Scarcity Frames Value

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Abstract

Economic models of decision making assume that people have a stable way of thinking about value. In contrast, psychology has shown that people's preferences are often malleable and influenced by normatively irrelevant contextual features. Whereas economics derives its predictions from the assumption that people navigate a world of scarce resources, recent psychological work has shown that people often do not attend to scarcity. In this article, we show that when scarcity does influence cognition, it renders people less susceptible to classic context effects. Under conditions of scarcity, people focus on pressing needs and recognize the trade-offs that must be made against those needs. Those trade-offs frame perception more consistently than irrelevant contextual cues, which exert less influence. The results suggest that scarcity can align certain behaviors more closely with traditional economic predictions.

Economic theories of decision making assume that people have stable perceptions of value (Friedman & Savage, 1948; Keeney & Raiffa, 1976; von Neumann & Morgenstern, 1944). The value of a $50 discount should not depend on what it is called or whether it is a large percentage of the original price. But psychological research shows that people's sense of value is often *framed* by normatively inconsequential contextual factors. These context effects are so robust that they almost seem universal (Bettman, Luce, & Payne, 1998; Kahneman & Tversky, 1979, 1984; Lichtenstein & Slovic, 2006; Shafir, Simonson, & Tversky, 1993; Thaler, 1999; Tversky & Kahneman, 1981).

Interestingly, classical economic predictions derive from a deeper assumption about scarcity, namely, that people treat all resources as limited. However, recent research suggests that scarcity is not a ubiquitous psychological reality. When people feel that resources are low relative to needs, a scarcity mind-set emerges, and it changes how they make decisions (Mani, Mullainathan, Shafir, & Zhao, 2013; Mullainathan & Shafir, 2013; Shah, Mullainathan, & Shafir, 2012). This raises a natural question: Are perceptions of value more stable (and therefore closer to the economic ideal) when people experience the scarcity mind-set?

This article examines this question. We tested how classic context effects change when participants experience scarcity and found that scarcity reduces or eliminates several kinds of context effects. Whereas previous work has focused on how scarcity negatively affects cognition (Haushofer & Fehr, 2014; Mani et al., 2013), here we document that under specific circumstances, scarcity brings decision making closer to normative predictions, which suggests that scarcity has more nuanced effects.

Because the current findings rely on a series of null results from a subgroup of participants, we should address some potential concerns at the outset. First, how robust are these results? We found a similar pattern of results across more than 10 studies with a total sample size of more than 4,000 participants, and we replicated two studies in a large-scale U.S. sample. We also report studies in which we did not find that scarcity eliminated context effects, to minimize the file-drawer problem.

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Second, are these results limited to a narrow range of values? We replicated the pattern of results across several amounts, ruling out the possibility that these results are simply due to the fact that the poor and rich are accustomed to thinking about different price ranges.[1] Third, can the results be attributed to confounding factors rather than to scarcity specifically? We show that monetary scarcity reduces a diverse array of context effects. We then focus on a particular mental-accounting effect and show that the results generalized across other forms of scarcity. Finally, we show that the results held when we experimentally manipulated scarcity to isolate it from other factors.

In what follows, we describe why scarcity might make valuation more consistent. We then report our experiments, which focused primarily on establishing the breadth and robustness of this consistent valuation, but also provided evidence for our proposed mechanism (see the next section). Finally, we discuss how this work can reconcile psychological and economic theories of decision making, and how it can inform policymaking for the poor.

Scarcity and Valuation

To appreciate how scarcity might influence context effects, consider the classic beer-on-the-beach scenario, in which people report their willingness to pay (WTP) for a beer that is purchased at either a fancy resort or a grocery store (Thaler, 1985). It is the same beer, consumed on the same beach, and yet people offer more money when they know it comes from the resort. Why?

Human judgment is inherently relative. People use contextual cues to interpret everything from color to size to value; when the context changes, so does their judgment. Visually, an object's perceived size depends on whether smaller or larger objects surround it. Likewise, numeric estimates are influenced by irrelevant anchors, and valuation depends on contextual cues. In the beer-on-the-beach scenario, point of purchase is a cue for pricing. Compared with a grocery store, a fancy resort brings to mind a higher price.

But scarcity generates different cues for deciding value. Under conditions of scarcity, pressing needs capture attention (Aarts, Dijksterhuis, & de Vries, 2001; Radel & Clément-Guillotin, 2012; Shah et al., 2012). When money is short, the utility bill and rent payment are on the top of one's mind. These concerns make trade-offs, or opportunity costs, highly accessible: Buying one thing means giving up other things (Spiller, 2011). Someone contemplating purchasing a beer compares the beer with other budgetary demands, like tomorrow's lunch or bus fare. And these trade-offs do not depend on where the beer is purchased. They lead the person to ignore irrelevant contextual cues

and instead rely on his or her own standards. They provide an internal frame of reference that more steadily guides evaluations.

Our main prediction was therefore that scarcity leads to more consistent valuation and reduces certain context effects. In addition, we expected that these effects of scarcity are partly due to greater trade-off thinking under scarcity. We tested these predictions via a series of studies involving classic context effects. There are many kinds of context effects. We focus on a particular kind in which inconsistencies arise because people have only a vague sense of what items are worth. To value an item, people look for useful cues.[2] The scenarios we focused on provide accessible but normatively irrelevant cues (e.g., where the beer is purchased). We selected scenarios that have produced robust context effects and that have highlighted the role of contextual cues in generating counternormative decision making. We tested how various forms of scarcity affected valuations in these scenarios. Scarcity either resulted from preexisting variation (e.g., participants' income) or was experimentally induced. Participants in the scarcity conditions were not abjectly poor—just budget constrained. This provided a rather conservative test of our hypotheses (and underscores that scarcity is not an absolute, but rather a subjective, matter). We first examined whether the original findings could be replicated in a nonscarcity condition and then tested whether the effects diminished under scarcity.

Our sample sizes were determined by, and were set to be larger than, the sizes of the samples in the original studies. In each case, data collection was stopped when the target size was reached or when several days had passed without new participants completing the study. Analyses were conducted after data collection terminated. For all studies except Studies 1d and 2c, participants were recruited from Amazon's Mechanical Turk. Participation was restricted to U.S. residents.

Participants in most studies indicated their age, gender, and ethnicity, as well as the highest level of education they had completed. They also reported their total annual household income on a scale with bins ranging from "less than $10,000" to "more than $150,000." Finally, they reported the number of people living in their household. Total household income was coded by taking the midpoint of the participant's income bin (or $150,000 for the highest bin) and then dividing that value by the square root of the participant's household size, in accordance with the OECD (2008) equivalence transformation. Our analyses are based on log-transformations of this metric because it is positively skewed.

In our first study, we tested whether people are more likely to think about trade-offs when they experience scarcity than when they do not.

Study 1a: Trade-Off Thinking Under Scarcity

Method

In this study, there were 103 participants (mean age = 29.3 years; 44 females, 59 males; median household size = 3 people; median household income = $35,000).

Participants read Thaler's (1985) beer-on-the-beach scenario, framed with either the text in the parentheses or the text in the brackets; portions of the scenario have been omitted for conciseness):

> You are lying on the beach on a hot day. . . . you have been thinking about how much you would enjoy a nice cold bottle of your favorite brand of beer. A companion . . . offers to bring back a beer from the only nearby place where beer is sold (a fancy resort hotel) [a small, run-down grocery store]. He . . . asks how much you are willing to pay for the beer . . . he will buy the beer if it costs as much or less than the price you state. But if it costs more than the price you state he will not buy it. . . . there is no possibility of bargaining with the (bartender) [store owner]. What price do you tell him?

After reading the scenario, participants were asked, "As you think about what price to tell your friend, what goes through your mind? Of the options below, which is most likely to influence how you decide on a price?" The response options were "where the beer is being purchased," "how hot it is on the beach and how relaxed I am," "other things I won't be able to buy if I use the money for beer," "the brand of the beer," and "the most recent time I had a beer." For our analyses, we focused on the two responses of interest: those that reflected trade-off thinking ("other things I won't be able to buy") and those that reflected context (location) considerations ("where the beer is being purchased").

Results

One participant was excluded as an outlier on income (more than 3 SD from the mean). We conducted binary logistic regressions to compare how frequently participants cited each of the two considerations of interest (trade-offs vs. location) as a function of income. Higher-income participants were more likely than lower-income participants to name location as the main consideration, β = 2.52, Wald-test $\chi^2(1, N = 102)$ = 5.54, $p < .05$, but lower-income participants were more likely than higher-income participants to name trade-offs as the main consideration, β = −1.62, Wald-test $\chi^2(1, N = 102)$ = 4.67, $p <$

.05 (see Fig. 1a). These results confirm that people facing scarcity naturally think of trade-offs, thus generating their own comparison standards (similar observations can be found in Mullainathan & Shafir, 2013). We turn now to our main question: Are people more consistent in their valuations when they are experiencing scarcity?

Studies 1b–1d: Consistent Valuations Under Scarcity

Method

In Study 1b, there were 151 participants (mean age = 32.9 years; 76 females, 75 males; median household size = 3 people; median household income = $45,000). In Study 1c, there were 604 participants (mean age = 29.9 years; 246 females, 358 males; median household size = 2 people; median household income = $45,000). Study 1d was conducted with a large, representative sample drawn from Survey Sampling International's panel of U.S. respondents. There were 2,015 participants (mean age = 39.1 years; 1,022 females, 993 males; median household size = 3 people; median household income = $55,000).

In Study 1b, participants read the beer-on-the-beach scenario and indicated their WTP for the beer. Studies 1c and 1d directly replicated Study 1b. Because WTP was elicited with an open-ended scale, some participants named unreasonably high prices. We describe our exclusion rules for these responses in the next section. These rules were determined before we conducted the significance tests.

Results

In Study 1b, we excluded 2 participants whose WTP was more than 3 standard deviations from the mean. We first report analyses based on a median split of the income metric; participants who fell at or below the median were grouped as lower income, and those who fell above the median were grouped as higher income. Higher-income participants showed the classic effect, offering a higher price for beer from the resort (M = $6.09, 95% confidence interval, CI = [$5.21, $6.98]) than for beer from the grocery store (M = $4.21, 95% CI = [$3.64, $4.79]). But lower-income participants' WTP did not differ significantly between beer from the resort (M = $4.44, 95% CI = [$3.81, $5.08]) and beer from the store (M = $5.37, 95% CI = [$4.35, $6.39]). The interaction between income and context was significant, $F(1, 145)$ = 11.18, $p < .01$, η_p^2 = .07 (see Fig. 1b). The interaction was also significant when income was treated as a continuous variable, β = 2.27, $t(145)$ = 2.17, $p < .05$.

Two follow-up studies help rule out potential confounds (for details, see Additional Methods and Results,
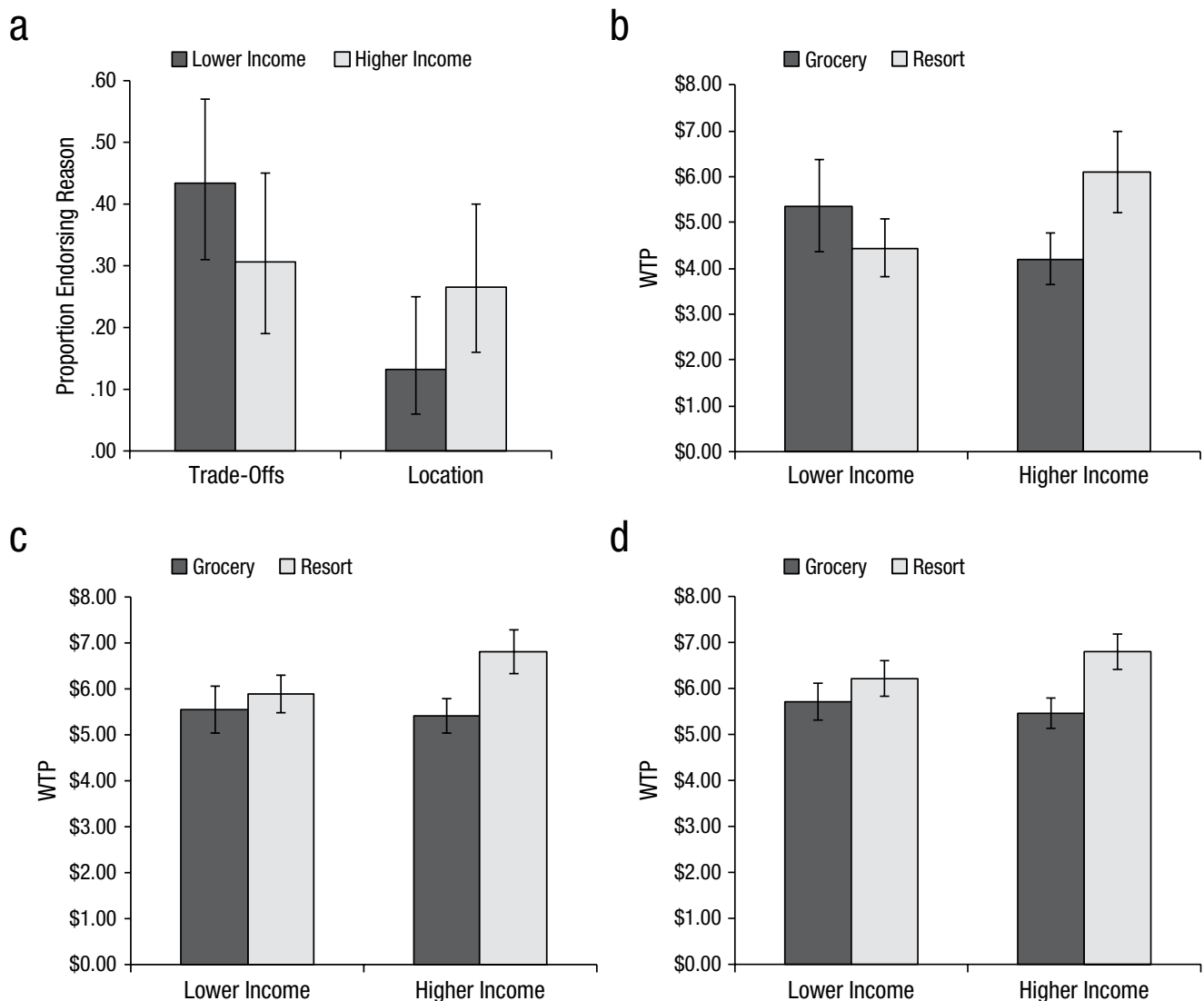
a

b

c

d

Fig. 1. Summary of results from Studies 1a through 1d: (a) the proportion of lower- and higher-income participants citing trade-off and location considerations in Study 1a and the amount lower- and higher-income participants were willing to pay (WTP) for beer at the grocery store and resort in (b) Study 1b, (c) Study 1c, and (d) Study 1d. For presentation here, participants were divided into lower- and higher-income groups on the basis of a median split. Error bars show 95% confidence intervals.

in the Supplemental Material). First, perhaps lower- and higher-income participants had different expectations about how the price of beer varied between the locations. We asked a separate group of participants what they expected the beer to cost. Both lower- and higher-income participants expected the price to be higher at the resort than at the grocery store. Second, perhaps the resort frame did not influence lower-income participants' WTP because the expected price was outside the range of what they would consider paying. We modified the scenario to shift prices downward, so that participants indicated their WTP for a beer from a small bar (expensive frame) or from a group of fellow beachgoers who had extra beer (cheap frame). Prices offered were on

average lower than for the grocery/resort scenario, but again, higher-income participants offered higher prices in the expensive-frame condition than in the cheap-frame condition, whereas lower-income participants did not.

We replicated the results of Study 1b with larger samples in Studies 1c and 1d. In Study 1c, we excluded 2 participants with missing responses, 5 with unreasonably high WTPs (over $100), and 19 additional outliers on WTP, which left 578 participants. Dividing participants according to a median split on income, we found that higher-income participants offered a higher price for beer from the resort ($M = \$6.81$, 95% CI = [\$6.34, \$7.28]) than for beer from the grocery store ($M = \$5.41$, 95% CI = [\$5.04, \$5.78]). Lower-income participants' WTP did not

differ significantly between beer from the resort ($M =$ $5.89, 95% CI = [$5.48, $6.31]) and beer from the store ($M =$ $5.56, 95% CI = [$5.06, $6.06]). The interaction between income and context was significant, $F(1, 574) =$ 5.68, $p < .05$, $\eta_p^2 = .01$ (see Fig. 1c). The interaction was also significant when income was treated continuously, $\beta = 1.65$, $t(574) = 3.27$, $p < .01$.

In Study 1d (the nationally representative sample), a large number of participants reported unreasonably high WTPs, and exclusions based on the rules set for the smaller samples in the previous studies would have left many unreasonable prices in the data set. We therefore included in analyses only those participants with a WTP of $20 or less, which seemed like the upper bound of a reasonable price. This set a cutoff price similar to the cutoff price based on standard deviations in Studies 1b and 1c. After this exclusion and the exclusion of 4 additional participants who were outliers on income, the final sample included 1,898 participants. Dividing participants according to a median split on income, we found that higher-income participants offered a higher price for beer from the resort ($M = $6.80, 95% CI = [$6.41, $7.18]) than for beer from the grocery store ($M = $5.46, 95% CI = [$5.13, $5.79]). Lower-income participants' WTP did not differ significantly between the resort ($M = $6.21, 95% CI = [$5.83, $6.60]) and the store ($M = $5.71, 95% CI = [$5.31, $6.11]). The interaction between income and context was significant, $F(1, 1894) = 4.82$, $p < .05$, $\eta_p^2 = .003$ (see Fig. 1d). This interaction was marginally significant when income was treated continuously, $\beta = 0.50$, $t(1894) = 1.85$, $p < .07$.

The beer-on-the-beach scenario provides a canonical example of the difficulty people have in translating utility into value. People have a sense of how much they would enjoy the beer, but they have difficulty representing this enjoyment with a price. However, under conditions of scarcity, people base their price not merely on anticipated enjoyment, but also on anticipated trade-offs, and those are more consistent guides for valuation. Could scarcity also lead to more consistent valuation of a dollar itself? The next set of studies addressed this question.

Study 2a: Proportional Versus Trade-Off Thinking

Method

In Study 2a, there were 238 participants (mean age = 30.7 years; 96 females, 142 males; median household size = 4 people; median household income = $25,000).

This study tested a classic demonstration of *proportional thinking* (adapted from Tversky & Kahneman, 1981, and Hall, 2008). Participants read the following scenario: "Imagine that you go to the store to buy a tablet computer that costs $300/$500/$1,000. The clerk informs

you that a store thirty minutes away sells the same tablet computer for $50 less. Would you go to the other store to buy the tablet computer or would you buy it at the current store?" Participants were randomly assigned to the $300, $500, or $1,000 condition.

Previous studies have found that people are more willing to travel for the discount when the tablet is cheaper (i.e., when the discount is proportionally higher). Because they have only a vague sense of what $50 is worth to them, people look at the total cost to gauge the discount's value. But we expected lower-income participants to value the discount more consistently. As in Study 1a, we tested whether lower-income participants engaged in more trade-off thinking than higher-income participants. Participants were asked, "As you consider the discount, what do you think about as you try to determine how large $50 feels and whether it is worth traveling for?" They were allowed to select only one of the following response options: "what percentage it is off the tablet's regular price," "how much I plan to use the tablet," "other things I won't be able to buy if I don't save money on the tablet," "how long I have been waiting to buy the tablet," and "what day of the week it is." For our analyses, we focused on the two responses reflecting the considerations of interest: those that reflected trade-off thinking ("other things I won't be able to buy") and those that reflected proportional thinking ("what percentage it is off").

Results

One participant was excluded as an outlier on income. We conducted binary logistic regressions to compare the frequency with which participants cited each of the two considerations of interest (trade-offs vs. proportional discount) as a function of income. Higher-income participants were more likely than lower-income participants to use proportional thinking, $\beta = 0.87$, Wald-test $\chi^2(1, N = 237) = 4.02$, $p < .05$, but lower-income participants were more likely than higher-income participants to use trade-off thinking, $\beta = -0.96$, Wald-test $\chi^2(1, N = 237) = 4.69$, $p < .05$. This again suggests that scarcity leads people to generate their own comparison standards, and Studies 2b through 2d tested whether this leads to more consistent preferences.

Studies 2b and 2c: Valuing Discounts

Method

In Study 2b, there were 705 participants (mean age = 30.0 years; 290 females, 415 males; median household size = 3 people; median household income = $45,000). The participants in Study 2c were the same participants as in Study 1d (and analyses were limited to the same

participants, but including all participants did not change the results). Note that participants completed Studies 1d and 2c in a counterbalanced order. Participants in Studies 2b and 2c responded to the same scenario as did participants in Study 2a, but they stated whether they would travel for the discount.

Results

In Study 2b, 1 participant was excluded for missing responses, and 2 were excluded as outliers on income. The analyses conducted were based on a median split on income. Confirming earlier findings, these analyses revealed that higher-income participants were more willing to travel when the discount was proportionally larger (i.e., the tablet cost less): Specifically, 86%, 75%, and 58% would travel when the tablet cost $300, $500, and $1,000, respectively. Lower-income participants were less sensitive to the proportional size of the discount: The corresponding percentages of lower-income participants willing to travel were 78%, 67%, and 67%. The interaction between income and context was significant in a binary logistic regression, $\beta = -0.48$, Wald-test $\chi^2(1, N = 702) = 4.93$, $p < .05$, and was marginally significant when income was treated continuously, $\beta = -0.57$, Wald-test $\chi^2(1, N = 702) = 3.32$, $p < .07$.

Five participants were excluded for missing responses in Study 2c, so 1,893 participants were included in the analyses. Analyses based on a median split on income revealed a more muted trend than in the previous study. Among higher-income participants, 71%, 67%, and 51% were willing to travel when the tablet cost $300, $500, and $1,000, respectively; among lower-income participants, the corresponding percentages were 70%, 69%, and 55%. When income was treated continuously, the interaction between income and context was clear, $\beta = -0.39$, Wald-test $\chi^2(1, N = 1,893) = 6.13$, $p < .05$.

Perhaps $50 is too large an amount for poorer participants to forgo. If so, floor or ceiling effects would result in illusory consistency among lower-income participants. But notice that higher-income participants, compared with lower-income participants, were actually more willing to travel when the discount was proportionally large, and less willing to travel when the discount was proportionally small, particularly in Study 2b. Floor or ceiling effects therefore cannot explain the consistency among our lower-income participants. Still, to be sure that the effect is robust, we tested it across a range of dollar amounts in Study 2d.

Study 2d: Consistency Across Amounts
Method

In Study 2d, there were 301 participants (mean age = 30.2 years; 120 females, 181 males; median household size =

3 people; median household income = $25,000). Participants responded to versions of the scenarios used in Studies 2a through 2c (but in this case, involving an appliance instead of a tablet). In the small-amount condition, participants could save $10 on either a $100 purchase (larger proportional discount) or a $200 purchase (smaller proportional discount). In the large-amount condition, participants could save $150 on either a $1,500 or a $3,000 purchase.

Results

No participants were excluded from analyses. We regressed willingness to travel on income (categorized by a median split), proportional size of the discount (large vs. small), absolute size of the discount ($10 vs. $150), all two-way interaction terms, and the three-way interaction term. Higher-income participants were significantly more willing to travel for a proportionally larger discount (60%) than for a proportionally smaller discount (41%), but this was not true for lower-income participants (50% vs. 61%). The interaction between proportional discount and income was significant, $\beta = -1.90$, Wald-test $\chi^2(1, N = 301) = 4.11$, $p < .05$. Note that this interaction did not depend on the absolute amount of the discount, as the three-way interaction was not significant, $\beta = -0.89$, Wald-test $\chi^2(1, N = 301) = 0.28$, $p > .6$. When income was treated continuously, the interaction between proportional discount and income also emerged, but was not significant, $\beta = -2.13$, Wald-test $\chi^2(1, N = 301) = 2.21$, $p < .15$. These results replicate an earlier study by Hall (2008), who documented similar effects among participants recruited in a soup kitchen versus a wealthy suburb.

Perhaps these results would not hold for extremely small or large sums of money. But for moderate amounts, those most relevant to everyday life, lower-income participants exhibit more consistent preferences. Whereas Studies 2b through 2d provide an indirect measure of a dollar's value, the next study revealed a similar pattern in direct reports of subjective value.

Study 3: Valuing a Dollar
Method

In Study 3, there were 505 participants (mean age = 33.0 years; 208 females, 297 males; median household size = 3 people; median household income = $45,000).

Study 3 revisited Slovic, Finucane, Peters, and MacGregor's (2002) documentation of how dominance relationships can be violated. In this scenario, participants rated the attractiveness of one of two gambles:

No-loss gamble: There is a 7/36 chance of winning $9.

Loss gamble: There is a 7/36 chance of winning $9 and a 29/36 chance of losing 5 cents.

People usually rated the second gamble as more attractive than the first gamble (on a scale from 1, *least attractive*, to 20, *most attractive*), even though the second gamble is dominated by the first gamble. It seems that people are unsure of how attractive $9 is when they consider it in isolation. But having the small loss as a comparison standard makes the $9 easier to evaluate (and renders the gamble more attractive). In contrast, if scarcity creates its own comparison standards, then we would expect lower-income participants to value $9 more consistently. In the current study, participants were assigned to rate the attractiveness of either the no-loss or the loss gamble, using the original 20-point rating scale.

Results

One participant was excluded for missing responses, and another was excluded as an outlier on income. Analyses based on a median split on income replicated earlier results. Higher-income individuals rated the loss gamble as significantly more attractive ($M = 11.63$, 95% CI = [10.56, 12.69]) than the no-loss gamble ($M = 8.33$, 95% CI = [7.62, 9.04]), but this difference was smaller for lower-income individuals (loss gamble: $M = 10.38$, 95% CI = [9.38, 11.38], no-loss gamble: $M = 9.18$, 95% CI = [8.31, 10.05]). The interaction between gamble and income was significant, $F(1, 499) = 5.04$, $p < .05$, $\eta_p^2 = .01$. The interaction was also significant when income was treated continuously, $\beta = 1.13$, $t(499) = 2.21$, $p < .05$. The fact that wealthier participants gave both the highest and the lowest average attractiveness ratings speaks against the possibility that floor or ceiling effects drove these results.

It seems that across a wide array of scenarios, lower-income participants are less susceptible to context effects than higher-income participants are. But are these results due to some other factor confounded with income? To address this concern, we focused on how one specific mental-accounting effect is influenced by monetary scarcity and then looked at how it is influenced by nonmonetary forms of scarcity as well.

Study 4: Consistent Accounting

Method

In Study 4, there were 263 participants (mean age = 31.6 years; 102 females, 161 males; median household size = 3 people; median household income = $45,000).

We studied Morewedge, Holtzman, and Epley's (2007) *accessible-accounts* effect. In this paradigm, participants first consider either a small or a large mental account. They then rate how expensive an item seems. Typically, when people evaluate items against the backdrop of a small mental account, the items seem more expensive. But we expected that scarcity would mitigate this effect because people would judge value against the backdrop of accessible trade-offs rather than momentarily primed accounts.

In the small-account condition, participants were asked, "What is currently in your wallet or purse?" and were instructed to click the checkbox next to each correct item. They made selections from the following options: pictures, photo ID, library card, credit card, and cash. In the large-account condition, participants were asked, "What kind of financial accounts do you use or possess?" and were instructed to click the checkbox next to each type of account that they had. They made selections from the following options: checking, savings, bonds, stock, and certificates of deposit.

After completing this priming manipulation, participants were asked to think about purchasing a newly released DVD available at Best Buy. They were asked to rate how expensive the DVD felt on a scale from 1 (*not expensive at all*) to 11 (*very expensive*). Participants also indicated how many minutes they would wait in line if the DVD were being given away for free. This latter question was used to measure whether greater perceived expensiveness would translate into greater willingness to give up something to receive the item. This secondary relationship was not observed and is not discussed further.

Results

Four participants were excluded for not completing the prime question. When we analyzed the data using a median split based on income, higher-income participants rated the DVD as significantly more expensive when they thought about a small account ($M = 5.74$, 95% CI = [5.04, 6.44]) rather than a large account ($M = 4.47$, 95% CI = [3.93, 5.01]), whereas the evaluations of lower-income participants did not differ significantly between the conditions (small account: $M = 5.55$, 95% CI = [4.92, 6.18]; large account: $M = 5.75$, 95% CI = [5.03, 6.48]). The interaction between income and condition was significant, $F(1, 255) = 4.96$, $p < .05$, $\eta_p^2 = .02$. The interaction was also significant when income was treated as a continuous variable, $\beta = 2.43$, $t(255) = 3.39$, $p < .01$. In our next study, we tested whether these results would generalize to another form of scarcity. Specifically, we examined whether dieters (people experiencing caloric scarcity) show more consistent valuation of calories than nondieters do.

Study 5: Caloric Scarcity

Method

In Study 5, there were 234 participants (mean age = 31.8 years; 107 females, 127 males). Participants were primed to think of either a small caloric account (calories consumed in a day) or a large caloric account (calories consumed in a week; Morewedge et al., 2007). They then rated how fattening a large order of McDonald's French fries felt on a scale from 1 (*not fattening at all*) to 11 (*very fattening*). Finally, participants also responded to two questions about their dieting habits: "How often do you go on a diet?" and "To what extent are you dieting right now?" Answers were on a 7-point scale, with higher numbers indicating greater dieting (Herman & Mack, 1975). We expected that dieters, compared with nondieters, would be less sensitive to which account was primed.

Results

No participants were excluded from the analyses. We first analyzed responses using a median split on participants' dieting behavior. Nondieters rated the fries as more fattening when they thought about a small account (M = 8.64, 95% CI = [8.20, 9.07]) than when they thought about a large account (M = 7.80, 95% CI = [7.21, 8.38]), but this was not true for dieters (small account: M = 8.86, 95% CI = [8.29, 9.43]; large account: M = 9.13, 95% CI = [8.66, 9.60]). The interaction between dieting status and condition was significant, $F(1, 230)$ = 4.40, $p <$ .05, η_p^2 = .02, and the interaction was also found when dieting behavior was treated continuously, β = 0.43, $t(230)$ = 2.11, $p <$ .05. It appears that greater scarcity in general can elicit more consistent valuations. But the studies we have reported thus far all relied on preexisting differences between groups. In our next study, we investigated whether scarcity can be manipulated directly to elicit this shift in mind-set.

Study 6: Time Scarcity

Method

In Study 6, 74 participants (mean age = 32.0 years; 46 females, 28 males) were told that they could win $25 gift certificates on the basis of their performance playing a game. We adapted a procedure from a previous study (Shah et al., 2012) in which participants played Family Feud, a trivia game in which players try to guess the five most popular responses (from a panel of 100 people) to prompts such as "name things you take on a picnic." Participants earned 1 point for every correct response (i.e., maximum of 5 points per round). These points were converted into lottery entries for the gift certificates.

Time scarcity was manipulated by giving participants different amounts of time in which to play the game. "Poor" participants were given 75 s overall. "Rich" participants were given 250 s overall. Participants played until they exhausted their time budget or reached the end of five rounds, whichever came first.

After playing Family Feud, participants were primed to think about either a small account (their time budget per round) or a large account (their overall time budget for the game). They then indicated how expensive or costly it would feel to lose 10 s, on a scale from 1 (*not expensive at all*) to 11 (*very expensive*). The proportional loss was clearly different for the poor and rich participants. But the relative difference between the percentage lost in the small-account condition and the percentage lost in the large-account condition was similar for the poor and rich, which made it possible to examine the interaction of interest.

Results

One participant was excluded because of a computer malfunction during the game. Time-rich participants rated the loss as more expensive when they thought about a small account (M = 8.31, 95% CI = [7.78, 8.84]) than when they thought about a large account (M = 6.50, 95% CI = [5.42, 7.58]), whereas time-poor participants' evaluations did not differ between the small-account condition (M = 8.33, 95% CI = [7.14, 9.52]) and the large-account condition (M = 8.83, 95% CI = [7.97, 9.69]). A 2 (scarcity condition) × 2 (account condition) analysis of variance revealed a significant interaction, $F(1, 69)$ = 5.16, $p <$ .05, η_p^2 = .07.

General Discussion

Combined with earlier work, these studies reveal a consistent pattern (see Table 1 for a summary of results; also see the scatter plots in the Supplemental Material). Various forms of scarcity bring trade-offs to the top of the mind (Mullainathan & Shafir, 2013; Shah et al., 2012; Spiller, 2011), and when these trade-offs frame one's valuation, one relies less on the external context. Although scarcity may not change the fact that valuation relies on contextual cues, it does change the cues that people consult. Instead of looking to external factors that shift haphazardly, people experiencing scarcity look to internally generated standards that provide a more stable frame.

These findings seem robust. The same pattern of results was found across a fairly wide range of values. And lower-income participants were not more consistent merely because the contextual cues were outside the range of prices they normally considered. Rather, their consistency seems to have been grounded in their greater

Table 1. Summary of Studies

Paradigm and study	Resource	Results[a]
Beer-on-the-beach scenario (Thaler, 1985): People value an item on the basis of its irrelevant point of purchase.		
Study 1b ($N = 151$, $n = 149$)	Money	Median split*, regression*
Study 1c ($N = 604$, $n = 578$)	Money	Median split*, regression*
Study 1d ($N = 2,015$, $n = 1,898$)	Money	Median split*, regression[†]
Proportional thinking (Tversky & Kahneman, 1981; Hall, 2008): People value the same absolute quantity less if it seems like a smaller proportion of a larger amount.		
Study 2b ($N = 705$, $n = 702$)	Money	Median split*, regression[†]
Study 2c ($N = 2,015$, $n = 1,893$)	Money	Median split[n.s.], regression*.
Study 2d ($N = 301$, $n = 301$)	Money	Median split*, regression[n.s.]
Dominance lottery (Slovic, Finucane, Peters, & MacGregor, 2002): People value a lottery more if there is a relatively small loss to go along with a larger gain.		
Study 3 ($N = 505$, $n = 503$)	Money	Median split*, regression*
Accessible accounts (Morewedge, Holtzman, & Epley, 2007): People value an item differentially depending on whether a small or large mental account is accessible.		
Study 4 ($N = 263$, $n = 259$)	Money	Median split*, regression*
Study 5 ($N = 234$, $n = 234$)	Calories	Median split*, regression*
Study 6 ($N = 74$, $n = 73$)	Time	2×2 analysis of variance*
Mental budgeting (Tversky & Kahneman, 1981): People value a purchase differently depending on whether it is compared with a within-budget cost.		
Study S8 ($N = 101$, $n = 101$)	Money	Median split[n.s.], regression[n.s.]
Anchoring willingness to pay (Ariely, Loewenstein, & Prelec, 2003): People value an item on the basis of an arbitrary anchor.		
Study S9 ($N = 95$, $n = 95$)	Money	Median split[n.s.], regression[n.s.]

Note: For each study, the table indicates the total number of participants (N) and the number of participants included in the analyses (n). Studies S8 and S9 are described in the Supplemental Material available online (see Additional Methods and Results).
[a]This column indicates which analyses revealed significant differences between the decisions of richer and poorer participants ([†]$p < .10$, *$p < .05$).

use of trade-off thinking. Moreover, this consistency generalized across several forms of scarcity.

Might poorer participants have been thinking more carefully in general (and not necessarily thinking about trade-offs)? If this careful-thinking hypothesis is true, then scarcity should lead to more consistent preferences even when trade-off thinking is not involved. In contrast, we would not expect the scarcity mind-set to make all choices more stable. Inconsistent preferences can arise from many psychological processes, ranging from decision conflict to identity salience. Our account is specific to circumstances that require valuation of items whose worth is vague. We argue that in these circumstances, scarcity leads people to rely on relatively consistent, internally generated standards.

There are certainly context effects that we would not expect to diminish under scarcity. For instance, we ran another study involving the *pseudocertainty effect* (Tversky & Kahneman, 1981). In that effect, preferences reverse not because of inconsistent valuation, but because of how probabilities are evaluated. In these circumstances, our theory would not predict greater consistency among the poor than among the rich, but the careful-thinking hypothesis would. In fact, we found that lower- and

higher-income participants responded similarly to the scenario presented in this study (and lower-income participants did not reason more systematically on the Cognitive Reflection Test; see Study S7 in Additional Methods and Results, in the Supplemental Material).

We tested two other effects that did not reveal a difference between higher- and lower-income participants: mental budgeting and anchoring (see Table 1 and Studies S8 and S9 in Additional Methods and Results, in the Supplemental Material). We tested mental budgeting using the lost-ticket scenario (Tversky & Kahneman, 1981) and found that low-income and high-income participants responded similarly. Perhaps this happened because mental budgets did not frame perceptions of value (e.g., "How expensive does this ticket feel?") but instead helped participants decide whether to buy an item again after having lost it. We were more surprised to find that scarcity did not interact with anchoring to influence participants' WTP for a variety of items (procedure adapted from Ariely, Loewenstein, & Prelec, 2003). Perhaps first asking a question such as "Would you pay more or less than $X?" fundamentally shifts the decision process. To answer this question, people may not draw on accessible trade-offs to construct a sense of value.

Instead, they may most immediately think of other items that cost $X or reasons why one would pay more or less than $X (Strack & Mussweiler, 1997). Or perhaps anchoring does not shift the representation of value, but merely distorts the scale used to express it (Frederick & Mochon, 2012). Further research might clarify when accessible trade-offs guide various evaluations.

This work offers a novel perspective on important questions surrounding policymaking for the poor. Policymakers often use framing and subtle contextual changes to nudge behavior in a number of domains, from energy (Allcott, 2012) to health (Banks et al., 1995) to voting (Bryan, Walton, Rogers, & Dweck, 2011). But recent research highlights the boundaries of such interventions. For example, a framing intervention might seem ideal for highlighting the benefits (and increasing the use) of bed nets to keep out mosquitoes. But in fact, framing has been found to have little impact on poor individuals' use of bed nets. Bed-net prices matter far more. Perhaps, in the context of that market, the evaluation of bed nets depends not on external frames, but rather on accessible trade-offs (Dupas, 2009). Likewise, policymakers might expect that describing the fee for a payday loan in terms of an annualized, instead of a biweekly, interest rate would shift the loan's perceived costs. People often balk at annualized interest rates that exceed 500%, which are typical of payday loans. But if trade-offs guide how money-poor borrowers think of the fee, then the rates in the alternative time frames will have little influence because they do not represent actual expenses (Collins, Morduch, Rutherford, & Ruthven, 2009). Instead, as Bertrand and Morse (2011) have shown, the concrete fees to be paid will have more impact, presumably because these are judged against competing expenses.

The present results offer a striking perspective on the exchange between economics and psychology. Economics makes concrete predictions about how preferences should unfold, whereas psychology and behavioral economics have identified several ways in which those predictions break down. Economics makes those predictions because it is built on the (correct) assumption that humans navigate a world of scarcity and regularly make trade-offs. Remarkably, however, when people experience sufficient abundance, those trade-offs recede from attention. In contrast, when people experience scarcity, they naturally think of accessible and consistent trade-offs, which steadily frame their perspective, aligning their preferences with economic predictions.

Author Contributions

All authors developed the concepts for the studies. A. K. Shah conducted the studies and analyzed the data. All authors contributed to the manuscript and approved the final version of the manuscript for submission.

Supplemental Material

Additional supporting information can be found at http://pss.sagepub.com/content/by/supplemental-data

Open Practices

All data and materials have been made publicly available via Open Science Framework and can be accessed at https://osf.io/vyibm/files/. The complete Open Practices Disclosure for this article can be found at http://pss.sagepub.com/content/by/supplemental-data. This article has received badges for Open Data and Open Materials. More information about the Open Practices badges can be found at https://osf.io/tvyxz/wiki/view/ and http://pss.sagepub.com/content/25/1/3.full.

Notes

1. We thank a reviewer for suggesting studies to rule out this explanation.
2. For a recent psychological model of these effects, see the general evaluability theory of Hsee and Zhang (2010). For recent economic models, see Bordalo, Gennaioli and Shleifer (2013) and Bushong, Rabin and Schwartzstein (2014).

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