THE ENDOWMENT EFFECT:
EVIDENCE OF LOSSES VALUED MORE THAN GAINS

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It has long been assumed that an individual's valuations of a good are independent of his or her entitlement to the good. In the absence of a wealth (or income) effect, the maximum sum a person would agree to pay to obtain the good should be equal to the minimum amount the person would demand to give it up. The traditional view that, "...we shall normally expect the results to be so close together that it would not matter which we choose" (Henderson, 1941, p. 121) (when the usual income effects are allowed for) is central to conventional economic theory. This view also provides the working assumption of economic practice in such diverse situations as predicting market responses, assessing damages for environmental harms, and the design of public policies.

There is, however, little or no empirical support for the empirical assertion of people's symmetrical valuations of gains and losses and the presumed economic choices and behavior that results from them. Instead, tests consistently indicate that people value the loss of an entitlement more, and usually far more, than a fully commensurate gain and make choices accordingly.

The early empirical evidence of a wide disparity between people's valuations of gains and losses appeared in results of contingent valuation studies in which respondents were asked both how much they would be willing to pay to prevent a loss of an environmental or other amenity, and what sum they would demand to accept its loss. In perhaps the first of these, duck hunters were reported to be willing to pay an average of $247 to prevent the loss of an area of duck habitat but demanded $1044 to accept its loss (Hammack and Brown, 1974). Many similar results were subsequently reported of people's valuations of environmental as well as other goods. Thaler (1980), for example, found that the minimum compensation people demanded to accept a .001 risk of death was one or two orders of magnitude greater than the maximum amount they would pay to avoid the same risk.

Table 1

Results of a random price market for coffee mugs. Subjects given a mug demanded more to give up the entitlement than others were willing to pay to gain a mug

	Mean	Median
Selling price	$5.78	$5.75
Buying price	2.21	2.25

1. Experimental Verification

The findings of large asymmetries in valuations of gains and losses in responses to hypothetical survey questions, prompted a further series of experimental tests involving real exchanges of goods and money. In the first of these real money experiments, one half of the participants were asked to pay varied sums to obtain a lottery ticket and the other half of the subjects were given a ticket and then offered different amounts of money to give it up (Knetsch and Sinden, 1984). When real good and actual cash payments motivate the valuations, the subjects having a lottery ticket demanded four times more to give it up than the others were willing to pay to obtain one.

The large disparity between buy and sell valuations has repeatedly also been evident in the results of a large number of market experiments. These include more persuasive random price tests in which subjects know that their bids to buy and offers to sell can have no conceivable effect on the eventual ruling price – as this is known to be determined randomly – and therefore know that there is no strategic reason to nominate any price other than one representing the true value. In one such experiment, mugs were given to one half of the participants and, after extensive explanations and two hypothetical trials, they were asked their minimum selling price; with the other half asked their maximum buying price (Kahneman, Knetsch, and Thaler, 1990). The results are given in Table 1, which show that the minimum sum needed to compensate losers was about two and a half times the maximum amount that others were willing to pay for the same mugs.

Similar findings of large differences have been found in between-subject real exchange experiments (in which participants in one group are offered an opportunity to acquire a good and those in another group an opportunity to give up the same good) but in within subject experiments, in which the same individuals can both acquire and give up a good. In one such test, the same twenty-eight individuals were given the opportunity to value a gain (loss) of a fifty percent chance to win $20 by offering to both buy (sell) such a prospect (Kachelmeier and Shehata, 1992). The experiment controlled for order effects by having half of the subjects buy first and the other sell first. Table 2 gives the results of this experiment. The value of this simple prospect was much larger in the domain of losses than in the domain of gains, which is consistent with essentially all experimental tests for an endowment effect. In this case, individuals on average de-

Table 2

Same subjects' valued losing a 50 percent chance to win $20 more than
they valued gaining the same entitlement

Mean willingness to pay to acquire	$5.43
Mean compensation demanded to give up	10.50

manded about twice as much to lose the prospect than they were willing to pay to gain it.

2. Exchanges

Many experimental studies have demonstrated a large asymmetry between the value of a loss and a gain of an otherwise fully commensurate entitlement in the context of a market exchange in which opportunities to exchange money and goods are offered to subjects. Such differences have also been shown in exchange experiments in which individuals exhibit reluctance to made simple trades: the value of the loss of a good looms larger than the value of the gain.

One straightforward exchange experiment was conducted with three groups in which all participates were given the opportunity to obtain one of two goods – a 400 gram chocolate bar or a coffee mug (Knetsch, 1989). The first group ($N = 55$) was given a simple choice between receiving a mug or a chocolate bar. The second group ($N = 76$) was given a mug, and then offered the opportunity to exchange (costlessly) it for a chocolate bar. The third group ($N = 87$) was provided with the opposite choice of first receiving a chocolate bar and then given the chance to give it up and obtain a mug in exchange. Given the absence of any possible income effects or wealth constraints, and minimum, if any, transaction costs necessary to make an exchange, traditional economic theory provides the strong prediction that the proportions of subjects indicating a preference for mugs over chocolate bars, and the proportions with the opposite preferences, should be roughly the same for each of the three groups.

The results, indicating a very different pattern from the one predicted by conventional views of valuation symmetry, are given in Table 3. With a reference of having neither good, slightly more than half (56%) of subjects in the first group selected a mug over a chocolate bar. However, after having been given a mug, the reference state for subjects in the second group is one of having a mug. Therefore, the exchange offer is seen to be a loss of the mug and a gain of the chocolate bar. Nearly nine of ten (89%) refused to make this trade. The reference position for subjects in the third group is one of having a chocolate bar and a full ninety percent of them turned down the opportunity to give up their chocolate bar to gain a mug. The very wide differences between the proportions of individuals taking home mugs and chocolate bars were consistent with their reference positions and with losses from this state being valued much more than gains to it.

Table 3

Results of choices between coffee mug and chocolate bar. No strong preference in group without reference of an initial entitlement, but random initial distribution of either good induced strong reluctance to exchange for other good

Group	Prefer mug over chocolate	Prefer chocolate over mug
No initial entitlement	56%	44%
Mug, chocolate offered	89%	11%
Chocolate, mug offered	10%	90%

Table 4

Results of offers to exchange an initial randomly distributed entitlement of either of two goods or money with one of the other entitlements. Participants were very reluctant to lose their entitlement to gain either of the alternatives, regardless of the nature of the initial or offered entitlement

Initial entitlement	Exchange offer	Prefer (percent)	
		Mug	Pen
Mug	Pen	88	12
Pen	Mug	10	90
		Mug	$2
Mug	$2	97	12
$2	Mug	18	82
		Pen	$2
Pen	$2	82	18
$2	Pen	14	86

The results from another exchange experiment demonstrated that asymmetries in the value of gains and losses can be as evident in exchanges of money and goods as they are in trades of one good for another (Knetsch, 1995). Approximately 50 individuals in each of six groups were given an initial entitlement of either a coffee mug, a pen in a sealed box, or $2. They were then all offered one of the other two goods in exchange for their reference entitlement in a way that covered all six possible entitlement-exchange possibilities (mug for a pen, mug for $2, pen for a mug, pen for $2, $2 for a mug, and $2 for a pen). Again, the assumption that valuations are independent of entitlements is greatly at variance with the outcome of the experiment. Rather than preferences between any pair being invariant to the direction of trade, the results presented in Table 4 show a strong contrary pattern of an overwhelming majority of subjects refusing to lose their initial entitlement to gain an alternative. (The pattern also shows widespread violations of common preference axioms as, for example, in the lack of transitivity of participants indicating a preference for pens over money, money over mugs, but also mugs over pens.)

3. Repeated Trials

Several endowment effect experiments have also been carried out over repeated iter-
ations to test for possible impacts of learning, about the trading institutions or about
values. For the most part, little change in the asymmetric valuation of gains and losses
has resulted from the repetitions. While a few tests have shown convergence of the gain
and loss values over the repeated trials (for example, Shogren et al., 1994), these have
occurred in experiments using some variant of Vickrey auction institutions whereby the
potential buyer making the highest bid buys at the next highest bid, and the potential
seller offering to sell at the lowest price sells at the second lowest price. Given the ab-
sence of reports of converging buy and sell values over repeated trials using any other
trading institution, the narrowing of values using the Vickrey auction appears to be an
artifact of this particular institution.

The usual pattern of wide disparities continuing over repeated iterations is illustrated
by the results of a market experiment in which 22 buyers and 22 sellers engaged in
three induced-value markets, and then four actual exchange markets for each of two
consumption goods (Kahneman, Knetsch, and Thaler, 1990). The same trading rules
were used for all of the eleven iterations, with the market clearing price determined by
the bids and offers of the participants in each market. On completion of the four rounds
for each consumption good – a mug and a boxed pen – one of the real goods market
rounds was randomly selected as the trial that "counted," and trades actually took place
at the market price for that particular round.

The results showed little change over the repeated markets. The median sell prices
ranged from 1.9 to 3.3 times larger than the median buy prices with no trend toward
convergence of gain and loss values over the repetitions. There was in this, as in other
studies, no evidence that participants learned anything over the repeated trials that would
lead them to adopt equal buying and selling prices. A further indication of this result
is given in Figure 1, which shows very little change in either the demand or the supply
curve for the first and the fourth, and last, market for mugs in this experiment.

4. Buy, Sell, and Choose

Exchanges of either money and a good, or one good for another, offer the possibility of
four comparisons or valuations of a good. In the case of money and good exchanges,
the first is giving up money to gain a good: a purchase or buy valuation measured by the
willingness of the individual to pay for the good. The second is a choice between either
a good or money: a choice of two gains. The third is a giving up a good for a gain of
money: a sell or loss valuation measured by the willingness of the individual to accept
compensation for the good. The fourth is a choice between giving up money or a good:
a choice of two losses.

The four values can be illustrated as comparisons in the four quadrants of Figure 2,
with the vertical axis indicating a gain or loss of a good, and the horizontal axis indi-
cating a gain or loss of money. The exchange and valuation, indicated in Quadrant I
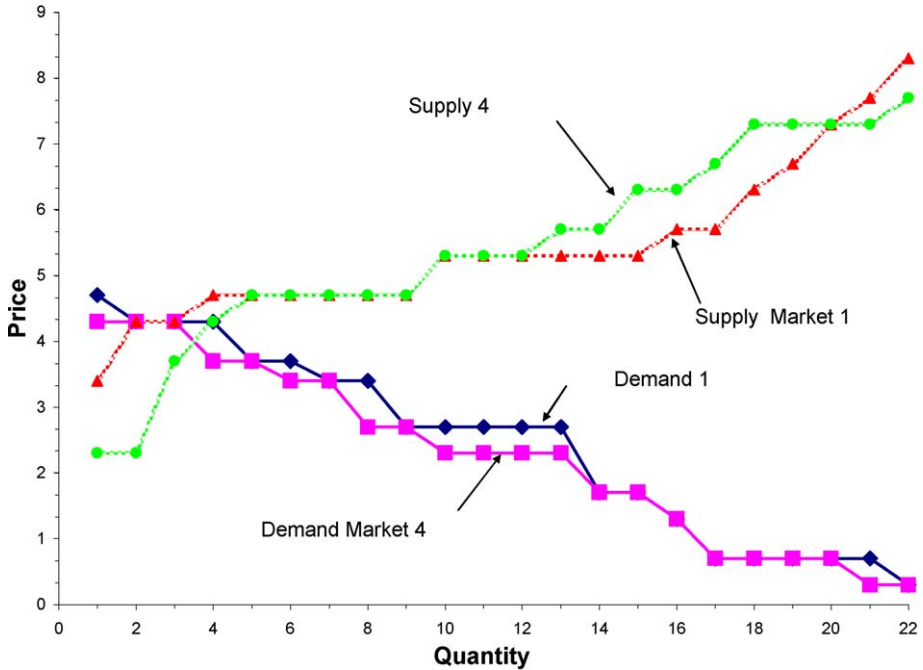
Figure 1. Supply and demand curves, markets 1 and 4. Markets were repeated four times, with little change evident in either supply or demand functions over the four iterations.

("Buy"), shows that this is in the domain of gains for the good and in the domain of losses for money. As gains are expected to be worth less than losses – the endowment effect – the value of the good, in terms of the sum of money willingly given up, would be expected to be less in this than in other quadrants. The opposite would be expected of values in Quadrant III ("Sell") where money is in the domain of gains and the good in the domain of losses: individuals would therefore be likely to demand the greatest monetary compensation to give up a good, indicating the highest valuation of the good among the four possibilities.

The valuations in Quadrants II and IV would normally be expected to be intermediate between those of Quadrant I and Quadrant III, depending on the relative extent of the gain and loss asymmetry between money and the good. The valuation in Quadrant III is in terms of both money and the good being in the domain of gains, and an indifference between receiving the good and a sum of money closer to the value in buy rather than to the value in the sell Quadrant would indicate that the disparity between the gain and loss valuations was likely due more to the reluctance of individuals to give up the good than to give up money. The valuation in Quadrant IV is in terms of money and the good being in the domain of losses, and a sum of money nearer to that of the buy value would
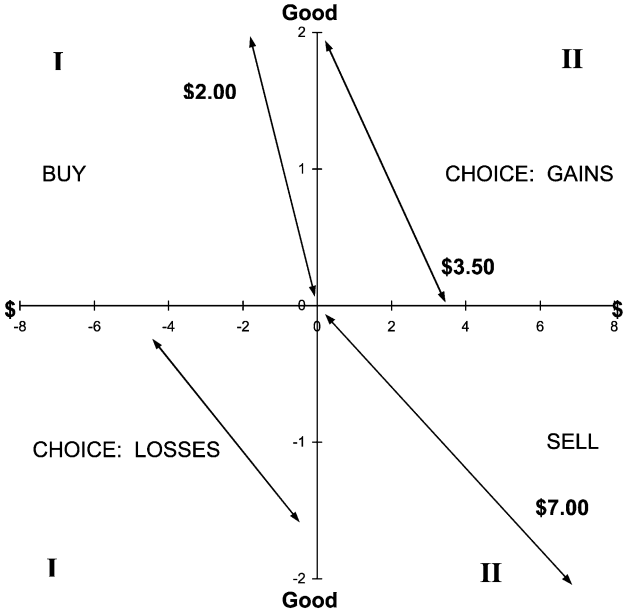
Figure 2. Comparisons of valuation of a good in domains of gains and losses of good and money. Smaller willingness to give up money to gain good; larger demand for compensation to give up good. Intermediate values of choices in same domains.

also indicate more of the difference between the gain and loss valuation being due to the welfare loss associated with giving up the good.

The results of a real exchange experiment involving three groups of participants who either were asked how much they would pay to gain a mug, how much they would demand to give up a mug, or how much they would need to receive rather than receive a mug are indicative of the expected pattern of valuations (Kahneman, Knetsch, and Thaler, 1990). The medians of the three values are given in Figure 2 in the corresponding buy, sell, and choice of gains quadrants. The $3.50 that these individuals indicated that they would accept rather than gain a mug is much closer to the buy value of $2.00 than to the sell value of $7.00, suggesting that the large difference between the gain and loss value is likely mostly due to a greater aversion to giving up a mug than giving up money.

The interpretation of the results in terms of the four valuations indicates the importance of the reference in distinguishing between gains and reductions of losses, and between losses and foregone gains. It also indicates the need to distinguish between valuations in the different quadrants. It is not uncommon, for example, to estimate time preference rates for a future gain by asking respondents if they would rather have *X* now or *X* + *Y* later, a choice between two gains (Quadrant II). Comparisons of such results with analogous ones from choices between two losses, would likely give differ-

ing interpretations of time preferences for gains and losses, than a comparison between paying and compensation (Quadrants I and III).

5. Market Transactions

The endowment effect may also have significant implications for voluntary market exchanges, as the greater value of losses over gains and consequent reluctance to pay as much as demanded to part with goods will lead to fewer mutually advantageous transactions than would be the case if values were indeed independent of entitlement. This shortfall is illustrated in the demand and supply curves of Figure 1. Given the random distribution of the mugs in that experiment, half of the 22 subjects receiving this good would likely value it less than half of the 22 who did not. This would imply 11 mutually advantageous exchanges. However, the actual markets based on the participants' real valuations of gains and losses yielded only from one to four trades.

The reluctance to trade is, of course, due to the diminished real gains from trade available in the presence of the valuation disparity, relative to the gains presumed to be available if valuations were independent of entitlement. The extent of this possible difference in the gains was illustrated by the results of two market simulations of the buy and sell valuations of the individual participants in the Kachelmeier and Shehata experiment involving the entitlement to a 50 percent chance to win \$20 referred to earlier (Borges and Knetsch, 1998). In the first simulations, the average gains from trade available to market participants from repeated distributions of 10 entitlements, assuming that each individual's sell value was equal to their buy value was \$34.02, in accord with conventional theory. In the second simulations, the average gains from trade that were available from repeated distributions of the same entitlements, but using the individuals' actual buy and sell values, was only \$7.71. In this case the actual available gains were only 23 percent of those traditionally assumed to be available to motivate trades.

The extent of the difference in the gains from trade that can be realized given the presence of endowment effects, relative to those normally assumed to be available, is illustrated in the Edgeworth box diagram of Figure 3, which is drawn with the difference in the areas of mutual gain roughly proportional to the difference found in the simulations of the markets for the prospect of a \$20 win. It is such shortfalls from the expected gains that lead directly to the fewer market transactions observed in experimental markets. On current evidence, such shortfalls – or perhaps more accurately, the exaggerations of the extent of available gains inherent in the accounts of traditional theory – are likely to lead to the same result in actual markets.

6. Summary

The results of experiments testing people's valuations of gains and losses have been consistent in showing that individuals value losses far more than otherwise fully com-
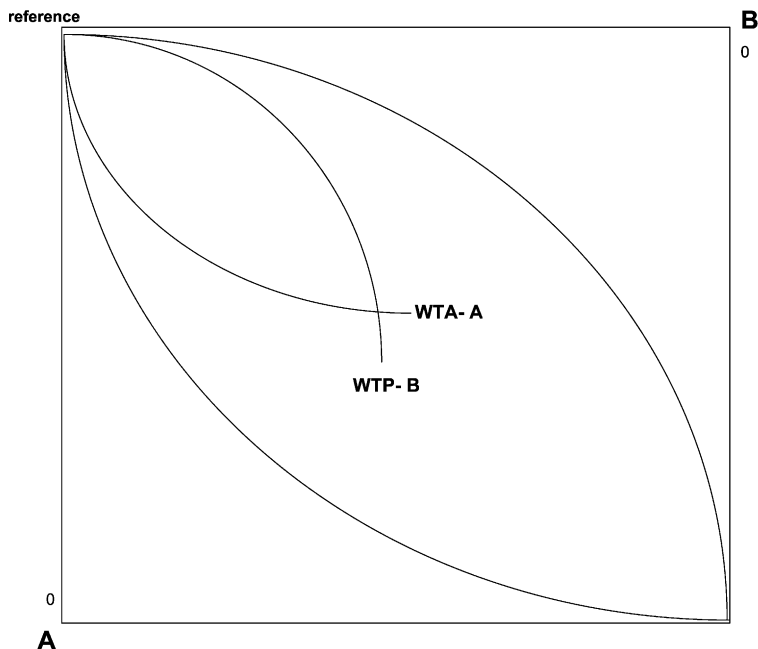
Figure 3. Illustrative representation of the smaller area of gains from trade resulting from the endowment effect, compared to the area of gains with assumed valuation equivalence.

mensurate gains. This leads to smaller gains from trade and fewer voluntary market transactions than would be the case with valuation equivalence. The valuation disparity also suggests greater caution in assessing welfare losses, predicting market outcomes, and may well imply different policy designs.

References

Borges, Bernhard F.J., Knetsch, Jack L. (1998). "Tests of market outcomes with asymmetric valuations of gains and losses: Smaller gains, fewer trades, and less value". Journal of Economic Behavior and Organization 33, 185–193.

Hammack, Judd, Brown, Gardner M. (1974). "Waterfowl and Wetlands: Toward Bioeconomic Analysis". Johns Hopkins Press, Baltimore.

Henderson, A.M. (1941). "Consumer's surplus and the compensation variation". Review of Economic Studies 8, 117.

Kachelmeier, S.J., Shehata, M. (1992). "Examining risk preferences under high monetary incentives: Experimental evidence from the People's Republic of China". The American Economic Review 82, 1120–1141.

Kahneman, Daniel, Knetsch, Jack L., Thaler, Richard H. (1990). "Experimental tests of the endowment effect and the coase theorem". Journal of Political Economy 98, 1325–1348.

Knetsch, Jack L. (1989). "The endowment effect and evidence of nonreversible indifference curves". The American Economic Review 79, 1277–1284.

Knetsch, Jack L. (1995). "Asymmetric valuation of gains and losses and preference order assumptions". Economic Inquiry 38, 138–141.

Knetsch, Jack L., Sinden, J.A. (1984). "Willingness to pay and compensation demanded: Experimental evidence of an unexpected disparity in measures of value". The Quarterly Journal of Economics 99, 507–521.

Shogren, Jason F., Shin, S.Y., Hayes, D.J., Kliebenstein, J.B. (1994). "Resolving differences in willingness to pay and willingness to accept". The American Economic Review 84, 255–270.

Thaler, Richard H. (1980). "Toward a positive theory of consumer choice". Journal of Economic Behavior and Organization 1, 39–60.