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In this article, the authors propose some psychological principles to describe the boundaries of loss aversion. A key idea is that exchange goods that are given up “as intended” do not exhibit loss aversion. For example, the authors propose that money given up in purchases is not generally subject to loss aversion. The results of several experiments provide preliminary support for the hypotheses. The authors find that, consistent with prospect theory, loss aversion provides a complete account of risk aversion for risks with equal probability to win or lose. The authors propose boundaries for this result and suggest further tests of the model.

The Boundaries of Loss Aversion

Contrary to the standard assumption that only final states matter in choice, an increasing body of evidence indicates that the carriers of utility are generally not states but rather changes relative to a reference point (Camerer 2000; Kahneman and Tversky 1979). Furthermore, there is strong evidence for loss aversion—that is, changes for the worse (losses) loom larger than equivalent changes for the better (Kahneman and Tversky 1984; Tversky and Kahneman 1991). This idea has been invoked in a model of risky choice to explain risk aversion in money (Kahneman and Tversky 1979). The same idea has also been invoked in the domain of riskless choice to explain the endowment effect and other forms of reluctance to trade (Kahneman, Knetsch, and Thaler 1990; Thaler 1980; Tversky and Kahneman 1991; for additional examples, see Kahneman and Tversky 2000). In this article, we examine risky and riskless loss aversion simultaneously in an effort to understand the boundaries of this seemingly ubiquitous phenomenon.

An early demonstration of loss aversion in a riskless context (i.e., the endowment effect) used coffee mugs (Kahneman, Knetsch, and Thaler 1990). Experimental participants were randomly assigned to be either sellers, who were given a mug, or buyers, who were not given a mug. Sellers were asked about the minimum they would be willing to accept to give up the mug, and buyers were asked about the maximum they would be willing to pay to acquire the mug. On average, buyers were willing to pay no more than \$2.87, but sellers asked for \$7.12. As Thaler (1980) proposes, the

difference is explained by loss aversion for the mug. Sellers evaluate the mug as a loss, whereas buyers evaluate the mug as a gain.

In an additional condition of the experiment, choosers had a choice between receiving a mug and receiving money. The average amount that choosers required to prefer money to the mug was \$3.12. This value was not reliably different from the price set by buyers. Similar valuations of buyers and choosers as observed in the experiment create an interesting puzzle: Both buyers and choosers consider the mug a gain, but buyers expect to give up money, whereas choosers expect to receive money. A universal notion of loss aversion implies that buyers should set substantially lower dollar values than choosers, but the data of the original experiment violate this expectation. To explain this result, Tversky and Kahneman (1991) posit that there is no loss aversion in routine transactions. Our research develops this argument.

Although loss aversion was originally studied with respect to choices between two-outcome monetary gambles, researchers soon identified loss aversion in many contexts, including areas that are important to marketing managers and consumers. For example, research has found that price increases and decreases can have asymmetric effects that are consistent with loss aversion (Putler 1992; Winer 1986). Loss aversion can also explain a reluctance to upgrade durable items (Okada 2001). It can reduce the number of transactions in the marketplace (Knetsch 1989) and may cause consumers and managers to take fewer risks (Rabin 2000). For example, loss aversion has been implicated in the premium for stock returns over bond returns (Benartzi and Thaler 1995). Remarkably, people do not expect loss aversion in themselves or in others (Van Boven, Dunning, and Loewenstein 2000), making any consequences of loss aversion in the marketplace likely to be attributed to some other cause. A better understanding of loss aversion and its boundaries could have important implications for how managers and consumers operate in the marketplace.

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Subsequently, we review some of the previous research on loss aversion, and we discuss some discrepancies between the results of the present experiments and the findings that Bateman and colleagues (1997) report. We then describe how we extend the endowment effect paradigm and propose several hypotheses that simultaneously consider risky and riskless loss aversion. Next, we present the results of our risky and riskless endowment effect paradigm as preliminary evidence for the boundaries of loss aversion. Finally, we present a detailed account of loss aversion, including a set of propositions about its boundaries, not only for the situations in our experiments but also for many other situations that involve a risky or riskless exchange of goods.

A BRIEF HISTORY OF LOSS AVERSION

Thaler (1980) was the first to extend the concept of loss aversion to riskless decisions, suggesting that receiving a good had a much smaller valuation than did losing the same item. He offered loss aversion as an explanation of the endowment effect, which he defined as a discrepancy between buying and selling prices. Robust evidence of a buying–selling discrepancy has accumulated in studies of contingent valuation (see Cummings, Brookshire, and Schulze 1986) and in Knetsch's (1989) early experiment, in which he found that the price that students set for a chocolate bar was \$.90 if they were buying it and \$1.83 if they were selling it. Kahneman, Knetsch, and Thaler's (1990) mug studies provide more evidence for the endowment effect, linking it to loss aversion. Tversky and Kahneman (1991) review the evidence and offer a formal treatment of loss aversion. Since that time, many studies have compared the value of receiving versus forfeiting various items and have uncovered loss aversion in a wide variety of transactions. For example, Carmon and Ariely (2000) find the endowment effect for college basketball tickets, Sen and Johnson (1997) find the endowment effect for gift certificates, and Levin and colleagues (2002) find the endowment effect for choices of pizza topping based on the number of toppings considered the status quo. Using supermarket purchase data, Putler (1992) finds that consumers are more sensitive to increases than to decreases in egg prices. Similarly, supermarket purchases reveal that consumers are loss averse for both price and quality of orange juice (Hardie, Johnson, and Fader 1993). In addition, there is evidence that people can experience loss aversion for goods they never owned, such as choice options that were merely considered part of making a decision (Carmon, Wertenbroch, and Zeelenberg 2003; Dhar and Simonson 1992). The finding that people place more value on giving up an item than on receiving the same item has been shown in valuations of many other things, including wine (Van Dijk and Knippenberg 1998), lottery tickets (Knetsch and Sinden 1984), hunting permits (Cummings, Brookshire, and Schulze 1986), clean air (Cummings, Brookshire, and Schulze 1986), and time (Hoorens, Remmers, and Van De Riet 1999).

Several studies of the endowment effect use an experimental design in which people are randomly endowed with one of two goods and then allowed to trade their good for the other. By chance, half of the participants in these studies should receive the item that is of lower value to them, and therefore they should be willing to trade. However,

observed trade rates are far below this theoretical level. For example, Knetsch (1989) uses mugs and chocolate bars and finds a trading rate of approximately 10%; studies that involve different types of candy bars obtain a trading rate of approximately 30% (Chapman 1998).

Most researchers accept loss aversion as both a description and an explanation of the phenomenon being studied. However, a few studies examine moderators of loss aversion in an attempt to understand its underlying mechanisms. For example, Chapman (1998; see also Van Dijk and Van Knippenberg 1998) uses a similar exchange paradigm as Knetsch's (1989) and finds that the endowment effect is reduced when the endowed and unendowed items are similar, suggesting that loss aversion is related to the substitutability of goods in an exchange. Other studies show that loss aversion can build up over time, revealing that a shorter duration of ownership decreases loss aversion (Strahilevitz and Loewenstein 1998). More recently, research has shown that the designation of less of a fixed sum of money for necessities leads to decreased loss aversion (Wicker et al. 2001), suggesting that the availability of expendable resources mitigates loss aversion. Carmon and Ariely (2000) suggest that the different perspectives of buyers and sellers underlie loss aversion; they find that focusing buyers on benefits of the object and sellers on alternative uses of money attenuates the endowment effect. Some research has even eliminated loss aversion, either by focusing on certain goods (e.g., exchange goods of fixed value show no loss aversion; Van Dijk and Van Knippenberg 1996) or by inducing emotions just before the value elicitation (e.g., people who experience disgust do not show the endowment effect; Lerner, Small, and Loewenstein 2004). Although each of the studies suggests possible underpinnings of loss aversion, few attempts have been made to unify the ideas into a more general theory of loss aversion.

Some research has failed to replicate Kahneman, Knetsch, and Thaler's (1990) original finding of nearly identical values for buying prices and choice equivalents. Bateman and colleagues (1997; see also Bateman et al., in press) conduct several studies in which buyers' and choosers' valuations differ, and they conclude that any reduction in current endowment results in loss aversion, which is in contrast to the position that there is no loss aversion for items that are given up in routine transactions (Tversky and Kahneman 1991). This disagreement has led to an adversarial collaboration (Bateman et al., in press) that has attempted, not entirely successfully, to reconcile the conflicting results. We return to this issue subsequently.

EXTENDING THE ENDOWMENT EFFECT

The original study of the endowment effect had three conditions: buying, selling, and choice. Our experiments introduce two more conditions, which add an element of risk to the basic transactions of buying and selling. As we show in the next section, we use these risky conditions to determine the boundaries of loss aversion.

We endow participants in the "risky selling" condition with a good, as in the selling condition. We then offer them an opportunity to accept a balanced risk with two equally probable outcomes: (1) to retain the good and gain an amount of money or (2) to lose the good and receive nothing in return. Participants who refuse the gamble simply

keep the good. This situation is analogous to a player placing his or her mug into a poker pot. If the player wins the hand, he or she keeps the mug and gains some money. If the player loses, he or she gives up the mug and receives nothing. The minimum amount of money for which participants in this condition accept the risk is labeled “risky willingness to accept” (RWTA). In the poker example, this is analogous to the minimum size of the pot that would make a player willing to put in the mug.

In the “risky buying” condition, participants are offered a gamble with the following equally probable outcomes: (1) to receive the good and pay nothing or (2) to pay an amount of money and not receive the good. If participants refuse the gamble, their endowment does not change. The risky buyer’s situation is analogous to that of a poker player who puts money into a pot that already contains a mug. If the player wins, he or she gets the mug and keeps the monetary stake. If the player loses, he or she gives up the money and does not get the mug. The maximum amount for which a participant in the risky buying condition will accept the gamble is labeled “risky willingness to pay” (RWTP). In the poker example, this is analogous to the maximum amount of money that a player would be willing to put into the pot for a chance to win the mug.

Hypotheses

The subsequent hypotheses summarize predictions for the risky and riskless conditions of the endowment paradigm. Willingness to accept (WTA) refers to the minimum price that sellers demand to give up their good. Choice equivalent (CE) refers to the minimum amount of money for which choosers prefer receiving money to receiving the good. Willingness to pay (WTP) is the highest price that buyers are willing to pay for the good. The first two hypotheses predict replications of Kahneman, Knetsch, and Thaler’s (1990) results. We expect the results to confirm the discrepancy between CE and WTA and the similarity between WTP and CE.

H₁: $WTA/CE > 1$ (endowment effect).

This inequality states that sellers set a price that is higher than the CE set by choosers, who are not endowed with the good, corresponding to Kahneman, Knetsch, and Thaler’s (1990) definition of the endowment effect. The ratio is an estimate of the coefficient of loss aversion.

H₂: $CE/WTP = 1$ (no loss aversion in buying 1 [NLIB 1]).

This hypothesis is based on Kahneman, Knetsch, and Thaler’s (1990) results, in which observed buying prices and CEs were similar. H₂ implies that buyers do not evaluate as a loss the money that is given up to purchase a good in a normal transaction. If buyers experience loss aversion for the money they spend, then instead of H₂, we would expect $CE = \alpha_m WTP$, where α_m is the loss-aversion coefficient for money. Our interpretation of H₂ is that money is normally held for the purpose of exchange, and there is no loss when that purpose is fulfilled. This hypothesis is central to the difference between our theory and Bateman and colleagues’ (1997; see also Bateman et al., in press) theory. We expand our discussion of this hypothesis and explain the difference between the two theories in the final section of the article.

The last two hypotheses compare the riskless conditions with the new risky conditions. H₃ provides a comparison of risky and riskless loss aversion. Support for H₃ would enable H₄ to provide a second test for loss aversion for money spent in buying.

H₃: $RWTA/WTA = 1$ for balanced risks (no risk aversion beyond loss aversion).

This hypothesis states prospect theory’s untested implication that loss aversion can completely explain the risk-averse preferences observed for balanced gambles. If other sources of risk aversion are present (e.g., uncertainty aversion), RWTA should exceed WTA because though both conditions include loss aversion, only the former includes risk. Support for this hypothesis would also provide evidence that the magnitude of loss aversion is the same in both risky and riskless decisions.

H₄: $WTP/RWTP > 1$ (NLIB 2).

Risky buyers are in a similar situation to that of buyers, except that they face a risky decision rather than a riskless one. Because risky buyers are gambling their money, we expect loss aversion for that money. By comparing risky buyers’ prices to buyers’ prices, we can test whether buyers also have loss aversion for money they are spending. As does H₂, H₄ proposes that buyers do not have loss aversion for money spent on purchases, and therefore they should be willing to pay more than risky buyers for the same good.

Note that the prediction rests on two assumptions that H₃ tests. First, it assumes no risk aversion beyond loss aversion. Otherwise, the comparison between risky buyers and buyers would reveal the risk aversion of risky buyers rather than a lack of loss aversion among buyers. Second, this prediction assumes that loss aversion has the same magnitude in risky and riskless situations. If this were not the case, the comparison between risky and riskless buyers would be inconclusive (for a summary of the hypotheses, see Table 1).

EXPERIMENTAL METHODS

We conducted the experiments we report herein over a period of several years, using Kahneman, Knetsch, and Thaler’s (1990) endowment paradigm, with the two additional conditions that we described previously (i.e., risky selling and risky buying). All the experiments were conducted in groups. We conducted some experiments in classes, and others involved the recruitment of paid participants. There were five conditions, but we did not use all conditions in each experiment. We used various inexpensive goods, including chocolates, pens, and mugs. The details of the individual experiments appear in the Appendix. This article includes all experiments in the series; we did not discard any individual data.

We began all experiments by randomly allocating color-coded forms to the respondents. A good (e.g., a mug) was given to participants who received the seller or risky seller forms. Participants then completed the form, which asked them to indicate their preference in a series of choices involving the good and an amount of money. We informed participants that one of the amounts of money had been pre-selected and that their preference involving that amount would determine their outcome. We used this format to elicit preferences that would be free of biases caused by

Table 1
SUMMARY OF HYPOTHESES

<i>Hypothesis</i>	<i>H₁: Endowment Effect</i>	<i>H₂: NLIB 1</i>	<i>H₃: No Risk Aversion Beyond Loss Aversion</i>	<i>H₄: NLIB 2</i>
Comparison	WTA/CE > 1	CE/WTP = 1	RWTA/WTA = 1	WTP/RWTP > 1
Interpretation	Sellers have loss aversion for giving up a mug, whereas choosers have no loss aversion for receiving a mug.	Buyers' evaluations are similar to those of choosers because buyers do not have loss aversion for money they are giving up.	Adding risk to selling does not affect valuations, because selling already involves loss aversion, and there is no risk aversion beyond loss aversion.	Unlike risky buyers, buyers do not experience loss aversion for money they are giving up.

strategic responding (Becker, Degroot, and Marschak 1964).

Choosers were offered a choice between receiving the good and receiving an amount of money. They made this choice for a series of dollar amounts. Choosers' instructions read as follows:

Please mark your choice for each of the values below. "Yes" indicates: "I prefer to receive this amount rather than [a mug]."

\$25.00	Yes	No
\$24.00	Yes	No
⋮		
\$2.00	Yes	No
\$1.50	Yes	No
\$1.00	Yes	No
\$.50	Yes	No

The CE for the good was set at the midpoint between the lowest offer accepted and the highest offer rejected. For example, if a participant preferred \$2.00 to the good and preferred the good to \$1.50, we recorded the CE at \$1.75.

We gave sellers a good and told them that it was theirs to keep. We then asked them to consider an opportunity to sell the good at each of several prices. If they refused to sell the good at the preselected price, they would simply keep it. We gave them the same list of amounts as the one we gave the choosers, and we asked whether they would accept each amount of money in exchange for their good. Circling "Yes" indicated "I agree to give up my [mug] in exchange for this amount of cash." The midpoint between the lowest offer accepted and the highest offer rejected is the WTA.

We offered buyers an opportunity to buy the good at various prices using their own money. We showed them the list of dollar amounts, and they indicated for each amount whether they would be willing to buy the good at that price. If they refused to buy the good at the preselected price, they would leave the experiment with their endowment unchanged. For buyers, "Yes" indicated "I agree to pay this amount to receive [a mug]." The midpoint between the highest price accepted and the lowest price rejected is the WTP.

We gave risky sellers a good and told them that it was theirs to keep. We then offered them a gamble with equal chances: (1) to win an amount of money and keep their good or (2) to lose the good and receive no money. If they refused the gamble at the preselected price, they would simply keep the good. Participants indicated whether they would accept or refuse the gamble for each dollar amount. "Yes" indicated "I accept a gamble with the following pos-

sible outcomes: 50% chance to receive this amount of cash and give up nothing or 50% chance to give up my [mug] and receive nothing in return." The midpoint between the lowest amount for which the gamble is accepted and the highest amount for which the gamble is rejected is the RWTA.

We offered risky buyers a gamble with equal chances: (1) to receive the good and pay nothing or (2) to pay the selected amount without receiving the good. They were asked whether they accepted or refused the gamble for each cash amount. "Yes" indicated "I accept a gamble with the following possible outcomes: 50% chance to receive [a mug] at no cost or 50% chance to pay this amount and receive nothing in return." The midpoint between the highest amount for which the gamble is accepted and the lowest amount for which the gamble is rejected is the RWTP.

After all participants recorded their preferences and the response sheets were collected, a preselected price was revealed, all riskless transactions were settled, and all gambles were played out with a coin toss. The variations in the individual experiments appear in the Appendix.

EXPERIMENTAL RESULTS

Each row in Table 2 corresponds to one experiment. The first five columns show the median dollar response for all experimental conditions. The sixth column presents the average number of participants per condition for each experiment. The last four columns present the four ratios corresponding to H_1 – H_4 . The last row in Table 2 presents the total number of participants in each of the five experimental conditions, as well as aggregate results (in bold) for the four ratios. We obtained the aggregate for each ratio by weighting the ratio observed in each experiment by the average number of participants in the conditions of that experiment (Column 6).

We used a bootstrapping method to estimate confidence intervals for the ratios we computed in each experiment, as well as for the aggregate data. We sampled the data of every condition in each experiment with replacement to reproduce the entire set of experiments. For example, if a particular condition in a particular experiment had 50 responses, we sampled the responses with replacement 50 times to generate a sample of the same size as the original data. We repeated this procedure 1000 times. We used the resultant distributions to derive 95% confidence intervals for the aggregate ratios that we show in the last row of Table 2 and also for each ratio in every experiment separately. The con-

Table 2
RESULTS

Study		RWTA	WTA	CE	WTP	RWTP	Average N per Condition	Computed Ratios			
								WTA/CE	CE/WTP	RWTA/WTA	WTP/RWTP
1	Median		7.50	3	2.75		24.33	2.5	1.09		
2	Median	2.25	3.75	1.75	1.25	.525	53.6	2.14	1.4	.6	2.38
3	Median	2.50	2.25				68.5			1.11	
4	Median		2.12	1.62			34.5	1.31			
5	Median	4.75	4.25	2.75			51.67	1.55		1.12	
6	Median	2.75	4.75	3			22.67	1.58		.58	
7	Median	3.75	3.25	1.75	3.25	1	37.4	1.86	.54	1.15	3.25
8	Median	6	10	4.75	4.25	3.75	33.6	2.11	1.12	.6	1.13
Total	N	259	340	256	148	122	1125	1.85	1.07	.91	2.31

confidence intervals for the aggregate results appear in Figure 1. Next, we review the statistical evidence for each of the hypotheses.

- H₁: WTA/CE > 1: As predicted, selling prices were higher than CEs, replicating the endowment effect. The aggregate estimate of this ratio is 1.85, which is close to the values observed in previous experiments. The 95% confidence interval included 2 in five of the seven relevant experiments and included 1 in only two experiments.
- H₂: CE/WTP = 1: As the NLIB 1 hypothesis predicts, buying prices and CEs were not significantly different. The aggregate estimate of the ratio of CE to WTP was 1.07. The confidence interval included unity for all four of the relevant experiments.
- H₃: RWTA/WTA = 1: Risky selling prices did not differ significantly from selling prices. Because both conditions include losses and only risky selling includes risk, this result supports the hypothesis that there is no risk aversion beyond loss aversion. The aggregate estimate of the ratio of RWTA to WTA is .91. The 95% confidence interval estimated separately for each experiment included unity for all six relevant experiments.
- H₄: WTP/RWTP > 1: The aggregate estimate of the ratio is 2.31, but the results for this comparison were highly variable. In Experiment 7, the ratio was unusually high (3.25), apparently because WTP was aberrantly high and the confidence interval barely included 2. In Experiment 8, the ratio was very low (1.13), and the confidence interval did not include 2. Further empirical work is needed to demonstrate this result definitively.

The results support several conclusions. First, there is no loss aversion for money that is given up in a purchase. This

was supported by the similarity of choosing and buying prices. If there were loss aversion for the money that buyers give up, we would expect buying prices to be approximately half of the CE set by choosers. This conclusion is also supported by the finding that loss aversion can be induced for money that is given up in an exchange if that exchange is a risky exchange. Risky buyers stated a price that was approximately half of the CE, so we can infer that risky buyers (as opposed to buyers) are loss averse for the money they are giving up.

Second, there is no risk aversion beyond loss aversion in balanced risks. Sellers are loss averse for the good that they are giving up, and apparently risky sellers exhibit the same degree of loss aversion for the good that they are wagering. If there were risk aversion beyond loss aversion, risky sellers should have set a higher price than sellers. That they set approximately equal prices suggests that there is no aversion to risk per se. This finding further supports the idea that there is no loss aversion for money that is given up in routine purchases, because it suggests that the difference between buyers and risky buyers can be attributed to loss aversion in the latter but not in the former. Any risk-related differences between buyers and risky buyers would have been mirrored with sellers and risky sellers, assuming risk aversion operates similarly for buying and selling.

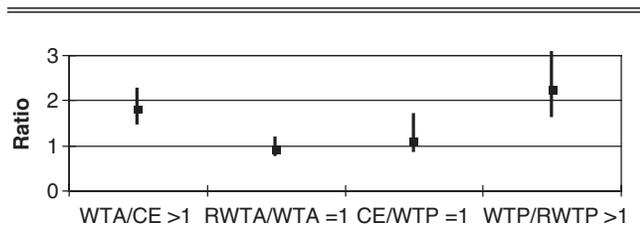
THREE PROPOSITIONS ABOUT THE PSYCHOLOGY OF LOSS AVERSION AND ITS BOUNDARIES

In this section, we present three main propositions that we derive from our data and previous loss-aversion research. In addition to the propositions, we also discuss the conditions under which we expect each proposition to fail.

P₁: The value attached to a consumption good that is given up in an exchange reflects loss aversion.

This proposition entails reluctance to exchange one good for another. However, a simple thought experiment suggests circumstances under which it fails. Consider a shopper who is asked to exchange a good for a similar one that comes in an undamaged package. The shopper is unlikely to experience loss aversion when giving up a good for a nearly identical one. As the example shows, there are exchanges in which a consumption good is given up without loss aversion. We suggest that our first proposition fails when all the benefits of the good that is given up are present in the acquired good. In other words, we believe that loss aversion

Figure 1
CONFIDENCE INTERVALS (95%) AROUND AGGREGATE RATIO ESTIMATES



operates on benefits rather than on attributes of goods. Thus, goods with different attributes that provide the same benefits can be exchanged without loss aversion. For example, there is no loss aversion for an old car that is traded in as part of the purchase of a new car if the new car is perceived as having all the benefits of the old one. Consider trading in an old car that has a cassette player for a new car that has a CD player. If the CD player is perceived to provide the same entertainment benefit as the cassette player, there is no loss aversion when the cassette player is given up. This prediction is consistent with research that finds that close substitutes show less loss aversion in exchange (Chapman 1998; Van Dijk and Van Knippenberg 1998). What matters here is not objective similarity but rather the agent's perception of the relationship between the good that is given up and the one that is acquired. A direct test of this boundary of loss aversion might include a study that manipulates the perceived benefits of two consumption goods. For example, focusing on the low-level, concrete benefits that are different between two goods (e.g., playing tapes versus playing CDs) should produce more loss aversion than focusing on higher-level benefits that are more similar across the goods (e.g., hearing favorite music on demand).

P_2 : Goods that are exchanged as intended are not evaluated as losses.

The operative phrase in P_2 is "as intended," and the same good can be intended for different uses by the different parties to a transaction. For example, consumers intend to wear the shoes they own, but a shoe merchant holds shoes with the intention of exchanging them for money. Thus, the merchant can sell the shoes without loss aversion, whereas the consumer cannot (unless the proceeds of the sale are designated to buy replacement shoes, as in P_1). This idea can be tested by manipulating intentions for a good (either to consume or to exchange) and determining whether the ratio of selling price to CE is much higher when the intention is consumption.

The primary exchange good for consumers is money, and a consumer's set of intentions for money can be described as a budget (Heath and Soll 1996), which specifies a set of consumption goods that will be acquired within a period, as well as the amounts to be spent on the purchases. Executing a budget still involves choices, but these are often choices between substitutes (e.g., different brands of cereal, different forms of entertainment), which do not typically evoke loss aversion. Furthermore, we believe that many fortunate customers have a budget that includes a category of "miscellaneous expenses," which covers minor purchases that are not specifically anticipated. Although the goods acquired in such purchases are not close substitutes in consumption, the money they cost is spent as intended and is not evaluated as a loss. We believe that this describes most of the buyers in our experiments, who indeed do not exhibit loss aversion for the money they are spending. The NLIB hypothesis is a special case of P_2 .

However, not all consumers maintain an allowance for miscellaneous spending. Some consumers operate with a budget that only covers necessities, either because their resources are tightly limited or because they value thrift and assign all surplus to a budget category of saving. Consumers who maintain a tight budget occasionally engage in opportunistic purchases, but the acquisition of a good that

was not budgeted for is associated with giving up some other good (either consumption or savings), which is evaluated as a loss in the decision. This is consistent with the finding that there is more loss aversion when a greater proportion of money is designated for necessities (Wicker et al. 2001). Note that choosers who are offered a good or an amount of money do not have the same dilemma. Therefore, in experiments such as ours, CEs may sometimes be higher than buying prices—contrary to the unqualified NLIB hypothesis—depending on whether the participants' individual budgets allow for miscellaneous expenses. Therefore, we qualify the NLIB hypothesis by the added assumption that consumers who maintain a tight budget exhibit loss aversion for small, unanticipated purchases (i.e., buying prices are lower than CEs). In extreme cases, such consumers may have buying prices as low as their own risky buying prices.

The tight-budget effect that we propose is distinct from an income effect. Income effects arise from the change in wealth that is induced by giving choosers (and not buyers) something for free. This would induce a discrepancy between buying and choice when the amounts at stake are substantial enough to change a person's feeling of overall wealth. For the goods in most endowment effect studies, offering the good to choosers at no cost is unlikely to change their wealth sufficiently to produce measurable changes in their value for goods and money. The budget effect is not dependent on the value of the good but rather on whether a person has money allocated for miscellaneous expenses. When people's budgets do not allow for such expenses, the valuations of buyers and choosers should diverge sharply. The budget interpretation is also distinct from the idea that the trade-off between money and consumption goods varies with people's wealth. If poorer people have tight budgets and also value money more than other people do, we would expect their financial situation to affect CEs as well as WTP. Therefore, increasing wealth does not necessarily influence the ratio of CE to WTP. However, the budget effect only affects WTP. In other words, a less wealthy consumer might value money more both in choosing and in buying, whereas a tight budget reduces buying prices but not CEs. Differences between CEs and WTP would suggest a budget effect rather than an effect of wealth. Note that risky buyers were facing the possibility of giving up their money without receiving any good in return, which is not what money, even in a miscellaneous account, was intended for. Therefore, P_2 does not preclude risky buyers from being loss averse for the money they wager. The tight budget idea can be tested by measuring people's mental budgets and eliciting their WTP and CEs for various goods.

Although our data provide support for NLIB, the results of some other experiments provide evidence against this hypothesis. The experiments that Bateman and colleagues (1997) report and the experiment that the subsequent adversarial collaboration (Bateman et al., in press) reports (all of which were conducted at the University of East Anglia) provide evidence that money spent in buying is subject to loss aversion. In the jointly designed experiment (Bateman et al., in press), the ratio of CE to WTP was 1.67, significantly in excess of 1. Estimates of the ratio of WTA to CE ranged between 1.25 and 1.40. The number of observations was approximately 40 per condition. These results show loss

aversion for money in buying and little, if any, loss aversion for the good in selling. As we stated previously, Bateman and colleagues (1997; Bateman et al., in press) believe that loss aversion applies to any loss from the status quo, including money spent in routine purchases. How could these conflicting findings be reconciled? Most studies showing the endowment effect have been conducted in North America, often using students as respondents, whereas Bateman and colleagues (1997; Bateman et al., in press) use U.K. students. Therefore, we conjecture that the subject pools may be one cause of the discrepancy and, more specifically, that differences in mental budgets may exist between the subject pools in the current studies and those that Bateman and colleagues (in press; see also Bateman et al. 1997) use. If their participants do not perceive that they have budget reserves, they may show loss aversion for the money they are spending, whereas our participants seem to perceive that they have reserves, and therefore they do not exhibit loss aversion in buying. Additional evidence is necessary to test this idea, and other factors may also contribute to the empirical discrepancy.

P_3 : There is no risk aversion beyond loss aversion in balanced risks.

We derive P_3 by extending prospect theory to riskless choice, which involves the strong assumption that a consumption good is evaluated identically (as a loss) when it is lost in a gamble and when it is given up in an exchange (i.e., $RWTA = WTA$). We believe that this holds under two conditions. First, income effects, which are different in risky and riskless selling, must be small enough to be negligible. We certainly do not expect $RWTA$ to be equal to WTA among people who are selling their house. In this case, the income effect is substantial, because for most people, the loss in risky selling would have a significant effect on future consumption. In psychological terms, the first condition for the equivalence of risky selling and selling is that losing the gamble should not cause a person to feel substantially poorer than he or she did previously. Second, the evaluation of the good given up and the evaluation of the money received should be separate. In psychological terms, separability breaks down when the loss associated with giving up the good is mitigated by explicitly linking it to the compensation received (e.g., by intentions to use the compensation to replace the sold item).

Together, these two conditions imply that the equivalence between $RWTA$ and WTA breaks down for goods with values so large that their loss substantially changes a person's future consumption and for goods that are expected to be replaced if they are sold. Comparison of $RWTA$ and WTA with the CE can identify which of the two mechanisms is producing the discrepancy between $RWTA$ and WTA . An increase in the ratio of $RWTA$ to CE suggests income effects, because anticipation of a substantial change in wealth if the risky sale is lost increases $RWTA$. A reduction in the ratio of WTA to CE suggests a failure of separability, because the linking of the compensation received to the loss of the good decreases loss aversion in the selling transaction. A study that manipulates the perceived wealth effect (e.g., by making the loss seem relevant or irrelevant to future consumption) and examines changes in the ratio of $RWTA$ to WTA would provide a test for the first qualification. Manipulating the connection between the proceeds of

the sale and the loss of the good would provide an empirical test for the second qualification. Some people may object to certain types of risks in principle and therefore may be unwilling to accept them at any price. Moral opposition to gambling can also induce differences between WTA and $RWTA$, but this is beyond the scope of our discussion.

MARKETING IMPLICATIONS OF LOSS AVERSION AND ITS BOUNDARIES

The ideas presented in this article may provide some insights into how marketers and consumers can operate more effectively in the marketplace. Although loss aversion may be an important mechanism for the success of several practices that are already widespread in marketing, our research suggests some additional practices that can help both consumers and marketers achieve their goals.

Transactions between firms and consumers can be roughly categorized into three types: selling to consumers, exchanging with consumers, and buying from consumers. For firms that only sell to consumers, loss aversion can have numerous effects that marketers should consider. For example, loss aversion may contribute to the success of some trial offers and even increase perceived brand loyalty, because when consumers are endowed with a particular good, their value for that good increases. Although certain consumers may not be willing to pay the market price to try a good, they may pay the market price to avoid losing that good. Similarly, any arrangements that delay payment until after consumption has commenced leave the consumer to decide whether to pay to avoid losing consumption, as opposed to paying to gain consumption. Drawing on the ideas we presented previously, such marketing tactics may also influence consumers by affecting their loss aversion for money. If the onset of consumption starts consumers thinking about how they could fit the new item into their budget, the good can be transformed during the trial period from an extrabudgetary purchase to part of the consumer's budget. If this happens, the money that is spent on that purchase is less likely to evoke loss aversion, thus making the payment easier. From the consumer's perspective, this change in valuation may be helpful or harmful. Fortunately, there are two ways the effects may be mitigated. First, consumers can continue to think of a product in a trial period as on loan and not something they own, keeping it out of their mental endowment and mental budget. Second, they can remember that their budget should reflect their true priorities with respect to consumption and not necessarily their current consumption.

Drawing on P_2 , marketers may be able to circumvent loss aversion if a particular purchase is reframed as being part of a budget rather than an extrabudgetary purchase. Although consumers set budgets to limit their spending (Heath and Soll 1996; Thaler 1985), the same budgets can be used ironically to increase spending. For example, encouraging consumers to frame previously unanticipated purchases as part of existing budget categories may make the money spent on those purchases easier to spend. If marketing communications frame indulgent purchases as part of a "good for your mental health" budget, they may reduce the loss aversion for money that is used to make such purchases. An experiment that changes nothing about a product but its budgetary category and tests for differences in loss aversion would provide evidence of the viability of such a practice. From

the consumer's perspective, it is important to be wary of marketers that influence the budget category of a particular purchase. Consumers should allocate budgeted resources to the best purchase for achieving the goals of each budget category. If the target item offers the best way to satisfy the consumer's goal, the consumer will benefit from the marketer's reframing.

In exchanges with consumers, such as when a durable good (e.g., car, appliance) is upgraded, loss aversion provides some guidelines on how best to implement the transaction. The decision to buy a new durable good involves several considerations. A consumer thinks not only about the value of the new product but also about the value of the old product that may be forgone if the purchase is made. Imagine how much more difficult it would be to sell a car to someone who already owns a car if that person experiences loss aversion for giving up the old car (e.g., if the car is perceived to have unused value; Okada 2001). Marketers may mitigate loss aversion for giving up the old product by accepting it as a trade-in. By having consumers think about trading in their old item as part of the purchase of the new product, the benefits of the new product are linked to the benefits of the old product, such that giving up the old product does not entail giving up any benefits. As we suggested previously, there is no loss aversion when the benefits of the item that is given up are perceived to be completely replaced by the item that is acquired. Drawing on P_2 , marketers could induce consumers to think about their old durable products as being held for the purpose of exchange rather than for continued consumption. This should also reduce consumers' reluctance to upgrade. For consumers, marketing practices that reduce the value for goods that they already own may or may not be beneficial. Although it may be beneficial to set a low price to sell rarely used items during a yard sale, it may not be beneficial to upgrade durable goods every time new features are offered. Consumers can combat this marketing tactic by thinking separately about the two components of an upgrade. For example, a consumer might consider separately how much he or she would accept for giving up an old car and how much he or she would be willing to pay to enjoy the enhanced benefits of the new car.

Another influence in the decision to upgrade is the perceived substitutability of the old and new items. If the old item is perceived as dissimilar to the new item, loss aversion for the old item is more likely, and upgrading is more difficult. However, marketers and marketing communications can affect perceptions of substitutability. It would be worthwhile to test whether experimental manipulation of the perceived similarity between two items would reduce the reluctance of participants to exchange the items, holding the objective similarity of the items constant. One way to conceptualize substitutability is to consider whether two items satisfy the same goal. Recent research (Markman and Brendl 2000) has shown that the temporary activation of goals can influence consumer choice. Together with the present research, this suggests that activating a broad versus narrow goal could influence whether consumers have loss aversion for an item that is given up in exchange for another item. The items are more likely to seem substitutable with a broad goal than with a narrow goal. Marketers should keep in mind that though perceived similarity may increase consumers' willingness to trade, it may also reduce their WTP

for the trade, because it is the differences between the two items that are being paid for. Taking the two effects of similarity together, marketers would be well served by increasing the perceived similarity for all attributes except those that are motivating the upgrade (i.e., those that make the new product superior to the old product). That is, vertical differences should be emphasized, and horizontal differences should be minimized.

For marketers that buy used goods from consumers (without necessarily selling them upgrades), encouraging consumers to designate the proceeds of the sale for a replacement item may help consumers part with the good without loss aversion. If the proceeds are perceived as replacing the benefits of the good that is given up, separability breaks down, and the old good is viewed as part of a transaction that ultimately replaces the benefits. According to the qualification of P_1 , this situation is unlikely to evoke loss aversion for the good that is given up.

The present research might also offer insights into prior research on mental accounts and budgets (Heath and Soll 1996; Thaler 1985). These theories put forward the notion that money cannot be transferred without cost from one account or category to another. The idea that loss aversion applies only to money that is not spent as intended could be one explanation for this lack of fungibility. When an expenditure requires money that was not allocated for that purpose, loss aversion in the evaluation of that money may be responsible for the mental accounting effect. If loss aversion is the primary cause of nonfungibility, we might expect to observe WTP that is about half that of consumers who have funds allocated for the target purchase. This would be consistent with many studies that find a loss-aversion coefficient of approximately 2.

The structure of budget intentions probably varies with income, cultural norms, recent windfalls, and even individual personalities, so it would be worthwhile to test for differences in the functioning of our propositions across different consumer segments. Consumers with different budgets, with or without a surplus category, and with or without an allocation for a particular category of goods respond differently to the same marketing efforts. Therefore, marketing could be tailored to consumers with certain types of budgets. For consumers who allocate money only to savings and specific categories of consumption (i.e., no surplus category), marketers' most effective message may be one that frames their product as an investment. For example, a marketing communication that suggests that money is safe in a particular durable purchase because it holds its value well may induce consumers to categorize the expenditure as savings rather than as consumption. This removes the loss aversion for the money that is spent by changing the extra-budgetary purchase into a budgeted use, in this case, savings. Because such messages are about allocations of savings, consumers should evaluate them by considering whether they really would be able to recover their savings when they need it by selling the good and whether there are other, more suitable forms of savings.

CONCLUSIONS

A theory should be as simple as possible but not simpler, and a realistic theory of loss aversion is unlikely to be simple. In its simplest form, loss aversion is applied to all negative departures from the status quo (Bateman et al. 1997).

Although early work finds loss aversion to be ubiquitous, applying to many types of goods and risks, it is important to note that there are limits to loss aversion. In this article, we focused on individual intentions and how such intentions can produce or inhibit loss aversion. The analysis we offer herein is substantially more complex than that of previous work on this topic, because the coding of outcomes as gains and losses depends on the agent's intentions and not only on the objective state of affairs at the moment of decision. Despite this added complexity, researchers have developed a formal model that captures intentions as a moderator of loss aversion (Koszegi and Rabin 2004).

Intentions define a good as an object of exchange or as an object of consumption, and therefore they determine whether giving up that good is evaluated as a loss or a foregone gain. Budgeting intentions distinguish between within-budget expenditures, which are not treated as losses, and extrabudget expenditures, which evoke loss aversion. Beyond effects of intention, we suggest that similar transactions can be evaluated differently depending on their size, with separability holding when the stakes are small but not when they are large.

Although the ideas we present herein are consistent with much prior research, they also provide new predictions. Intentions are the key to this analysis, and we expect research that measures or manipulates intentions to shed light on the boundaries of loss aversion.

APPENDIX: VARIATIONS IN THE INDIVIDUAL EXPERIMENTS

Study 1 was conducted with 73 participants who were enrolled in psychology courses at a public Western Canadian university. The order in which dollar amounts were presented was counterbalanced in all three conditions (i.e., sellers, buyers, and choosers). We used mugs decorated with university markings in this study. Otherwise, the procedure corresponds to the procedure we describe in the "Experimental Methods" section.

Study 2 was conducted with 268 participants who were enrolled in a psychology course at a public California university. We gave all participants six hypothetical decisions before receiving the decision for real stakes that we report in the results section. We used all five conditions for the real stakes decision in which the good was a Parker Jotter pen. We counterbalanced heads and tails across participants in the two risky conditions. We listed the prices in descending order in all five conditions.

Study 3 was conducted with 140 participants who were enrolled in a psychology class at a public California university. All participants made three hypothetical decisions, all sell or risky sell decisions. Then, we gave all participants Parker Jotter pens and one of two instruction sheets for either the selling or the risky selling conditions.

Study 4 was conducted immediately following Study 3 and involved the same participants. (The number of participants in Study 4, 69, is less than that in Study 3 because some participants were given a different task.) We gave half of the participants a chocolate bar; then we gave them an opportunity to sell it. They indicated their willingness to sell for each possible selling price. We gave the other half of the participants the choice between a chocolate bar and a cash payment.

Study 5 was conducted with 202 participants from a public California university, separating them into three condi-

tions: sellers, choosers, and risky sellers. The good was a pair of Toblerone chocolate bars.

Study 6 was conducted with 68 participants from two large New York City universities. They were assigned to three conditions: selling, choosing, and risky selling. We listed all dollar amounts in descending order. The good was a university mug.

Study 7 was conducted with 187 participants from a public California university. They were assigned to five conditions. They answered five questions, with the second question involving real stakes and the other questions being hypothetical. Participants were made aware that the second question was for real stakes. We gave participants in the seller and risky seller conditions a boxed Parker Jotter pen. All dollar amounts were listed in descending order.

Study 8 was conducted with 168 graduate and undergraduate business students from a private Pennsylvania university, randomly assigning them to five conditions. We counterbalanced the order of dollar amounts. The good was a bag of Godiva chocolates.

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