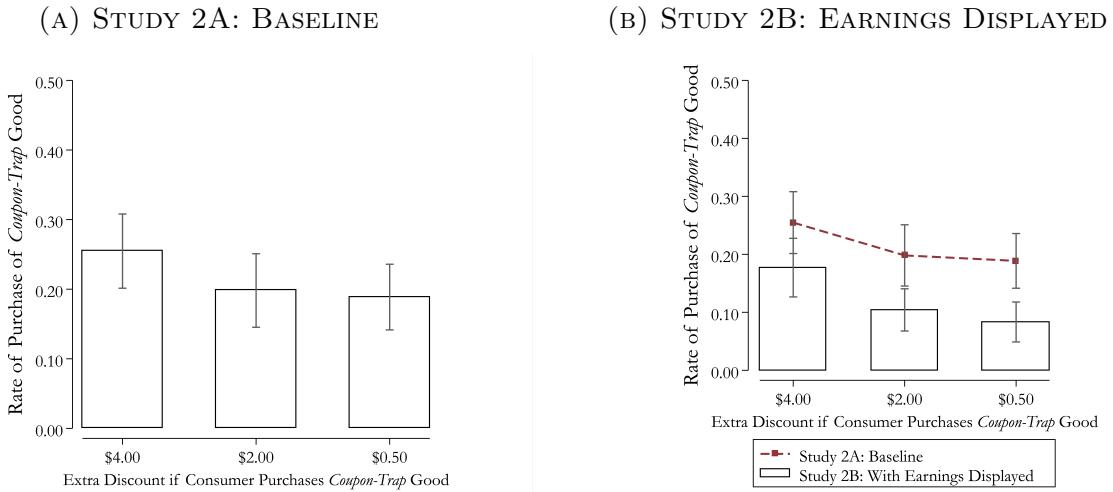
(A) STUDY 2A: BASELINE (B) STUDY 2B: EARNINGS DISPLAYED

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.

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TABLE B2: 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	-0.051***	-0.051***	-0.003	-0.003
	(0.014)	(0.014)	(0.011)	(0.011)
Extra Discount	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 clustered at the individual level in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1.

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 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 B3: 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	-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	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 clustered at the individual level in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1.

C Experimental Protocols

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.

- <u>Game A:</u> 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.

- <u>Game B:</u> 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

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.

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

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.

FIGURE C4: PARTICIPANTS' DECISION PROBLEM
Study 1A & 1B: Discount and Mark-up Game Game

(A) EARNINGS NOT DISPLAYED

<u>Game A: Item 1</u>

Your value of Item 1 is $9.00
Seller's cost of Item 1 is $6.00

Your Price: $8.42
Original Price: $7.02
(This original price was offered to other participants in this study.)

Please answer the two questions below:

	Do you want to purchase the item for $8.42?		On a scale of 1-5 (where 1 is a very bad deal and 5 is a very good deal), how would you rate this price?				
	Yes	No	Very Bad	Bad	Neither Good nor Bad	Good	Very Good
Please answer the following questions:	O	O	O	O	O	O	O

Next

(B) EARNINGS DISPLAYED

<u>Game A: Item 1</u>

Your value of Item 1 is $9.00
Seller's cost of Item 1 is $6.00

Your Price: $8.42
Original Price: $7.02
(This original price was offered to other participants in this study.)
(If you choose to purchase this item your earnings are: $0.58)

Please answer the two questions below:

	Do you want to purchase the item for $8.42?		On a scale of 1-5 (where 1 is a very bad deal and 5 is a very good deal), how would you rate this price?				
	Yes	No	Very Bad	Bad	Neither Good nor Bad	Good	Very Good
Please answer the following questions:	O	O	O	O	O	O	O

Next

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C.2   Coupon Game

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:	[▾]	[▾]

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(A) EARNINGS NOT DISPLAYED

Game B: Round 1

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 $6.00	Your value of Item Z is $8.00
Original Price of Item Y: $3.00	Original Price of Item Z: $8.00

Would you like to use the "$5.00 off the original price" discount coupon to purchase item Y or item Z?

Item Z

Item Y

(B) EARNINGS DISPLAYED

Game B: Round 1

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 $6.00	Your value of Item Z is $8.00
Original Price of Item Y: $3.00	Original Price of Item Z: $8.00

(Note: If you choose to purchase item Y, your earnings are $6.00. If you choose to purchase item Z, your earnings are $5.00.)

Would you like to use the "$5.00 off the original price" discount coupon to purchase item Y or item Z?

Item Z

Item Y