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True Context-dependent Preferences? The Causes of Market-dependent Valuations

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ABSTRACT

A central assumption of neoclassical economics is that reservation prices for familiar products express people's true preferences for these products; that is, they represent the total benefit that a good confers to the consumers and are, thus, independent of actual prices in the market. Nevertheless, a vast amount of research has shown that valuations can be sensitive to other salient prices, particularly when individuals are explicitly anchored on them. In this paper, the authors extend previous research on single-price anchoring and study the sensitivity of valuations to the distribution of prices found for a product in the market. In addition, they examine its possible causes. They find that market-dependent valuations cannot be fully explained by rational inferences consumers draw about a product's value and are unlikely to be fully explained by true market-dependent preferences. Rather, the market dependence of valuations likely reflects consumers' focus on something other than the total benefit that the product confers to them. Furthermore, this paper shows that market-dependent valuations persist when – as in many real-life settings – individuals make repeated purchase decisions over time and infer the distribution of the product's prices from their market experience. Finally, the authors consider the implications of their findings for marketers and consumers.

Supporting information may be found in the online version of this article.

KEY WORDS reference price; distribution; bias; valuations; expression; anchoring

INTRODUCTION

Recent findings in consumer behavior, psychology, and economics have repeatedly questioned one of the key tenets of neoclassical utility theory: that preferences are stable and independent of the external environment that decision makers face. In particular, a vast amount of research has investigated contextual price influences on people's internal notion of value as manifested in their willingness to pay. Most notably, the reference price literature has shown that the presentation of a *single* price, including the previous or present market price of the good in question, the price of a close substitute or an unrelated good, and even an arbitrarily generated price can influence customers' willingness to pay for a product by serving as an *anchor* (e.g., Adaval & Monroe, 2002; Adaval & Wyer, 2011; Chapman & Johnson, 2002; Krishna, Wagner, Yoon, & Adaval, 2006; Monroe, 2003; Nunes & Boatwright, 2004; Simonson & Drolet, 2004; Tversky & Kahneman, 1974).

In addition, research on *categorical price judgments* (e.g., "good" vs. "bad"; "large" vs. "medium" vs. "small") on the basis of Parducci's (1965) range-frequency theory suggests that individuals also shift their purchase decisions (i.e., to buy or not to buy) in response to distributional attributes such as range, modality, or skewing of observed *prices for other products in the same category* (Alba, Mela, Shimp, & Urbany, 1999; Cooke, Janiszewski, Cunha, Nasco, & De Wildem, 2004; Janiszewski & Lichtenstein, 1999; Niedrich, Sharma, & Wedell, 2001; Niedrich, Weathers, Hill, & Bell, 2009). In particular, consumers judge a product price offering relative to its position between the endpoints of the price range of the given product category (range principle) and the product's percentile location within that price range (frequency principle). Thus, for example, increasing the price of the most expensive product in a category (expanding the range) will lead to contrast effects from the endpoint referent price such that the unchanged price of a lower-priced target product is now perceived as less expensive than before. Related results emerge from recent research based on adaptation-level-theory (Helson, 1964) and assimilation-contrast theory (Sherif, Taub, & Hovland, 1958), which supports the notion that in some circumstances, the mean of a price distribution might act as a referent for price judgments. Specifically, Cunha and Shulman (2011) have shown that when the processing goal is generalization (rather than discrimination), as the mean of prices in a product category goes up, consumers will show assimilation (rather than contrast) and perceive the unchanged price of a lower-priced target product as more (rather than less) expensive than before. What these latter results show is that processing goals moderate categorical price-judgment processes. Yet, a further advance in the role of assimilation in pricing suggests that not only categorical price judgments but also people's reservation prices can be affected by distributional attributes. Specifically, Bohm, Linden, and Sonnegard (1997) demonstrated that expanding the range of prices that sellers face for a target product (rather than for the entire product category), with an unrealistically high upper bound, increases sellers' elicited reservation prices.

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Building upon these multiple streams of research, this paper contributes to our understanding of context-dependent preferences in three ways. First, as an initial contribution, we extend the evidence on the price-distribution sensitivity of categorical price judgments and the findings of Bohm et al. (1997) on the price-distribution sensitivity of sellers' reservation prices and show that buyers' reservation prices for a product depend on the distribution of prices they face for that product in the market. Second, to test for external validity, we ask whether individuals also exhibit price-distribution sensitivity when they learn about the product's prices from observation over time and from making repeated purchase decisions – that is, in settings that closely resemble real-life situations. Third, and most importantly, we investigate the meaning of such expressed context-dependent preferences. In particular, we examine whether the price-distribution dependence of valuations (i.e., market-dependent valuations) can be explained by the following: (i) rational inferences individuals draw about the product's value; (ii) true context-dependent preferences that are sensitive to the distribution of prices that individuals face for the product in the market; or (iii) individuals' focus on something other than the total benefit that the product confers to them and thus, from an economists point of view, a bias or mistake in expressing their true product preferences. Although all three causes likely contribute to the phenomenon in general, we find that the market-sensitivity of reservation prices is unlikely to be fully explained by the first two causes. Instead, the most pervasive contributor to the phenomenon seems to be a departure from thinking about the benefits one receives from the product.

The remainder of this paper is organized as follows. First, we present two experiments in which we graphically depicted a product's market-price distribution and found a dramatic violation of the independence of valuations from the price distribution: Product valuations were dramatically lower when the price distribution was skewed to the right (higher frequency of lower market prices) than when it was skewed to the left. More importantly, in these experiments, we investigated the possible underlying causes for the price-distribution dependence of preferences. In Experiment 3, we show that the sensitivity of valuations to a product's price distribution extends to a multi-period market simulation in which participants learn the distribution of prices in the market from observation over time. Finally, we discuss the implications of the price-distribution dependence of valuations for marketers and consumers.

EXPERIMENT 1: THE EFFECT AND ITS CAUSES

In our first experiment, we sought to build on the findings by Bohm et al. (1997), showing that reservation prices can depend on the distribution of prices that individuals face for a specific product in the market and start to explore in detail the possible sources of such a dependency. Building upon previous reference-price research (e.g., Ariely, Loewenstein, & Prelec, 2003; Nunes & Boatwright, 2004), we elicited our participants' reservation prices with the Becker, DeGroot, and Marschak Procedure (1964), henceforth BDM. The BDM procedure is a widely used, incentive-compatible mechanism to measure individuals' valuations of consumption goods and other experiences (see e.g., Budescu, Weinberg, & Wallsten, 1988; Fox, Rogers, & Tversky, 1996; Kahneman, Knetsch, & Thaler, 1990; Prelec & Simester, 2001). When employing this procedure, participants are informed of a distribution of selling prices at which they may acquire a good and are asked to indicate their reservation price. After they have done so, one selling price (the realized price) is randomly drawn from the price distribution, and the appropriate outcome is implemented: If the reservation price exceeds the realized price, the decision maker receives the good and pays the realized price; if the reservation price is below the realized price, the decision maker does not receive the good and does not pay anything. Because this mechanism precludes participants from influencing the price, it is a (weakly) dominant strategy to reveal one's true preferences (Wertenbroch & Skiera, 2002).

Possible causes for a market dependence of preferences

To identify the marketing and economic implications of a potential dependence of valuations on price distributions, it is crucial to know the source and nature of that dependence. After all, marketers and economists alike assume that elicited reservation prices express people's true preferences for these products; that is, they represent the total benefit that a good confers to the consumers. We consider three possibilities: (i) uncertainty about the product's value leads consumers to make rational inferences about it from the price distribution; (ii) true context-dependent preferences: differing price distributions generate different benefits or utilities that a good confers to the consumers; and (iii) a "bias" occurs in the expression of individuals' preferences in that individuals focus on something other than the benefit that the product confers to them. Experiment 1 attempts to discriminate among these explanations and suggests that the last one is a large part of the phenomenon.

Testing the uncertainty about the product's value

To reconcile potential market-dependent valuations with neoclassical utility theory, one could argue that differences in valuations across markets with, for example, a left and a right-skewed price distribution stem from participants being uncertain about the value of a product. Under this hypothesis, consumers draw rational inferences about the product's value from the price distributions they experience (see e.g., Kamenica, 2008; Prelec, Wernerfelt, & Zettelmeyer, 1997; Wernerfelt, 1995 for similar explanations of other context effects) and adjust their reservation prices to the price distribution as a result. As in a real market such inferences are surely going on, it is important to know whether the price-distribution sensitivity of valuations can be attributed entirely to them. In this experiment, we address this question by providing participants the same information in all conditions; specifically, by showing participants the differing selling-price distributions of two markets (one market with

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a left-skewed price distribution and another with a right-skewed price distribution) and only later randomly selecting the relevant market, using a coin flip performed by the participant herself. This procedure makes it explicit that the particular price distribution is randomly determined and, hence, uninformative. If rational inferences about the value of a product drive market-dependent valuations, this experimental design should not generate any distribution dependence of the elicited valuations.

Testing a true change in product preferences across contexts against a "bias" in expressing product preferences

Even if we demonstrate that the price-distribution dependence of valuations cannot plausibly be due only to informational considerations, the implications of our findings depend crucially on the extent to which the two other, more psychological, explanations contribute to the effect. First, the sensitivity of valuations may be driven by true context-dependent preferences, whereby prices affect consumers' utility from the product and, thus, their willingness to pay for it (see e.g., Plassmann, O'Doherty, Shiv, & Rangel, 2008). That is, when consumers face higher prices, even if those prices come about randomly, they truly like and enjoy the product more and therefore are willing to pay more for it. For example, a consumer may enjoy wearing a Rolex rather than a fake just because it is more expensive, even though she and others cannot distinguish it from the fake. A second account is that the price distribution might not affect consumers' true-experienced utility but rather act as an environmental cue that leads consumers to focus on something other than the total benefit that the product confers to them. After all, prior research demonstrated that individuals often rely on environmental cues to guide their choices (e.g., Bettman, Luce, & Payne, 1998; Huber, Payne, & Puto, 1982; Tversky, Sattath, & Slovic, 1988), and the price is an extremely salient such cue.

To distinguish between true context-dependent product preferences and a distracted expression of these preferences, we asked one-third of the participants in Experiment 1 to indicate their reservation price for both markets with its differing price distributions (joint valuations) and the remaining two-thirds of the participants to indicate their reservation price for only one of the two markets (separate valuations). The logic behind this manipulation is that if participants have true context-dependent preferences – and, crucially, they are aware of this – then even in the joint valuation condition they will anticipate different utilities from the product depending on which distribution is chosen and hence indicate different reservation prices (for related arguments see Hsee, Loewenstein, Blount, & Bazerman, 1999). In other words, when respondents make valuations jointly, the effect of the price distributions should emerge only if the cause of the difference is a true change in preferences. Note that this procedure does not allow us to determine what individuals' true preference is, nor even to say whether valuations indicated in the joint or separate evaluations are closer to these preferences – but it does allow us to rule out that the phenomenon is fully explained by true price distribution-dependent preferences that individuals are aware of.

To keep both the joint and the separate valuations as similar as possible and incentive-compatible, we varied the timing of the coin flip relative to the timing of the valuations. In the joint valuations condition, after observing both markets with its differing distributions, participants indicated their reservation prices for both markets and then flipped a coin to determine the price distribution that would be used to determine their outcome. In the separate valuations conditions, after observing both markets, participants first flipped the coin to determine the price distribution that would be used to determine the outcome of their valuation, and then they indicated their reservation price for that market only.

Procedure

The experimenter approached students on campus of a northeastern university with a sample travel mug that had been offered in stores US-wide (e.g., Walmart and Target) at a price of $4.99 (students were not informed of this) and asked whether they were interested in an opportunity to purchase one for real with their own money. Only those who were interested proceeded to the experiment. Participants did not receive any other compensation for participation.

Sixty students participated in this experiment, which was conducted with one participant at a time. The experimenter gave the participant a sheet with a description of the BDM procedure and a prominent graphical depiction of two price distributions, a left-skewed distribution and a right-skewed distribution, both of which had support from $1 to $10. The right-skewed distribution assigned a probability of .5 to the lowest value ($1) and distributed the remaining probability equally in the range from $1.01 to $10 (in steps of $.01). The left-skewed distribution assigned a probability of .5 to the highest value ($10) and distributed the remaining probability equally in the range from $1 to $9.99 (in steps of $.01; see Figure 1). The instructions indicated that the participant would have a chance to buy a mug at a selling price to be determined randomly by one of these two price distributions and that a coin flip performed by the participant would determine the distribution to be used. In addition, the instructions explained that if the selling price drawn from the distribution came out higher than the student's reservation price, she would not receive the mug and not pay anything; and that if the selling price drawn from the distribution was the same or lower than the student's reservation price, she would receive the mug and pay the realized selling price. The description also included a sentence that emphasized the incentive compatibility of this procedure and instructed the participant to ask the experimenter any remaining clarifying questions they may have before proceeding with the task.

Students were randomly assigned to one of two experimental conditions: the joint or separate valuations condition. In the joint valuations condition, after participants finished reading the instructions, which included both distributions, they were asked to indicate for each of the two markets with their differing price distributions their willingness to pay for the mug, should that market be selected by their coin flip. The participants then performed the coin flip to determine which of the two markets would be used to determine the

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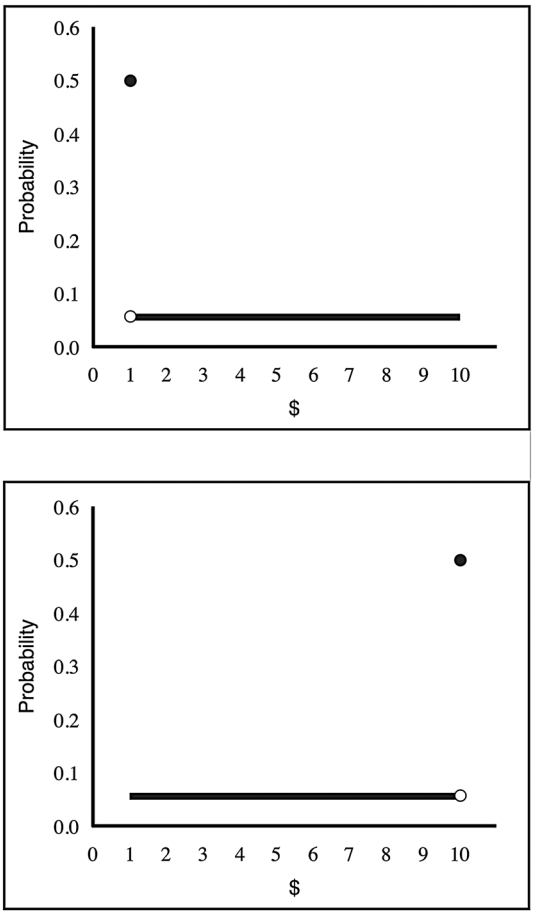

Figure 1. Two selling price distributions underlying the Becker, DeGroot, and Marschak procedure in Experiment 1

outcome. Next, the experimenter used a random-number generator to determine the realized selling price from the corresponding selling-price distribution, and finally, the participants' relevant outcomes were implemented. In the separate valuations condition, after participants finished reading the same instructions, they flipped a coin to determine which of the two markets would be used and then indicated their willingness to pay only for the selected market and its corresponding selling-price distribution. After providing the valuation, the experimenter used a random-number generator to determine the realized selling price from the selected market, and the participants' relevant outcomes were implemented.

Results and discussion

Using the reservation prices submitted to the BDM procedure, we analyzed the data as a 2 (left-skewed vs. right-skewed distribution) by 2 (joint vs. separate valuations) between-participants ANOVA. We found a significant interaction between the type of distribution and the method of valuation ($F(1, 76) = 5.193$, $p = .026$). Specifically, although there was a significant difference ($F(1, 76) = 13.539$, $p < .001$) of \$2.66 in reservation prices in the separate valuations conditions (right-skewed price distribution: $M = \$2.42$, $SD = 1.79$ vs. left-skewed price distribution: $M = \$5.08$, $SD = 2.39$), there was only a small and insignificant difference in reservation prices in the joint valuations conditions (right-skewed price distribution: $M = \$3.09$, $SD = 2.22$ vs. left-skewed price distribution: $M = \$3.44$, $SD = 2.60$; $F(1, 76) = .249$, $p = .619$).[1] In fact, the average within-participant difference in reservation prices for the left and right-skewed distribution in the joint valuations condition was \$.35 ($SD = \$2.33$; paired $t(19) = .679$, $p = .505$).[2]

Because our separate valuations conditions showed that reservation prices were influenced by the relevant selling-price distribution even though participants knew both markets with their respective price distributions, we can reject the hypothesis that our findings are solely due to rational inferences about the value of the mug drawn from the price distribution. More importantly, the finding that participants in the joint valuations condition indicated more similar reservation prices is evidence against the interpretation that their true preferences for the product depended on the price distribution they ended up facing.

One alternative account for the differing results in the joint and separate valuation conditions is that participants had indeed inherent preferences that varied across the two markets (i.e., they had true price distribution-dependent preferences) and that their elicited reservation prices in the joint valuations condition (rather than in the separate valuations condition) did not reflect their true preferences. For example, even if the procedure was incentive-compatible, individuals might have given consistent reservation prices in the joint valuations condition because of demand effects (i.e., social desirability) or because of not being aware of their true context-dependent preferences as long as they were not certain about the price distribution they would face. Experiment 2 was designed to minimize these concerns and to further test the pervasiveness of the causes of the sensitivity of valuations to the price distribution.

EXPERIMENT 2: MORE DELIBERATED CHOICES

The main motivation for Experiment 2 was to focus on testing the account of a true change in product preferences across markets against the account that individuals' elicited reservation prices simply do not, as typically assumed, represent the total benefit that the product confers to them, and do so with a different approach than the one used in Experiment 1. In particular, we tested the effect of guided deliberation on participants' valuations of a product. If the price-distribution dependence of preferences is due to true market-dependent preferences, there is no reason to think that asking participants to deliberate about their valuation should reduce

[1]The observation of relatively low reservation prices in comparison to the true market value of a target product has been found in similar experimental settings where participants were unlikely to have had the intention of buying the target product when being approached by an experimenter or entering the experiment (see e.g., Nunes and Boatwright (2004)).

[2]Of the 20 participants in the joint valuations condition, two participants indicated a lower reservation price for the left-skewed distribution, seven participants indicated a higher reservation for left-skewed distribution, and 11 participants indicated the same reservation price for both the left and right-skewed distributions.

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or eliminate the dependence. But if our conclusion from Experiment 1 was correct and participants were mainly distracted from their product preferences because of overly relying on the salient environmental cue of prices in the market, deliberation could well reduce or eliminate differences in reservation prices. As in the case of Experiment 1, our design cannot identify what the true underlying preferences are (Simonson, 2008ab) or even whether deliberation leads individuals to act more in line with these preferences (Wilson & Schooler, 1991) – but it can nevertheless help cast doubt on the hypothesis that true context-dependent preferences drive the price-distribution sensitivity of valuations.

Procedure

The experimenter approached students on campus of a northeastern university with a $15 gift certificate for Amazon.com and asked whether they were interested in an opportunity to purchase one for real with their own money. Seventy-nine students were interested and proceeded to the experiment. Participants did not receive any other compensation for participation.

Each participant was randomly assigned to one of four conditions in a 2 (elicitation method: standard BDM vs. titration-based BDM) by 2 (price distribution: left-skewed vs. right-skewed) between-participants design. The major change in Experiment 2 (other than the product) was the inclusion of a variant of the standard BDM method used in Experiment 1 to elicit participants' reservation prices: titration-based BDM. As in Experiment 1, participants were informed that a selling price would be drawn randomly from the price distribution illustrated graphically on the instructions. In the standard version of the BDM procedure, they then directly stated their maximum willingness to pay by writing down an amount, and the outcome was determined by that number and the selling price randomly drawn from the price distribution. In the newly added titration-based BDM procedure, participants were advised to think about their reservation price in the following specific way. They were first asked to write down a number they thought was a reasonable estimate of the maximum amount they would be willing to pay for the product. Next, they were asked to consider if the amount that they had written down was too high, too low, or just the right reservation price. If respondents answered too low or too high, they were asked to think about a new price and continue the process until they came up with the "just right" response. This final "just right" amount was then subjected to the standard BDM procedure. Note that this procedure explicitly articulates the steps individuals might actually take when answering an open-ended pricing question such as the one they face in the standard BDM procedure. We expected this variant elicitation method would increase participants' attention to their inherent preferences and diminish the sensitivity to contextual cues.

The two price distributions that we used in this experiment had a support on the integers from $1 to $20 and assigned a probability of 1/29 to values between 2 and 19. The right-skewed distribution had a probability of 10/29 for the lowest value ($1) and a probability of 1/29 for the highest value ($20). The left-skewed distribution had a probability of 10/29 for the highest value ($20) and a probability of 1/29 for the lowest value ($1) (Figure 2).

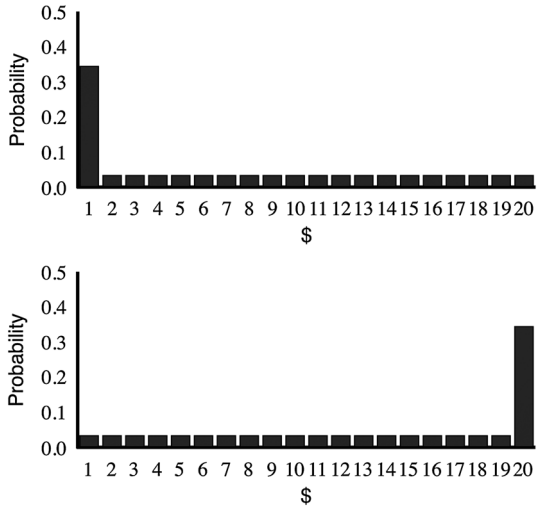

Figure 2. Two selling price distributions underlying the Becker, DeGroot, and Marschak procedure in Experiment 2

Results and discussion

The results from the standard BDM procedure replicated the findings of the previous experiment. The mean reservation price for the gift certificate was dramatically lower with the right-skewed price distribution ($M = \$5.24$, $SD = 3.26$) compared with the left-skewed price distribution ($M = \$8.48$, $SD = 3.56$), and this difference of $3.24 was significant ($F(1, 75) = 10.585$, $p < .002$). Most important to the goal of the current experiment, the effect of the price distribution on reservation prices in the titration-based BDM procedure was small and insignificant ($F(1, 75) = .368$, $p = .546$; right-skewed market: $M = \$5.65$, $SD = 2.46$ vs. left-skewed market: $M = \$6.28$, $SD = 3.36$; interaction of type of distribution x type of elicitation procedure: $F(1, 75) = 3.305$, $p = .073$). We recorded the number of iterations for 19 out of 38 participants in the titration-based BDM procedure. We found that on average, participants went through only 1.1 out of six possible iterations (two participants went through two iterations whereas the remaining 16 went through one iteration only).[3] Thus, it seems

[3]We replicated these findings with the same experimental design (same conditions and distributions) but with a more experiential product for which one could argue consumers' have a relatively good idea of the utility or pleasure that they would derive from it but less of an idea of the retail price of the product: a box of Godiva chocolates (Gold Ballotin 1/4 lb. with nine pieces of confection). In this new experiment (N = 79), same as in Experiment 2, with the standard BDM procedure, the mean reservation price for the chocolates was dramatically lower with the right-skewed price distribution ($M = \$3.75$, $SD = 2.81$) compared with the left-skewed price distribution ($M = \$6.85$, $SD = 3.9$), and this difference of $3.10 was significant ($F(1, 75) = 7.339$, $p = .008$). In contrast, the titration-based BDM procedure eliminated the effect: The mean reservation price for the chocolates was lower in the market with the right-skewed price distribution ($M = \$5.18$, $SD = 4.15$) compared with the market with the left-skewed price distribution ($M = \$6.11$, $SD = 3.46$), ($F(1, 75) = .644$, $p = .425$). Similarly, we found that on average, participants went through only 1.5 out of six possible iterations ($SD = .8$; 27 out of 39 participants went through only one iteration; the maximum number of iterations that six participants went through was three).

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that it is the nature of the titration task itself, and not the number of iterations, that caused the decreased sensitivity to the price distributions.

EXPERIMENT 3: EXPERIENCING A PRICE DISTRIBUTION

Both Experiments 1 and 2 used a rather salient, visual representation of the selling prices in a market (i.e., a graphical illustration of the price distribution). In contrast, in most real-world settings, consumers observe and experience prices over time, and therefore their knowledge of the selling-price distribution is typically represented in some form in their memory. Experiment 3 was designed to examine the price dependence of valuations in a setting that more closely resembles such standard market situations.

Procedure

One hundred and ninety students participated in this market simulation experiment, which was advertised as a 30-minute long multi-experiment session in exchange for a $5 participation fee. Each participant sat in a private booth in front of a computer screen. In the first task, an application explained the BDM procedure in detail and then asked two multiple-choice questions to test participants' understanding of the BDM procedure. In particular, participants had to answer what happens in the BDM procedure when one's reservation price is higher and when it is lower than the realized selling price. Participants had multiple shots at answering the two questions. Only once both questions were correctly answered they proceeded to the market simulation experiment.

The instructions of the market simulation experiment explained to all participants that they would face a market that consisted of 50 sellers, each of whom had one $5 gift certificate for Amazon.ca available for sale. Participants were instructed that they could potentially purchase, with their own money, one and only one of these gift certificates. Next, they were informed that in the first stage of the experiment, they would encounter each of the sellers and their prices sequentially on the computer screen (one seller at a time) without the opportunity to make any purchases. The sellers were displayed in the same randomized order for all participants, and participants could advance through the screens at their own pace (the sellers were numbered 1–50; e.g., "Seller 1", "Seller 2", etc.).

We manipulated between participants the instructions after the first stage was completed (two levels: "exposure" vs. "exposure & decisions"). This manipulation was meant to test to what extent the type of experience with a market (i.e., only exposure to prices vs. a series of purchase decisions) affects the price-distribution dependence of valuations. In addition, we wanted to see whether our findings would replicate in a setting that did not explicitly rely on the BDM procedure. In the "exposure" conditions, we announced to the participants that they would encounter the 50 sellers and their prices one more time in the exact same order and without the opportunity to make a purchase (in effect repeating the first stage). Only after completing that second stage, participants were offered a chance to purchase one $5 gift certificate for Amazon from those sellers with the BDM procedure. They were asked to indicate their maximum willingness to pay to purchase one $5 gift certificate and informed that once they have done so, the computer would randomly select one of the 50 sellers and determine whether the participant bought the gift certificate for that seller's price. In the "exposure & decisions" conditions, we announced to the participants that they would encounter the 50 sellers and their prices one more time in the exact same order but this time with the opportunity to make a purchase. In particular, participants were informed that for each seller, they would have to answer whether they would purchase the $5 gift certificate for that seller's price (yes or no). We further explained that after having responded to all 50 sellers, one of those sellers would be selected at random and whatever their answer to that sellers' price was would be implemented. After having answered the purchase questions for all 50 sellers and their prices, however, we surprised the participants in the "exposure & decisions" conditions by offering them another chance to purchase the $5 gift certificate but this time through the same BDM procedure that was explained to the participants in the "exposure" condition. That is, participants were asked to indicate their maximum willingness to pay to purchase one $5 gift certificate for Amazon from those 50 sellers and informed that at the end, the computer would randomly decide whether their purchase outcome would be determined by their previous 50 purchase decisions or by the BDM procedure and then randomly select one of the sellers to determine the outcome. That is, they would only have the chance to purchase one gift certificate.

The second factor that we manipulated between participants was the distribution of selling prices that ranged from $1 to $5 in steps of $.50 but differed in the frequency at which the two extreme prices $1 and $5 were offered. In the right-skewed distribution, we assigned 26 of the 50 sellers to the lowest value ($1) and distributed the remaining 24 sellers equally among the remaining eight prices ranging from $1.5 to $5 (three sellers per price). In the left-skewed distribution, we assigned 26 of the 50 sellers to the highest value ($5) and equal frequencies to the other eight prices ranging from $1 to $4.5 (Figure 3).

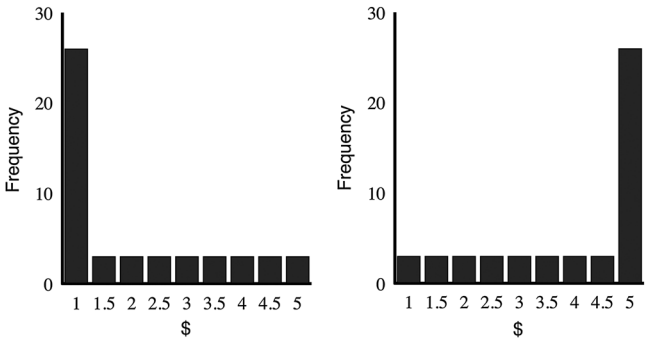

Figure 3. Two selling price distributions underlying the Becker, DeGroot, and Marschak procedure in Experiment 3

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Finally, we added a control condition in which participants did not encounter any sellers and prices but instead after completing the two multiple-choice questions about the BDM procedure were directly asked to indicate their maximum willingness to pay. In this control condition, participants were informed that we would use the BDM procedure to determine whether they had to purchase one \$5 gift certificate for Amazon and for what price. However, participants did not receive any information about the distribution of prices that was underlying the BDM procedure. Thus, the entire experiment consisted of a market simulation with a 2 (type of distribution: left-skewed vs. right-skewed) by 2 (type of encounter: exposure vs. exposure & decisions) between-participants design plus a control condition without a market simulation.

Results and discussion

A two-factorial ANOVA revealed a significant main effect of the price distribution ($F(1, 151) = 13.402$, $p < .001$) on participants' maximum willingness to pay that was submitted to the BDM procedure. As can be seen in Figure 4, valuations were over 60¢ lower for participants who had encountered the right-skewed distribution than for participants who had encountered the left-skewed distribution, and this was true for both, those that were only exposed to the prices ($F(1, 151) = 9.078$, $p = .003$) and those that were exposed to the prices and had to make purchase decisions ($F(1, 151) = 4.672$, $p = .032$). There was no significant main effect of the type of experience with the market ($F(1, 151) = .242$, $p = .623$) on participant's willingness to pay and no interaction between the type of experience and the selling price distribution ($F(1, 151) = .376$, $p = .541$). Furthermore, the maximum willingness to pay of the participants, who had experienced the left-skewed distribution, was not significantly different from those in the control condition, who had not experienced any selling prices (control-exposure contrast: $t(185) = .525$, $p = .6$; control-exposure & decisions contrast: $t(185) = 1.254$, $p = .211$).

In addition, we wanted to see whether people's valuations for the Amazon gift certificate would also be affected outside of an explicit BDM procedure. To test for this, we looked at participants' purchase decisions in the two exposure & decisions conditions. For each participant, we defined the "reservation price" during the series of the 50 yes/no decisions as the highest price at which that participant was still willing to purchase the gift certificate. An ordinal logistic regression revealed that again, the reservation price differed significantly between participants who encountered the right-skewed price distribution and those who encountered the left-skewed price distribution ($\chi^2(1, N = 67) = 4.044$, $p = .044$).[4] Participants in the market with the right-skewed price distribution ($M = \$2.10$, $SE = .25$) had on average a 64¢ lower reservation price than the participants in the market with the left-skewed distribution ($M = \$2.74$, $SE = .25$).[5] Together, these results show that valuations are market-dependent even in more "natural" settings, suggesting that the phenomenon may be quite general.

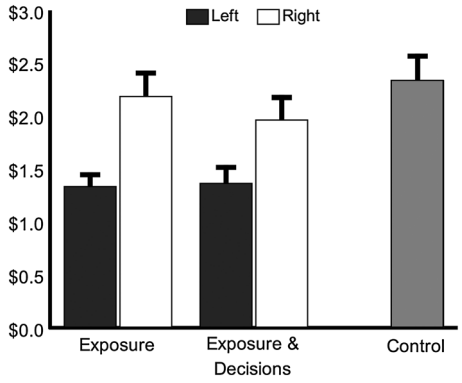

Figure 4. Mean reservation prices for the two distributions across the exposure, exposure & decisions, and control conditions in Experiment 3. Error bars are based on standard errors of the mean

GENERAL DISCUSSION

In this work, we experimentally demonstrate that consumers' product valuations as expressed through their reservation prices can be sensitive to a central characteristic of markets: the price distribution consumers face for the product. The contribution of our paper, however, goes beyond merely identifying another contextual factor: We investigate the pervasiveness of three candidate causes of this dependence in incentive-compatible contexts without the use of an explicit anchor.

In Experiments 1 and 2, we find that valuations for products can be lower when consumers encounter a distribution that is skewed toward higher rather than lower prices – a finding that seconds a common concern of marketers that deep discounts can hurt consumers' willingness to purchase a product for its regular (full) price (Kalwani & Yim, 1992). In addition, we test three key accounts for this influence: (i) uncertainty about the product's value, which leads to rational inferences about it from the price distribution; (ii) true context-dependent preferences, such that a concentration of higher (lower) prices confers a higher (lower) product utility to the consumers; and (iii) consumers focus on something other than the total benefit that the product confers to them and thus, from an economists point of view, a bias or mistake in expressing their "true" product preferences. The goal of this paper is not to settle on one

[4]This analysis excluded participants, who did not answer "yes" to any of the 50 sellers; that is, who were not interested in purchasing a \$5 gift certificate for Amazon at any of the offered prices (\$1 to \$5). If we include those participants and code their reservation prices as \$0, the difference is marginally significant ($\chi^2(1, N = 78) = 2.997$, $p = .083$; right-skewed price distribution: $M = \$1.79$, $SE = .24$, left-skewed distribution: $M = \$2.38$, $SE = .26$).

[5]We replicated these findings from the "exposure & decisions" conditions in another experiment with a deterministic setting and without a BDM procedure. In that experiment, after experiencing 50 sellers for \$0.50 gift certificates for Amazon.com (the distribution of seller prices was the same as in Experiment 3 but with prices that were one-tenth of those in Experiment 3), each of participants' 50 purchase decisions were consequential (i.e., participants could purchase up to 50 gift certificates totaling a value of $50 \times \$0.50 = \$25$). In that experiment as well, individuals' mean reservation price (the highest price at which participants were still buying a \$0.50 gift certificate) was significantly lower in the market with the left-skewed price distribution ($M = \$.29$, $SE = .02$) than in the market with the right-skewed price distribution ($M = \$.37$, $SE = .02$; ($\chi^2(1, N = 82) = 8.398$, $p = .004$).

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definite cause – in fact, depending on the nature of the product, the market, or other circumstances, multiple causes might be at play at the same time. Instead, our results show that even when rational inferences are largely controlled for, we can still observe price distribution-dependent preferences and suggest that the most pervasive cause for the observed behavior is likely not a reflection of true context-dependent preferences in the sense of the total benefit that a good confers to the consumers. Furthermore, the comparison of the different reservation prices obtained with the standard BDM procedure and the titration-based BDM procedure in Experiment 2 can shed some light on the psychological process by which individuals typically decide about their reservation prices. In particular, the differing results suggest that when respondents pick a reservation price using the standard BDM procedure, they do not seem to use a procedure that resembles an iterative approach (although intuitively the iterative approach seems to be a natural process for arriving at a reservation price). What respondents are doing instead is unclear, and an interesting and promising path for future research. Finally, in Experiment 3, we replicate our findings in a setting that more closely resembles a market situation and reject the hypothesis that our findings were due to characteristics inherent to our experimental procedure.

Together, these results suggest that although most business and economic analyses assume that exogenously given preferences determine the market price (along with supply), the influence also runs in the other direction: The market with its price distribution is an inherently powerful contextual variable that determines expressed but not true preferences even for common and familiar products. Consequently, because in supply–demand analyses consumer preferences are often inferred exactly from how consumers react to different prices, marketers may systematically underestimate the elasticity of consumer demand and overestimate consumer surplus as well as excess burden from taxation and subsidies. These findings have important implications for the interpretation of pricing models and subsequent marketing strategies (for the interested readers, see details in the Supplementary Material).

Finally, this sensitivity of expressed but not true preferences to the price also has implications for the measurement of valuations in marketing research. On the basis of the results presented herein, we believe that caution should be taken when interpreting absolute levels of preferences ("absolute valuations") from experimental data, but our results do not necessarily undermine conclusions based on directional comparisons between conditions ("relative valuations"). Consider, for example, a study that examines the valuation of a product compared with another study that contrasts valuations for the same product in different conditions (e.g., buying and selling). Although the price-distribution sensitivity we found will likely be present in both studies, the resulting biased estimates pose a larger problem for the former one. In particular, when comparing elicited preferences with an external standard, the aspects of the price distribution experienced or known by the participant can largely determine the conclusions of the study. In contrast, when the main focus is comparing the qualitative (directional) difference between two conditions, and as long as participants in both conditions are exposed to the same market, the general conclusions should be unaffected by the mismeasurement of absolute preferences.

CONCLUDING REMARKS

It is worthwhile to reflect on our findings in a broader consumer psychology context. Our findings demonstrate that although consumers may have true (i.e., stable) preferences for products (for a discussion see also Amir & Levav, 2008), they might, for example, not be willing to pay the corresponding value unless they are prompted to think carefully about the value that the product provides to them (see titration conditions in Experiment 2) or they are "reminded" that the distribution of market prices should not matter (see joint condition in Experiment 1). This suggests that consumers might sometimes end up making sub-optimal purchase decisions and not purchase a product for a price at which they would still receive a positive net utility from it. We speculate that this arises from consumers being distracted by the "wrong" goal: They are shortsightedly focusing on optimizing the pleasure of having a good deal and focusing less on the utility or pleasure that the product itself offers. In addition, it is an interesting question for future research to what extent individual differences such as tightwads versus spendthrifts (Rick, Cryder, & Loewenstein, 2008) that differ in their focus on a good deal, or the type of product (e.g., utilitarian vs. hedonic, durable vs. non-durable, experiential vs. non-experiential) that affects the salience and type of the expected utility might mediate the proneness to price cues and the relevance of the other two causes (uncertainty about a product's value and true context-dependent preferences).

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