Willingness to Accept, Willingness to Pay, and Loss Aversion*

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Abstract

We study the endowment effect using four incentivized representative surveys with 4,000 U.S. adults. We replicate the standard finding of an endowment effect for lotteries—a divergence between Willingness to Accept (WTA) and Willingness to Pay (WTP)—but document three new findings. First, we find little evidence that the endowment effect is related to loss aversion for risky prospects, contradicting predictions of leading explanations such as prospect theory. Second, WTA and WTP not only diverge but are, at best, weakly correlated. Third, WTA and WTP strongly relate to other aspects of risk preferences. Our results allow us to differentiate between existing theories, and point to Salience or Cautious Utility as the most complete explanations for our data.

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1 Introduction

A central phenomenon in behavioral economics is the *endowment effect*—the observation that an individual's minimum Willingness To Accept (WTA) money for a good is typically higher than their maximum Willingness To Pay (WTP) money for the same good, contrary to standard economic theory (Camerer, 1995; DellaVigna, 2009). Since Kahneman, Knetsch, and Thaler (1990), the endowment effect is generally modeled as a consequence of *loss aversion*—the assumption that the disutility from a loss exceeds the utility from an equivalent gain. Introduced in Kahneman and Tversky (1979a), loss aversion should manifest as a change in risk aversion around a reference point—a phenomenon we refer to as *loss aversion for risky prospects*. If the endowment effect is also due to loss aversion, as in popular models, then it should be empirically related to loss aversion for risky prospects.

This paper finds little evidence of the theorized link between the endowment effect and loss aversion for risky prospects across four incentivized surveys in representative samples of the U.S. population, totaling 4,000 participants. We also add two novel findings about the relationship between WTA, WTP, and measures of risk preferences, allowing us to further restrict the set of possible theories. First, WTA and WTP are either uncorrelated or weakly negatively correlated, depending on the specification. Second, WTA and WTP are strongly related to independent clusters of other risk measures—with correlations that reach magnitudes of up to 0.66. Together, these findings point to specific alternative theories of the endowment effect.

The endowment effect directly affects how markets function: it contradicts the central assumption of neoclassical economics that choice is determined by individuals' unique values for goods, and implies that there are ranges of prices in which people are unwilling to trade. An improved understanding of the causes of the endowment effect is important both in predicting where and when such problems may arise and in developing policies that address them. Our study provides evidence about the theorized causes of the endowment effect, and thus may be informative to market designers, policymakers, and anyone else who has a stake in well-functioning markets.

Theory: The Endowment Effect from Loss Aversion. The most common theory of the endowment effect in economics ascribes it to loss aversion. Introduced in Kahneman and Tversky (1979b) to study risk preferences, loss aversion manifests as an increase in risk aversion for lotteries that involve both gain and losses. Kahneman, Knetsch, and Thaler (1991) propose that if selling a good is encoded as a loss of that item, then loss aversion implies that WTA is greater than WTP, with more loss averse individuals exhibiting a larger endowment effect. Under this model, the endowment effect is related to loss aversion as measured in risky prospects. This relationship is also predicted by theories that extend reference-dependence preferences to lotteries, such as stochastic reference dependence Kőszegi and Rabin (2006, 2007) or third-generation prospect theory (Schmidt, Starmer, and Sugden, 2008).

Our Data. Our data come from four incentivized surveys in representative samples of the U.S. population. The first includes 2,000 participants who were contacted in early 2015. The second resurveyed 1,465 of the original participants six months later. The third and fourth each included 1,000 independent participants and were fielded in 2016 and 2020. To capture the preferences of demographic groups that are generally underrepresented or overlooked in samples drawn from student populations or crowdsourcing websites, we use the services of YouGov, a commercial survey company.[1] In each survey, we measure the WTA and WTP for two lottery tickets. Across the surveys, there are three different measures of loss aversion for risky prospects, and six different measures of risk preferences. Thus, we demonstrate the robustness of the endowment effect across the general population, while providing reassurance that the lack of correlations we observe is not an artifact of a particular sample or measure.

We focus on WTA and WTP for monetary lottery tickets for three main reasons. First, this maximizes the probability of finding a relationship between the endowment effect and loss aversion for risky prospects, as the two are measured on the same dimension—money. If we measured the endowment effect for a mug and loss aversion for monetary gambles, a lack of correlation could be explained by different and unrelated loss aversion for money and for mugs. This issue does not arise with monetary lotteries. Second, the previous literature has established robust evidence of an endowment effect for lotteries, reaching back to the first experimental study of the endowment effect (Knetsch and Sinden, 1984).[2] Moreover, it has been robustly documented across a number of studies both in the lab (see Horowitz and McConnell 2004 and Marzilli Ericson and Fuster 2014 for reviews) as well as in the field (Anagol, Balasubramaniam, and Ramadorai, 2018). Third, it is feasible to implement in online surveys. Indeed, our study provides what may be the most substantial evidence for an individual-level endowment effect—such an effect exists in each of our large representative samples and within every subgroup we examine, see Appendix Tables A.2 and A.3.[3]

With this data, we replicate the classical finding of an endowment effect, but also document the following three findings:

[1]In our (weighted) sample, 40% of participants have attained no more than high school education, in comparison to 38% reported in the 2020 American Community Survey, and just 11% on Prolific (Gupta, Rigotti, and Wilson, 2021, we thank Neeraja Gupta for sharing this figure). YouGov builds nationally representative samples through targeted quota sampling from a two-million-person panel and constructing sample weights—producing better representative samples than other non-probability sampling procedures, and performing better than traditional probability sampling in eliciting attitudes (Pew Research Center, 2016, YouGov is Sample I). See Stantcheva (2022) for a general discussion of the advantages of running studies with online panels.

[2]Knetsch and Sinden (1984) studied lotteries, inspired by earlier survey evidence of large WTA–WTP disparities for recreational use goods, such as fishing and hunting licenses, which are effectively lotteries over valued outcomes such as catches and kills (Meyer, 1979).

[3]Most studies of the endowment effect use a between-subjects design—some participants buy, and some sell—and find that the distribution of WTA first-order stochastically dominates the distribution of WTP. Instead, our study is within-participant—each participant buys and sells two lottery tickets.

Finding 1: The Endowment Effect is Not Correlated with Loss Aversion for Risky Prospects. In our data, the endowment effect is not related to loss aversion for risky prospects. This holds if we define the endowment effect either as the ratio of, or difference between, WTA and WTP; if we use any of our three different measures of loss aversion for risky prospects; if we disaggregate by survey or lottery ticket; if we control for risk aversion in several possible ways; or if we control for measurement error using various methods, including an instrumental-variable approach that provides consistent estimates in the presence of measurement error (Gillen, Snowberg, and Yariv, 2019, ORIV). Additionally, we find no evidence of a positive correlation among participants most likely to provide less noisy responses, for example, those that take more time to complete the survey. Examining other demographic subgroups does not produce consistently positive or statistically-significant correlations. The exception is noisy, but suggestive, evidence of a positive correlation for participants in the top 5–10% of a measure of IQ. As we discuss below, this can help us relate our study to the prior literature.

Finding 2: WTA and WTP are Either Uncorrelated or Weakly Negatively Correlated. In our data, WTA and WTP are not only different: they are, at best, weakly related to each other. Knowing WTA conveys almost no information about WTP. This is true across numerous subgroups, and, importantly, it is not due to noise in our measures.

Finding 3: WTA and WTP are Linked to Different Clusters of Risk Preferences. Our surveys encompass several measures of risk preferences, including both the certainty-equivalents of lotteries and the lottery-equivalents of sure amounts or of other lotteries. WTA is strongly related to certainty-equivalents of lotteries, whereas WTP is strongly related to lottery-equivalents of sure amounts. However, these different types of risk elicitations are not related to each other. Overall, our measures have a very clear structure, in which risk preferences exhibit two clear clusters, with strong correlation within and weak correlation across. Remarkably, WTA and WTP belong to different clusters. This finding is in line with the approach of Hershey and Schoemaker (1985); Sprenger (2015), according to which the fixed option in a Multiple Price List (MPL) may act as an endowment. That is, risk attitudes seem to depend on whether one is (implicitly) buying or selling a lottery.

Other Theories of the Endowment Effect. Our first finding contradicts theories that ascribe the endowment effect to loss aversion. Our second and third findings suggest that while WTA and WTP are largely independent, they are important correlates of measures of risk preferences—a central object of investigation in behavioral and experimental economics. We use these results to narrow the set of plausible theories.

Among the many prominent models of the endowment effect and risk preferences only two we are aware of are consistent with our all results: Salience and Cautious Utility. In Salience Theory (Bordalo, Gennaioli, and Shleifer, 2012a,b), the endowment effect is due to the overweighting of positive features of goods received for free, while loss aversion results from an asymmetry in the utility of gains and equal-sized losses. Under specific parameter restrictions, these phenomena could be independent. In Cautious Utility (Cerreia-Vioglio, Dillenberger, and Ortoleva, 2021), individuals are unsure about tradeoffs and apply *caution*. When they are unsure about the dollar value to assign to a good, such as a lottery, but think it is in some possible range, caution generates the endowment effect. In particular, an individual will not sell for less than the highest value of the range, and they also will not pay more than the lowest value. Loss aversion for risky prospects emerges when an individual is unsure how to aggregate gains and losses, as caution pushes them away from options with both. Thus, both effects may emerge but remain distinct and independent—each may be present without the other.

Several other models of the endowment effect do not examine risk preferences and hence, do not capture loss aversion for risky prospects. By construction, these models cannot explain all of our findings. However, if these models—of incomplete preferences, reference prices, and differential processing during buying and selling—were extended to incorporate loss aversion, it would likely be possible to generate loss aversion separately from the endowment effect. Thus, we describe how these models might incorporate (some of) our results.

Related Literature. Our findings relate to several strands of the literature, discussed in detail in Section 6. We are aware of only three other papers that test the relation between the endowment effect and loss aversion for risky prospects. These report mixed results. The differences in findings across studies may stem from examining different populations—the two studies (including ours) of large representative samples find no relationship, while studies in smaller selected samples find a positive correlation.[4] Finding 2 is consistent with correlations estimated using available data from all previous studies that elicited within-subject estimates of WTA and WTP (although only one of these prior studies with an $N = 45$ reports that correlation). Finding 3 relates to a literature on multidimensionality of risk preferences, and to papers discussing how MPL-based elicitations may induce reference effects.

2 Theory: The Endowment Effect from Loss Aversion

The most common explanation of the endowment effect in economics ascribes it to loss aversion, as modeled in Prospect Theory (Kahneman, Knetsch, and Thaler 1990; Tversky and Kahneman 1991; see O'Donoghue and Sprenger 2018 for a review). In the classical approach, devised to explain

[4]The additional study in a representative population was begun after the initial draft of this paper, while the two in selected samples predate this paper.

the endowment effect for risk-free goods such as mugs, individuals evaluate a bundle x relative to a reference bundle r with utility $U(x|r) = \sum_i V_i(x_i - r_i)$, where the utility in each dimension i is such that $V_i(x_i - r_i) = -\lambda V_i(r_i - x_i)$ if $x_i < r_i$. The parameter $\lambda \in \mathbb{R}_+$, which may also be dimension-specific, is generally assumed to be larger than 1, and captures *loss aversion*. This parameter represents an asymmetry in the treatment of gains and losses, and was originally used to describe the increase in risk aversion when a risky prospect includes a loss in addition to gains (Kahneman and Tversky, 1979a).

If the reference point is a person's endowment, loss aversion leads to the endowment effect. The maximum amount the agent is willing to pay (WTP) to acquire a good that gives utility G, and the minimum they are willing to accept (WTA) to forgo it, are

$$\begin{aligned} u(\text{WTA}) - \lambda G = 0 \quad &\Rightarrow \quad \text{WTA} = u^{-1}(\lambda G) \\ -\lambda u(\text{WTP}) + G = 0 \quad &\Rightarrow \quad \text{WTP} = u^{-1}(G/\lambda) \end{aligned}$$

in which u denotes the utility of money. The endowment effect is due to loss aversion λ, but modulated by the curvature of u. Indeed, WTA $\geq$ WTP if and only if $\lambda \geq 1$.

To model the endowment effect for lottery tickets, we need to extend this formulation to the case in which the endowed good is a lottery. The simplest way to do so is to treat lotteries as simply a good with expected utility G.[5] A more common approach in the recent literature is to allow the lottery to create a stochastic reference point and follow the model of Kőszegi and Rabin (2006; 2007; henceforth KR). In this formulation, a lottery p is evaluated relative to a reference lottery q by considering each possible realization of p and q as if they are independent. That is

$$U(p|q) = \sum_x \sum_r U_{\text{KR}}(x|r) p(x) q(r)$$

where it is typically assumed[6] that $U_{\text{KR}} : \mathbb{R} \times \mathbb{R} \to \mathbb{R}$ is

$$U_{\text{KR}}(x|r) = \begin{cases} u(x) + \eta\,(u(x) - u(r)) & \text{if } u(x) \geq u(r) \\ u(x) + \eta\lambda\,(u(x) - u(r)) & \text{if } u(x) < u(r). \end{cases}$$

In this formulation, each outcome is evaluated as the sum of consumption utility u and gain-loss utility, in which $\eta \in \mathbb{R}_+$ determines the relative weight of each. In our setting, payoffs are only over money, so u is the utility of money, and λ captures the overweighting of losses in loss aversion. Following the standard approach of assuming linear u for small stakes (see Kőszegi and Rabin,

[5]While this has the benefit of simplicity, applying this to degenerate lotteries implies an endowment effect for money.

[6]Although rarely used in applications (see O'Donoghue and Sprenger, 2018, p. 16), one could also allow for diminishing sensitivity: $U_{KR}(x|r) = u(x) + \eta\mu\,(u(x) - u(r))$, with μ a strictly increasing function that satisfies the conditions that guarantee loss aversion (Kőszegi and Rabin, 2006, 2007). This does not change any of the conclusions, but complicates the algebra; following standard practice, we therefore assume μ is linear.

2006, 2007; Sprenger, 2015; O'Donoghue and Sprenger, 2018), the WTA and WTP for a lottery ticket that pays $h > 0$ or 0 with equal probability are:

$$\frac{1}{4}\big(h - \eta h + h + \eta h\big) = \frac{1}{2}\big(\mathrm{WTA} + \eta\lambda(\mathrm{WTA} - h)\big) + \frac{1}{2}\big(\mathrm{WTA} + \eta\mathrm{WTA}\big) \quad \Rightarrow \quad \mathrm{WTA} = \frac{h}{2}$$

$$\frac{1}{2}\big(h - \mathrm{WTP} + \eta(h - \mathrm{WTP})\big) + \frac{1}{2}\big(-\mathrm{WTP} - \lambda\eta\mathrm{WTP}\big) = 0 \quad \Rightarrow \quad \mathrm{WTP} = \frac{h}{2}\frac{1+\eta}{1+\eta\lambda}$$

$$\Rightarrow \quad \frac{\mathrm{WTA}}{\mathrm{WTP}} = \frac{1+\eta\lambda}{1+\eta}.$$

Once again, the endowment effect is due to loss aversion λ. Note that the linearity of u in this model implies that WTA is just the expected value of the lottery, and hence should not vary. This can be corrected, at some cost to complexity, by allowing for heterogeneity in the curvature of u.[7]

Another approach to stochastic reference points is taken by Third Generation Prospect Theory (Schmidt, Starmer, and Sugden 2008; henceforth 3PT). In this model, a lottery p is evaluated relative to the reference lottery q according to

$$U(p|q) = \sum_x \sum_r U_{3PT}(x|r)\mathrm{P}_{p,q}(x,r),$$

in which $\mathrm{P}_{p,q}(x,r)$ is the joint probability that p returns x and q returns r, and

$$U_{3PT}(x|r) = \begin{cases} (x-r)^{\beta} & \text{if } x \geq r \\ -\lambda\,(r-x)^{\beta} & \text{if } x < r. \end{cases}$$

One key difference with KR is that it accounts for the correlation between the outcome lottery and the reference lottery. In particular, this implies that the value of holding the reference lottery is zero, which is not the case under KR. With this formulation, we obtain

$$0 = \frac{1}{2}\,(h - \mathrm{WTP})^{\beta} - \frac{\lambda}{2}\,(-\mathrm{WTP})^{\beta} \Rightarrow \quad \mathrm{WTP} = \frac{h}{1+\lambda^{\frac{1}{\beta}}}$$

$$\Rightarrow \quad \frac{\mathrm{WTA}}{\mathrm{WTP}} = \lambda^{\frac{1}{\beta}}.$$

Thus, in 3PT, WTA is increasing in loss aversion and WTP is decreasing. The endowment effect is,

[7]If u exhibits constant relative risk aversion (CRRA), $u(x) = x^{\alpha}$ for $x > 0$ and $u(-x) = -u(x)$:

$$\frac{1}{4}\big(h^{\alpha} - \eta h^{\alpha} + h^{\alpha} + \eta h^{\alpha}\big) = \frac{1}{2}\big(\mathrm{WTA}^{\alpha} + \eta\lambda(\mathrm{WTA}^{\alpha} - h^{\alpha})\big) + \frac{1}{2}\big(\mathrm{WTA}^{\alpha} + \eta\mathrm{WTA}^{\alpha}\big) \quad \Rightarrow \mathrm{WTA} = \frac{h}{2^{\frac{1}{\alpha}}}$$

$$\frac{1}{2}\big((h - \mathrm{WTP})^{\alpha} + \eta(h - \mathrm{WTP})^{\alpha}\big) + \frac{1}{2}\big(-\mathrm{WTP}^{\alpha} - \lambda\eta\mathrm{WTP}^{\alpha}\big) = 0 \quad \Rightarrow \mathrm{WTP} = \frac{h}{1 + (\frac{1+\eta\lambda}{1+\eta})^{\frac{1}{\alpha}}}.$$

Once again, the endowment effect is caused by λ and modulated by α.

once again, increasing in loss aversion λ.

Measures of Loss Aversion for Risk. Our surveys measure loss aversion for risky prospects in three ways. First, *DOSE-λ* is a direct estimate of λ from a sequence of binary choices, assuming a standard CRRA utility function, as detailed in Section 3. This coincides with classic prospect theory or 3PT, with a reference point of zero. As, under all formulations above, the endowment effect is increasing in λ, all predict a positive (and large) correlation between the endowment effect (measured as WTA/WTP) and this measure of loss aversion.

Second, *FM-Mixed* is the lottery equivalent of zero: the (negative) value c that makes individuals indifferent between 0 for sure and a binary lottery that pays with equal probability either $g > 0$ or c. Under classical prospect theory and 3PT, assuming a reference point of zero,

$$0 = \frac{1}{2}g^{\beta} - \frac{1}{2}\lambda(-c)^{\beta} \quad \Rightarrow \quad c = -g\lambda^{-1/\beta}.$$

Under KR with linear utility,[8]

$$0 = \frac{1}{2}(g + \eta g) + \frac{1}{2}(-c + \eta\lambda(-c)) \Rightarrow \quad c = -g\frac{1+\eta}{1+\eta\lambda}.$$

Thus, under all formulations, c is increasing (becoming less negative) in λ, as is the endowment effect. Thus, this measure of loss aversion should be positively related to the endowment effect.

Third, *Mixed* is the certainty equivalent a (positive or negative) of a 50/50 lottery between identical gains and losses k and $-k$. For classical prospect theory and 3PT,

$$a = \begin{cases} -k\left(\frac{\lambda-1}{2\lambda}\right)^{\frac{1}{\beta}} & \text{if } \lambda \geq 1 \\ k\left(\frac{1-\lambda}{2}\right)^{\frac{1}{\beta}} & \text{if } \lambda < 1. \end{cases}$$

For KR with linear utility,[9] we have

$$a = \begin{cases} -k\left(\frac{\eta\lambda-\eta}{1+\eta\lambda}\right) & \text{if } \lambda \geq 1 \\ k\left(\frac{\eta-\eta\lambda}{1+\eta}\right) & \text{if } \lambda < 1. \end{cases}$$

Again, under all formulations, a is increasing in λ, as is the endowment effect, so the two should be positively correlated.

[8]If u exhibits CRRA, we have $\frac{1}{2}(g^{\alpha} + \eta g^{\alpha}) + \frac{1}{2}(-c^{\alpha} + \eta\lambda(-c^{\alpha})) = 0$, giving us $c = -g\left(\frac{1+\eta}{1+\eta\lambda}\right)^{\frac{1}{\alpha}}$.

[9]If u exhibits CRRA, we have $a = -k\left(\frac{\eta\lambda-\eta}{1+\eta\lambda}\right)^{\frac{1}{\alpha}}$ if $\lambda \geq 1$ and $a = k\left(\frac{\eta-\eta\lambda}{1+\eta}\right)^{\frac{1}{\alpha}}$ if $\lambda < 1$.

Measures of the Endowment Effect. As noted in the introduction, we focus on the endowment effect for lottery tickets with monetary rewards and loss aversion for risky monetary prospects. This simplifies modeling, as it allows us to adopt a single parameter of loss aversion λ describing gain-loss trade offs on the only relevant dimension—monetary amounts. In turn, this allows us to straightforwardly derive testable predictions on the relationship between the endowment effect and loss aversion for risky prospects. If, instead, we computed the endowment effect for physical goods and loss aversion for risky monetary prospects, these may be evaluated using two independent loss aversion parameters. This would not result in a testable prediction on the correlation between the endowment effect and loss aversion for risky prospects.

While we have focused on measuring the endowment effect as the ratio of WTA and WTP, it is also sometimes measured as their difference, WTA−WTP. This should also be correlated with our various measures of loss aversion. To see why, note that in all of the formulations above, WTP is decreasing in λ. WTA may be increasing in λ in classical prospect theory or 3PT, or unaffected by λ in KR. Thus, the gap between WTA and WTP will increase in λ under any of the above formulations.

The Correlation between WTA and WTP. In all of the formulations above, WTP is decreasing when λ increases, while WTA may be increasing (3PT) or unchanging (KR) when λ increases. Both WTA and WTP decrease as the curvature of u becomes more substantial. If, as is commonly assumed, u is linear, then all variation in WTA and WTP is due to λ. This leads to a prediction of a strong negative correlation between WTA and WTP under 3PT. Under KR, the correlation is undefined, as there should be no variation in WTA other than noise—which is ruled out by our Finding 3, as there is a robust pattern of correlations between WTA and measures of risk preferences. Note that these models are thus incompatible with our data when making the common assumption of linear u.

With variation in both u and λ, then small correlations are possible only when the negative correlation induced by λ is precisely offset by the positive correlation induced by the curvature of u. This requires a specific joint distribution of these parameters, which depends on the model and functional form(s) used.

Summary. While differing in the details, the endowment effect is due to, and strictly increasing in, loss aversion λ in any of the formulations above. The same parameter also drives our measures of loss aversion for risky prospects. This allows for a parsimonious representation, but also leads to a testable restriction: the endowment effect and loss aversion for risky prospects should be substantially and positively related.

3 Design and Data

Our data come from three studies comprising four representative surveys of U.S. adults conducted online by YouGov, totaling 4,000 participants, as summarized in Table A.1.[10] All surveys were incentivized, with participants paid based on either one (Study 3) or two (Studies 1 and 2) randomly selected choices. Outcomes were expressed in points, an internal YouGov currency convertible to U.S. dollars at approximately $1 per 1,000 points.

The first study consisted of two waves conducted about six months apart in 2015, with an initial wave of 2,000 participants, of which 1,465 participated in the second wave.[11] Studies 2 and 3 were run on independent, 1,000-person representative samples in 2016 and 2020. Screenshots of the measures described below can be found in Online Appendix E.[12]

MPLs. Most elicitations in our surveys—including those of WTA and WTP—used multiple price lists (MPLs, Holt and Laury, 2002), a common method that is generally considered to be easier to understand than other pricing tasks (Andersen et al., 2006). MPLs are lists of binary choices between a fixed option on the left—for example, keeping an endowed lottery ticket in WTA—and a varying option on the right—for example, a number of points. The right-hand option changes monotonically. Rational participants should select options on one side until the row at which they prefer the option on the other side of the MPL. At that point, the participant should switch and continue to select the other-side option for all remaining rows.[13] The row on which a participant switches sides of the MPL identifies a range of possible values for their indifference point. We use the midpoint of this range in our analysis, but the results are similar if we use the minimum or maximum value. Participants received extensive training on MPLs, and correctly answered several comprehension questions at the beginning of each survey. In addition, Study 3 contained three "attention screeners" throughout the survey. Removing those who failed any attention screeners does not change results, see Tables 3 and C.1.

[10] As is standard in the survey research literature, our samples are constructed to be representative on observables, not on unobservables. In principle, random sampling, rather than the targeted quota sampling used by YouGov, could achieve a sample that is representative on both observable and unobservables. In practice, however, differential non-response patterns mean that other sampling methods, such as those used by YouGov, are more effective (Pew Research Center, 2016).

[11] An attrition rate of about 25% is lower than most online surveys. This is due, in part, to YouGov's panel management and, in part, to the large incentives we offered. A simple regression of a dummy variable for attrition on individual demographics suggests that participants who were male, non-white, or in the oldest age quartile were more likely to drop out, although this is no longer significant if we use sample weights.

[12] More description of our data can be found in Online Appendix A. Complete design documents and screenshots can be found at eriksnowberg.com/wep.html, and will be included in replication data accompanying the paper.

[13] The software produced an error if a participant made more than one switch. Participants were also given an "auto-complete" button to help them fill the MPL faster. In addition, there was generally a dominated choice in the top and bottom row, with the undominated option pre-selected (as suggested by Andreoni and Sprenger, 2012).

Table 1: Details of Studies.

	Dates	N	Avg. Time (minutes)	Avg. Pay (points)	Loss Aversion Measures
Study 1					
Wave 1	Mar. 27–Apr. 4 2015	2,000	40 (median) 55 (mean)	9,500 (median) 9,837 (mean)	DOSE-λ
Wave 2	Sep. 21–Nov. 23 2015	1,465	37 (median) 56 (mean)	9,500 (median) 10,032 (mean)	DOSE-λ
Study 2	Mar. 30–Apr. 14 2016	1,000	46 (median) 71 (mean)	13,000 (median) 13,565 (mean)	Mixed
Study 3	Feb. 21–Mar. 24 2020	1,000	43 (median) 55 (mean)	9,000 (median) 43 (mean)	DOSE-λ Mixed FM-Mixed

WTA and WTP. Each study contained incentivized measures of both WTA and WTP for two different lottery tickets. The ordering of questions in each study was randomized, with one of WTA or WTP randomly chosen in one of the first question slots, and the other in one of the last question slots.

The elicitation of WTA and WTP explicitly used the language of buying and selling, in line with the literature (see, for example, Isoni, Loomes, and Sugden, 2011). For WTA, the elicitation reads:

> For this question, you are given a lottery ticket that has a 50% chance of paying you 10,000 points, and a 50% chance of paying you 0 points. You have two options for this lottery ticket:
>
> - Keep it or
> - Sell it for a certain amount of points (for example, 2,000 points).

Participants were then presented with an MPL with the option "The Lottery Ticket" or "Sell it for x points," where x changed with the row.

To elicit WTP, we presented participants with the same lottery tickets and told them:

> For this question, you have been given 10,000 points. You will be offered the opportunity to exchange some of these points for a lottery ticket. This lottery ticket has a 50% chance of paying you 10,000 points, and a 50% chance of paying 0 points.
>
> For example, if you choose to pay 1,000 points for a lottery ticket, and this question is chosen for payment, you will:

- Pay 1,000 points for the lottery ticket;
- Keep 9,000 points for yourself; and
- Earn whatever proceeds you get from the lottery ticket (if any).

Participants were shown an MPL with the options "Keep 10,000 points" or "Buy the lottery ticket for (10,000−x) points and keep the remaining x points", with x varying by row. We used the same range of values of x in WTA and WTP questions to avoid biases that may come with differing ranges (Beauchamp et al., 2020; Mazar, Kőszegi, and Ariely, 2014).

Measurement Error and ORIV. We elicit two measures of most of our variables, allowing us to reduce concern that some of our results are due to measurement error and consequent attenuation bias. To do this, we take two approaches. Our main approach uses Obviously-Related Instrumental Variables (ORIV; Gillen, Snowberg, and Yariv, 2019). This adapts an errors-in-variables instrumental variables (IV) approach and produces consistent estimates of correlations. In essence, ORIV stacks all four possible IV regressions—for all possible combinations of one measure as the instrument of the other—to maximize the information in the estimate, and then applies adjustments to the regression coefficient to obtain a consistent estimate of the correlation, and to ensure that standard errors are calculated efficiently (see Gillen, Snowberg, and Yariv (2019) for details). In addition, we also average two elicitations of the same characteristic. This reduces, but does not eliminate, attenuation due to measurement error, while avoiding the increase in standard errors associated with IV methods.

Multiple Hypotheses. As two of our findings are about the limited relationship between different measures, we examine these relationships in a large number of different ways to test their robustness. This raises the concern of spurious findings. A common approach to this issue is to use corrections for multiple hypothesis testing. However, such corrections would make it *more* likely that we would establish null findings. Thus, we instead test each hypothesis independently—a more conservative approach. For similar reasons, we highlight results that are marginally statistically significant ($p < 0.1$) in our tables. Using multiple hypothesis testing adjustments would only strengthen Findings 1 and 2 while not substantially affecting Finding 3.

Measures of Risk Preferences. In addition to WTA and WTP, we collect several other measures of risk preferences.

Study 1 and 3 used Dynamically Optimized Sequential Experimentation (DOSE, Chapman et al., 2018) to elicit the parameters of a Prospect Theory value function with CRRA utility curvature: utility curvature (α) and loss aversion (λ). DOSE starts with a flat prior over parameters, and elicits individual-level parameter estimates by presenting participants with a personalized sequence of ten binary choices between a 50/50 lottery and a sure amount. These lotteries may contain gains only, or gains and losses. After each choice, the prior is updated, and a new question is chosen to maximize the expected information gain.

Our studies contained several other measures of risk attitudes. As with WTA and WTP, these are measured using MPLs, with two elicitations of each measure to account for measurement error. These risk measures fall into two broad categories, those eliciting certainty equivalents, and those eliciting lottery equivalents. The former group includes:

- *Gain (Studies 2 and 3)*: The certainty equivalent (sure gain) of a 50/50 lottery between a large and small (or zero) gain. For example, a 50/50 chance of 5,000 or zero points.

- *Mixed (Studies 2 and 3)*: The certainty equivalent (sure loss or sure gain) of a 50/50 lottery between a moderate gain and a moderate loss. For example, a 50/50 chance of gaining or losing 5,000 points.

- *Loss (Studies 2 and 3)*: The certainty equivalent (sure loss) of a 50/50 lottery between a large and small (or zero) loss. For example, a 50/50 chance of losing zero or 5,000 points.

- *Urn (Study 2)*: The certainty equivalent (sure gain) of a large and small (or zero) gain tied to the color of a ball drawn from an urn containing an equal number of two colors of balls. For example, an urn with 50 brown and 50 blue balls, which pays 10,000 points if a brown ball is drawn and zero if a blue ball is drawn.

The measures eliciting lottery equivalents include:

- *FM (= Fixed Money, Studies 1 and 2)*: Participants choose between a fixed monetary gain and a lottery with varying prizes but fixed probabilities. For example, we elicit the x that makes a participant indifferent between 2,500 points for sure versus a 75% chance of x points and a 25% chance of zero.

- *2L (= Two Lotteries, Studies 1 and 2)*: Participants choose between a fixed lottery and another lottery in which one prize varies. For example, the x that makes a participant indifferent between a 25% chance of 2,500 points and a 75% chance of zero versus a 20% chance of x points and an 80% chance of zero.

- *FM–Mixed (Study 3)*: This elicitation is similar to FM above, but the fixed amount is zero and the varying lottery includes an equal chance of a fixed gain and a varying loss y. For example, we elicit the y that makes a participant indifferent between a lottery over a loss of y and a gain of 5,000 points and a sure amount of 0 points.

Loss Aversion for Risky Prospects. We derive three measures of loss aversion for risky prospects from the variables above, drawing on different methodological approaches, as summarized in Table A.1. First, in Studies 1 and 3, we have the parameter λ given by the DOSE procedure. In some of our specifications, we also control for the CRRA risk aversion parameter α recovered by the same procedure. We refer to these measures as *DOSE-*λ and *DOSE-*α. Second, in Studies 2 and 3, we have *Mixed*, the certainty equivalent of a lottery of equal gains and losses. Third, in Study 3, we also have *FM-Mixed*, the lottery equivalent of 0, in which there is a fixed gain and a variable loss. The latter two are widely used continuous measures of loss aversion. In some of our specifications, we control for curvature using Gain and Loss, described above. In what follows, all measures are normalized such that higher values denote higher loss aversion.

Other measures. Our surveys also contain a cognitive ability measure and several demographic characteristics that are used in subgroup analysis. The cognitive ability measure is a six-question battery from the International Cognitive Ability Resource (ICAR; Condon and Revelle 2014) that gives a measure of IQ. In addition, each study contains some other measures and elicitations not used in this paper. Depending on the study, these measures include, for example, social and time preferences, ethnicity and race, political behaviors, and so on.[14]

Student Samples. We also recruited two student samples from the University of Pittsburgh Experimental Laboratory (PEEL) mailing list to participate in our studies, which were administered by YouGov. The first student sample ($N = 369$) participated in a study similar to Study 1 in January 2019; the second student sample ($N = 437$) participated in a study similar to Study 3 in November 2021. These are primarily used in Section 6 to try and understand the relationship between our study and one prior paper related to Finding 1, but in a student population.[15]

4 Findings

We begin by analyzing the basic patterns of WTA, WTP, the endowment effect, and loss aversion in our surveys, and then establish the three main findings described in the Introduction.

WTA, WTP, and the Endowment Effect. We find robust evidence of an endowment effect across the U.S. population, both in aggregate and at the individual level. Across all studies and lotteries,

[14]More description of our data can be found in Online Appendix A. For the complete design documents of each of these studies, see eriksnowberg.com/wep.html. Screenshots of the specific questions used in this study are included in Appendix E.

[15]The students completed the survey online, and questions were presented with the same point values as in our representative samples. The most significant difference was that students received the value of their points converted into cash within two weeks, via Visa gift card, rather than deposited into a YouGov account. For the complete design documents of each of these studies, see eriksnowberg.com/wep.html.

WTA was 90% of the expected value of the lottery ticket, while WTP was 68%, giving us an aggregate endowment effect—see Appendix Table A.1 for a breakdown by lottery and study. Further, as we measure both WTA and WTP for each participant, we can estimate the endowment effect at an individual level. Across our three representative studies, 58% of participants demonstrate a (strictly positive) endowment effect, with another 12% who have WTA=WTP. The remaining 30% express a negative endowment effect.[16] These proportions are relatively constant across all the subgroups we examine, including our sample of students from the University of Pittsburgh, see Appendix Tables A.2 and A.3. Moreover, these figures are in line with the few previous within-participant estimates in the lab (see Appendix C.2).

Our data provide what may be the largest, and most robust, evidence for a pervasive individual-level endowment effect in the general population. For the analysis below, we construct two individual-level measures of the endowment effect: the ratio of WTA to WTP (mean=2.07, median=1.18, s.d.=2.08), and the difference between WTA and WTP (mean=22% of the expected value of the lottery, median=13%, s.d.=51%). The magnitude of the endowment effect that we find is similar to that reported by Isoni, Loomes, and Sugden (2011) for the lotteries we re-analyze in Appendix Table C.3: across the five lotteries, the mean WTA/WTP ranged from 1.11 to 2.19, and the median from 1 to 1.33.

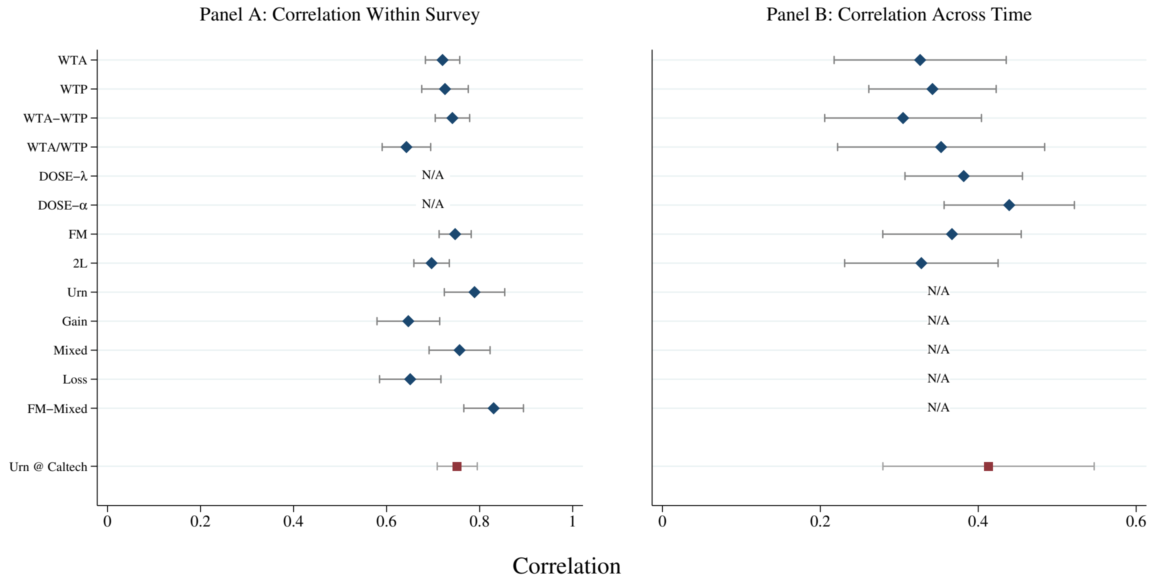
Measures of Loss Aversion for Risky Prospects. We have three measures of loss aversion for risky prospects: DOSE-λ in Studies 1 and 3, Mixed in Studies 2 and 3, and FM-Mixed in Study 3. Approximately half of participants are classified as loss averse under each of these measures (47% by DOSE-λ, 47% by Mixed, and 51% by FM-Mixed).[17] Despite the very different methodologies, our three loss aversion measures correlate with each other. Two of our measures—DOSE-λ and FM-Mixed—are highly correlated (ORIV Correlation 0.49, s.e.=0.04). The third—Mixed—is also significantly correlated with the other two, albeit somewhat less substantially (ORIV Correlation with DOSE-λ 0.20, s.e. 0.05; ORIV Correlation with FM-Mixed 0.13 (s.e.=0.06).[18]

[16]The exact size of the proportion expressing a negative endowment effect is uncertain: the discrete nature of our MPL elicitations does not allow us to distinguish between participants with small positive, small negative, or no endowment effect. If, instead of encoding choices using the midpoint of the two values around the MPL switching point, we consider alternative approaches, the percentage of participants with negative effect can shrink to 15%. The choice of a negative endowment effect does not appear to be simply a mistake: of those with a negative endowment effect on a single lottery, there is a 65% chance they have a negative endowment effect on the other lottery. By comparison, those with a strictly positive endowment effect for one lottery ticket had a 71% chance of having a positive endowment effect for the other.

[17]For FM-Mixed and Mixed, we classify participants as loss averse by averaging across the two elicitations of each measure. Over the four elicitations, the proportion of choices consistent with either loss neutrality or loss aversion is 63%. See Chapman et al. (2022) for a detailed discussion of heterogeneity in our loss aversion measures, including a wide range of robustness tests and comparisons with previous literature. Our measures of risk aversion classify most participants as risk neutral or risk averse over gains (76% by DOSE-α, 55% by Gain, 70% by FM, and 73% by 2L), and risk-neutral or risk-loving over losses (72% by Loss).

[18]As we discuss in Section 4.3, the less substantial correlation between Mixed and FM-Mixed is likely explained by the structure of these questions.

Figure 1: Relatively Low Measurement Error in Our Surveys.



Notes: The left-hand panel displays correlations between the two different elicitations of each variable across all of our surveys. The right-hand panel displays correlations between the measures collected across the two waves of Study 1, which were conducted six months apart. "Urn @ Caltech" relates to two elicitations of a measure similar to Urn, collected from Caltech undergraduates by Gillen, Snowberg, and Yariv (2019; $N = 903$ for within study correlation, $N = 785$ for over-time correlation). Over-time correlations are estimated using ORIV, except for the DOSE-elicited parameters, for which there is only a single measure in each survey wave.

Measurement Error. We assess the level of measurement error in our studies in two ways, as displayed in the two panels of Figure 1. First, in the left-hand panel, we observe high correlations between the two elicitations of each of our survey measures, clearly demonstrating that the variables are not simply capturing noise. The correlations between different elicitations range between 0.64 and 0.83, comparable to the 0.75 that Snowberg and Yariv (2021) found among Caltech undergraduate students—a population where we would anticipate low levels of measurement error—completing a question similar to Urn.

The over-time correlations in our studies are also similar to those found among Caltech students, as shown in the right-hand panel of Figure 1. This figure estimates the over-time stability of measures of risk preferences and loss aversion for risky prospects measured six months apart in Study 1, and Caltech undergraduates (Gillen, Snowberg, and Yariv, 2019). Our measures are relatively stable within individuals over time, with correlations across survey waves ranging from 0.33 to 0.44—similar to the over-time correlation of 0.41 in Caltech undergraduates. Overall, these results suggest that our measures capture relatively stable behavioral traits.

Table 2: Relationships between the endowment effect and loss and risk aversion.

Dependent Variable:	WTA/WTP		WTA–WTP	
Panel A: DOSE (Study 1 & 3; N = 3,000)				
Loss Aversion (λ)	−0.03	−0.03	0.02	0.02
	(.03)	(.029)	(.029)	(.027)
Risk Aversion ($1 - \alpha$)		−0.07**		−0.12***
		(.034)		(.032)
Panel B: FM-Mixed (Study 3; N = 1,000; ORIV)				
Loss Aversion	−0.07	−0.07	0.07	0.07
(FM-Mixed)	(.075)	(.072)	(.068)	(.062)
Risk Aversion		−0.27***		−0.32***
(Gains)		(.098)		(.096)
Risk Aversion		−0.20***		−0.24***
(Losses)		(.071)		(.083)
Panel C: Mixed (Study 2 & 3; N = 2,000; ORIV)				
Loss Aversion	−0.40***	−0.21***	−0.38***	−0.12*
(Mixed)	(.047)	(.07)	(.047)	(.067)
Risk Aversion		−0.27***		−0.32***
(Gains)		(.07)		(.07)
Risk Aversion		−0.08		−0.18***
(Losses)		(.064)		(.065)

Notes: ***, **, * denote statistical significance at the 1%, 5%, and 10% level, with standard errors in parentheses.

4.1 Finding 1: The Endowment Effect is Not Correlated with Loss Aversion for Risky Prospects

The main prediction of the models discussed in Section 2 is that the endowment effect should be positively correlated with loss aversion for risky prospects.

This prediction is not supported in our data, for either measure of the endowment effect, nor for any of the three measures of loss aversion in our study, whether or not one controls for risk aversion (utility curvature), as shown in Table 2. The columns of Table 2 vary the measure of the endowment effect and the specification, while each panel uses a different measure of loss aversion. All coefficients on loss aversion are small and not significantly different from zero, except the relationship between Mixed and the endowment effect, which has the *opposite* of the predicted sign.[19]

These statistical results are confirmed visually in Figure 2. This figure shows a scatter plot of the endowment effect (measured as the ratio of WTA to WTP) against DOSE-λ in Panel A, against FM-Mixed in Panel B, and against Mixed in Panel C. Each panel also includes a non-parametric fit of the data. As in Table 2, the only obvious correlation is the negative one between the endowment effect and Mixed, in Panel C.

The theories considered in Section 2, like KR and 3PT, make additional predictions regarding the relationship between loss aversion for risky prospects and the constituent components of the endowment effect—WTA and WTP—which we can also examine with the data. For WTA, the only statistically-significant relationship is a correlation of -0.28 (s.e.= 0.050, $p < 0.01$) with Mixed. Neither of the theories we consider predicts a negative relationship between WTA and loss aversion. WTP is correlated 0.05 with DOSE-λ (s.e. = 0.025, $p = 0.03$), -0.18 (s.e. = 0.060, $p < 0.01$) with FM-Mixed, and 0.18 (s.e. = 0.044, $p < 0.01$) with Mixed. All models predict the negative relationship with WTP we find for the FM-Mixed measure, but not the positive relationship with the DOSE-λ or Mixed measures. As we discuss in Section 4.3, this overall pattern is better explained by the hypothesis that these correlations are driven by the structure of the question, rather than by a unified notion of loss aversion.

Subgroups. Examining the results in Table 2 among different subgroups shows that they seem to hold fairly generally across the population, and are not simply due to groups of noisy respondents.

In principle, it is possible that noisy data from specific groups of participants—such as those who fail attention-screener questions—could wash out a positive correlation among the remaining ones.[20] This is not the case in our data, as shown in Table 3, which presents the six specifications from Table 2 that control for risk aversion for several subgroups. Appendix Table B.3 replicates this analysis without controlling for risk aversion; results are substantially similar.

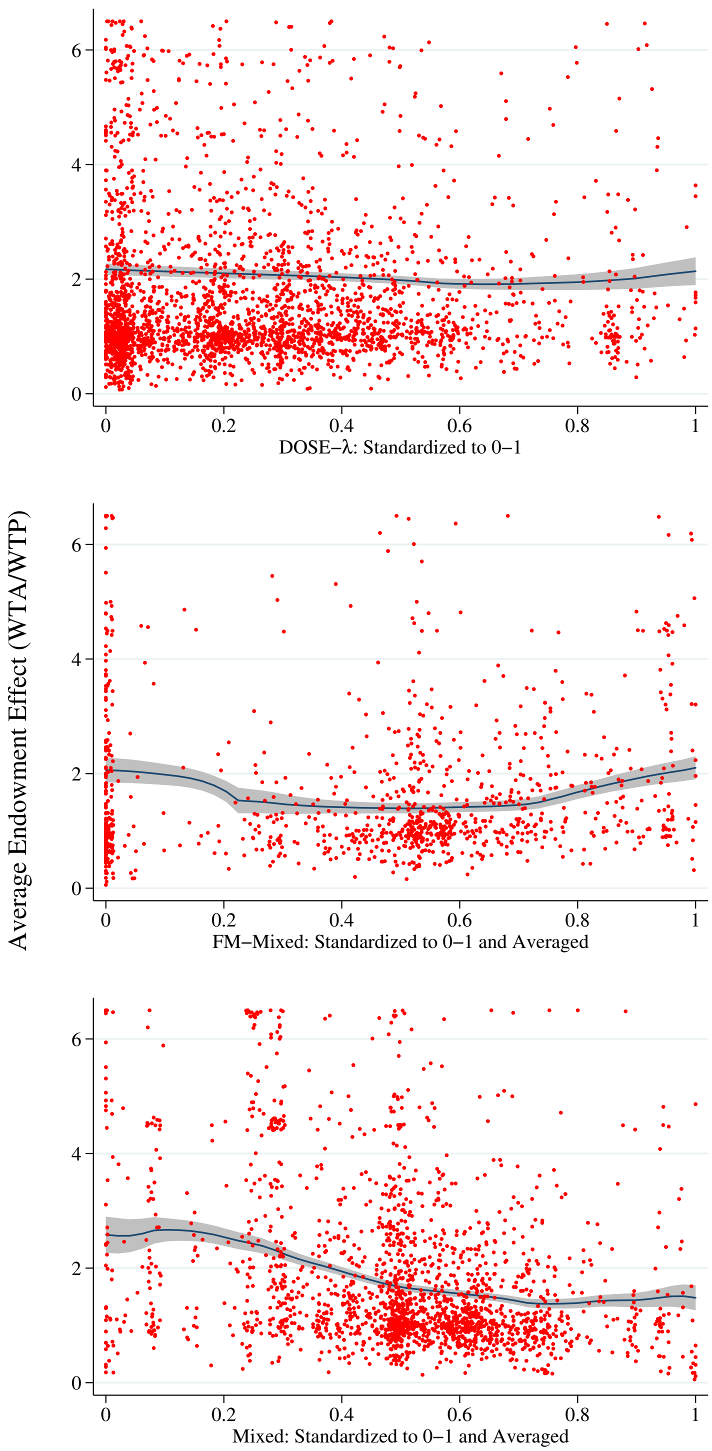
Results are similar when we eliminate participants who may be paying less attention. The second and third rows eliminate participants who failed an attention screener in Study 3, and the participants who completed the survey in the fastest 10% of times, respectively.[21]

[19]We disaggregate Table 2 by study and lottery in Appendix Table B.1, and in no specification is there a positive and statistically-significant relationship between any of our measures of loss aversion and either measure of the endowment effect. Naturally, adjusting p-values for multiple hypotheses testing would only reduce the statistical significance of these even further.

[20]As we use ORIV—which corrects for idiosyncratic measurement error—for the specifications involving Mixed or FM-Mixed, a particular subgroup obscuring a correlation between the endowment effect and loss aversion in the general population would require non-classical measurement error, such as a response bias. Further, YouGov automatically excludes from the final dataset participants who do not appear to take the survey seriously—completing the survey overly fast, or choosing the same option in many questions.

[21]The percent of participants in our Study 3 who failed at least one attention screener (16%) compares favorably to 18% of students from the University of British Columbia who failed at least one attention screener in a laboratory

Figure 2: No evidence of a positive correlation between loss aversion and the endowment effect.



Notes: Scatter plot is shown with a small amount of jitter. Horizontal axis standardizes loss aversion measure between 0 and 1. In the second and third panel, this is done before averaging.

Table 3: Relationship between the endowment effect and loss aversion, controlling for risk aversion, by subgroup.

Loss Aversion:	DOSE		FM-Mixed		Mixed	
Endowment Effect:	WTA/WTP	WTA–WTP	WTA/WTP	WTA–WTP	WTA/WTP	WTA–WTP
Estimation:	Regression		ORIV		ORIV	
All	−0.03	0.02	−0.07	0.07	−0.21***	−0.12*
	(.029)	(.027)	(.072)	(.062)	(.07)	(.067)
	N = 3,000		N = 1,000		N = 2,000	
Passed Attention Checks	−0.01	0.07	−0.04	0.06	−0.00	0.10
	(.059)	(.056)	(.077)	(.064)	(.109)	(.105)
	N = 840†		N = 840†		N = 840†	
Not Too Fast	−0.03	0.02	−0.02	0.10	−0.22***	−0.11
	(.03)	(.028)	(.075)	(.066)	(.074)	(.073)
	N = 2,701		N = 900		N = 1,801	
High School or Less	0.01	0.07	−0.13	0.03	−0.15	−0.01
	(.052)	(.048)	(.151)	(.13)	(.143)	(.137)
	N = 1,199		N = 345		N = 757	
Some College or College Degree	−0.03	0.01	−0.01	0.10*	−0.24***	−0.17**
	(.037)	(.033)	(.062)	(.058)	(.078)	(.077)
	N = 1,495		N = 534		N = 1,035	
Advanced Degree	−0.09*	−0.05	0.02	0.10	−0.16	−0.17
	(.053)	(.072)	(.088)	(.092)	(.132)	(.134)
	N = 306		N = 121		N = 208	
Income: Above Median	0.02	0.05	0.02	0.11*	−0.19**	−0.10
	(.043)	(.038)	(.078)	(.063)	(.078)	(.073)
	N = 1,417		N = 509		N = 972	
Income: Top ∼ 10%	−0.07	−0.05	−0.07	0.01	−0.37**	−0.26
	(.055)	(.06)	(.092)	(.098)	(.172)	(.18)
	N = 381		N = 161		N = 263	
Income: Top ∼ 5%	−0.04	−0.08	−0.34**	−0.26**	−0.15	−0.15
	(.104)	(.108)	(.162)	(.126)	(.155)	(.155)
	N = 137		N = 58		N = 102	
IQ: Above Median	0.02	0.05	0.01	0.09	−0.15	−0.08
	(.037)	(.037)	(.066)	(.058)	(.091)	(.097)
	N = 1,713		N = 629		N = 1,182	
IQ: Top ∼ 10%	0.12	0.13	−0.03	0.14	−0.03	0.06
	(.12)	(.089)	(.127)	(.149)	(.162)	(.188)
	N = 337		N = 122		N = 209	
IQ: Top ∼ 5%	−0.07	−0.01	0.11	0.21**	0.23	0.18
	(.05)	(.061)	(.082)	(.108)	(.282)	(.318)
	N = 114		N = 47		N = 88	

Notes: ***, **, * denote statistical significance at the 1%, 5%, and 10% level, unadjusted for multiple hypotheses, with standard errors in parentheses. Number of observations for each cell are given below standard errors, and differ across columns as each measure of loss aversion for risky prospects appears in different studies. †: Number of observations are the same, as attention checks were only present in Study 3.

The remaining rows examine demographic subgroups that may exhibit different response characteristics. Once again, results are not substantially different than those in the entire sample, with two notable exceptions. First, for two subgroups—above median incomes, and those who attended college—one out of six of the specifications produces marginally statistically significant results (recall, however, that we do not adjust for testing multiple hypotheses). However, two out of six specifications for those with incomes in the top 5% of our sample have negative and statistically significant correlations. Second, participants in the top 5–10% of our IQ measure exhibit stronger positive correlations. Indeed, the strongest positive relationship in Table 3 is for those in the Top 5% of IQ, using FM-Mixed as the measure of loss aversion for risky prospects, and the difference between WTA and WTP as the measure of the endowment effect. Some positive results, albeit not even marginally significant, are present for IQ in the top 10%. Correlations for those with IQ above the median are much closer to the results for the full sample.

We also stratify participants by other subgroups in Appendix Table B.2. Across those additional subgroups, the largest positive correlation is for those with above median Cognitive Reflection Test (CRT; Frederick, 2005) scores using FM-Mixed as the measure of loss aversion for risky prospects, and the difference between WTA and WTP as the measure of the endowment effect. However, that coefficient falls and is insignificant when considering those with a CRT score in the top 10%. Across all subgroups and specifications we consider here and in the appendix, only 6 out of 150 have positive and statistically-significant coefficients at the $p < 0.1$ level, without adjusting for multiple hypothesis testing. By contrast, 20 out of 150 have a negative and significant correlation.[22] These are primarily in specifications involving Mixed as the measure of loss aversion for risky prospects. As mentioned above, we believe this is explained by the hypothesis that these correlations are driven by the structure of the question rather than a unified notion of loss aversion, which we discuss in Section 4.3.

Overall, our analysis indicates a lack of correlation between loss aversion for risky prospects and the endowment effect, with the possible exception of a positive correlation among highly-selected high-IQ subsamples. We discuss this further when describing the previous literature in Section 6.

4.2 Finding 2: WTA and WTP are Either Uncorrelated or Weakly Negatively Correlated

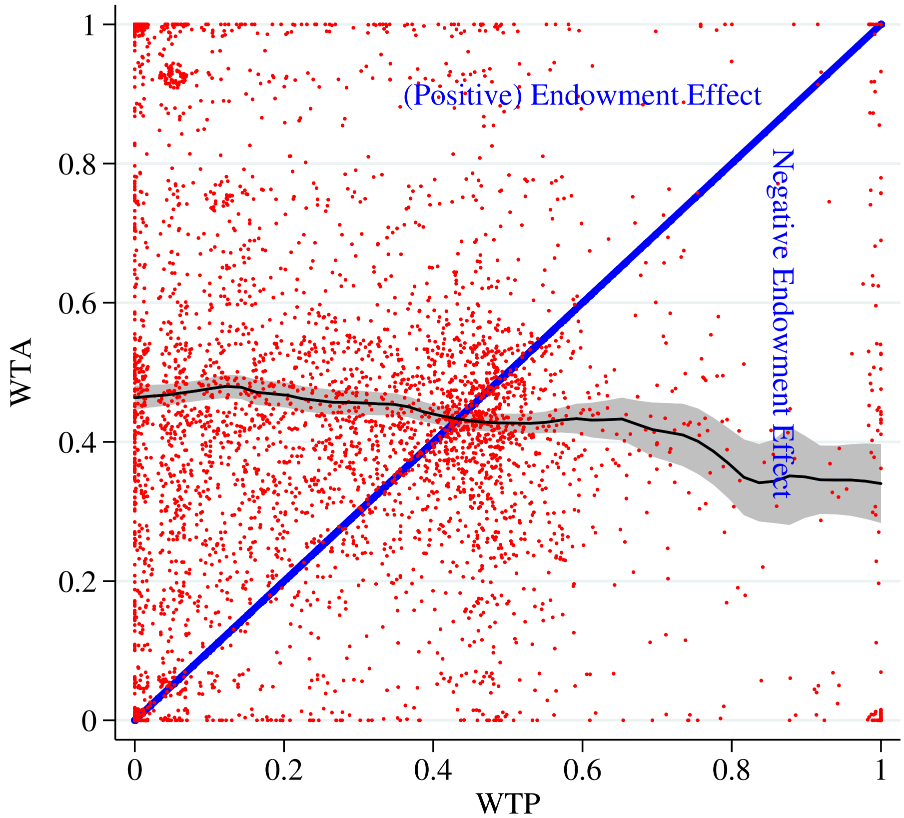
We have established that the endowment effect is unrelated to loss aversion for risky prospects, in contrast to the leading explanation in economics. We now turn to our additional findings about WTA and WTP that can help guide the selection of other theories of the endowment effect.

In our data, WTA and WTP are, at best, very weakly related to each other: observing a high

environment, see Snowberg and Yariv (2021).

[22]Adjustments for multiple hypothesis would be complicated by the fact that the subgroups and specifications are not independent.

Figure 3: WTA and WTP are largely unrelated.



Notes: Axes represent the average WTA and WTP for two lotteries. WTA and WTP for each lottery is measured as the percent of the expected value, normalized to [0,1], and is displayed with a small amount of jitter.

willingness to pay for a lottery ticket conveys very little information about willingness to accept. This is shown graphically in Figure 3, which plots the average WTA against the average WTP for all 4,000 participants in our data. There is wide variation in both WTA and WTP, and a non-parametric fit of the data demonstrates that while there is a negative relationship throughout, this is strongest for those who express risk-loving preferences for the lottery ticket (WTP > 0.5 on the normalized scale of the figure). The slope in this region of the graph is not well estimated, as it contains only 14% of the participants.[23]

The visual patterns in Figure 3 are confirmed by statistical analysis in Table 4. In all of our studies, the relationship between WTA and WTP is small in magnitude and typically negative. The last two columns take steps to reduce concerns that this is due to measurement error by using ORIV and by averaging across the two lotteries. Doing so does not affect our results.

The main finding of Figure 3 and Table 4 that WTA and WTP are, at best, weakly correlated is on

[23]Similar patterns are found separately for each lottery ticket in each study, see Appendix Figure C.1.

Table 4: Correlations between WTA and WTP.

	N	Lottery 1	Lottery 2	ORIV	Averages
Study 1, Wave 1	2,000	-0.06^{*} (.037)	-0.06^{*} (.037)	-0.09^{**} (.043)	-0.08^{**} (.037)
Study 1, Wave 2	1,465	−0.01 (.05)	−0.02 (.049)	−0.02 (.064)	−0.02 (.054)
Study 2	1,000	-0.09^{*} (.051)	−0.06 (.056)	−0.11 (.069)	−0.09 (.058)
Study 3	1,000	-0.13^{**} (.058)	-0.12^{**} (.052)	-0.15^{**} (.067)	-0.13^{**} (.055)
All Studies	4,000	-0.08^{***} (.027)	-0.08^{***} (.027)	-0.11^{***} (.033)	-0.09^{***} (.027)

Notes: ***, **, * denote statistical significance at the 1%, 5%, and 10% level, uncorrected for multiple hypotheses testing. Note that as Wave 2 of Study 1 contains a subset of individuals from Wave 1, we do not include it in the "All Studies" row.

its own, incompatible with the models discussed in Section 2 under the very common assumption that u is linear. Recall that, under that assumption, all variation in WTA and WTP is due to variation in λ, with WTP decreasing when λ increases, while WTA may be increasing (3PT) or unchanging (KR) when λ increases. Under 3PT, this leads to a strong negative correlation between WTA and WTP, contrary to what we document. Under KR, the correlation is undefined but there should be no variation in WTA other than noise—which is not the case in our data as our measures of WTA are related to each other, and over time.

Subgroups. In Appendix Table C.1, we examine the correlation between WTA and WTP within the different subgroups analyzed in Table 3. Correlations are small in magnitude in most of the subgroups we examine. As was the case for Finding 1, we see a different result among those with the Top 5% of IQs, as measured in our survey: in this group the ORIV correlation is 0.32 and statistically significant.

Taken together, the evidence across our studies is that the correlation between WTA and WTP is small in magnitude, except for in high-IQ subgroups.

4.3 Finding 3: WTA and WTP are Linked to Different Clusters of Risk Preferences

As WTA and WTP are elicited for lottery tickets, they should relate to measures of risk preferences. However, as WTA and WTP are unrelated to each other, this raises questions about the exact pattern of correlations. Here we show that WTA and WTP are related to independent clusters of risk preference measures.

As shown in Table 5, WTA and WTP are related to different risk preference measures, depending on whether participants explicitly or implicitly sell a lottery—WTA and certainty equivalent measures—or explicitly or implicitly buy a lottery—WTP and lottery equivalent measures. This table shows the correlations between WTA, WTP, and the risk preferences measures in Study 2.[24] A very clear pattern emerges: there are two clusters of strongly-related variables. The first cluster includes WTA and the certainty equivalent measures: Urn, Gain, Mixed, and Loss. The second cluster includes WTP and the lottery equivalents: FM and 2L.[25] These clusters feature large within-cluster correlations and smaller correlations with measures in the other cluster.[26] A principal components analysis confirms these clusters, and suggests relationships with a broad range of other preference measures: this is studied in detail in Chapman et al. (2023).

These findings show that our data have a clear structure, despite being incompatible with theories of WTA and WTP discussed in Section 2. They also provide further evidence that our measures of WTA and WTP capture a real variation in preferences, despite being uncorrelated.

A Possible Explanation. An organizing principle for these findings is proposed by Hershey and Schoemaker (1985) and Sprenger (2015), who suggest that MPL-based risk elicitations induce a reference effect, with the fixed option of the MPL treated as an endowment. In particular, in the certainty equivalent measures—Urn, Gain, Mixed, and Loss—the lottery is fixed on the left-hand side of the MPL, and participants are asked for their certainty equivalent. Implicitly, participants are asked how much money they will accept for the lottery. In this light, it is not surprising that these measures are related to WTA, which is explicitly framed as selling. Similarly, in FM, the fixed option is an amount of money, and participants are implicitly asked to gauge how much of that they

[24]Correlations are ORIV. All risk aversion measures are coded so that higher values correspond to more risk aversion. Thus, the expected (and usually observed) sign of the correlation between WTA or WTP and these measures is negative. The correlations in this table are arranged to highlight the clusters, rather than displayed as a traditional lower-diagonal matrix.

[25]Study 3 contains a subset of these measures, and the pattern of correlations among them is largely consistent with Table 5.

[26]The fact that theoretically-equivalent risk attitudes are weakly correlated is consistent with a large literature. For recent reviews in economics and psychology, see Friedman et al. (2014); Pedroni et al. (2017); Holzmeister and Stefan (2021). Gillen, Snowberg, and Yariv (2019) suggest that findings of low correlations between measures of risk attitudes may be due to measurement error—we adopted their techniques to rule this out.

Table 5: ORIV Correlations between WTA, WTP, and Other Risk Measures, Study 2.

		WTA	Urn	Certainty Equivalent Gain	Certainty Equivalent Mixed	Certainty Equivalent Loss	WTP	Lottery Equivalent FM
Certainty Equivalent	Urn	-0.66^{***}					0.07	
		(.051)					(.067)	
	Gain	-0.66^{***}	0.65^{***}				0.04	
		(.064)	(.058)				(.071)	
	Mixed	-0.58^{***}	0.51^{***}	0.60^{***}			0.19^{***}	
		(.063)	(.058)	(.057)			(.071)	
	Loss	-0.27^{***}	0.26^{***}	0.39^{***}	0.65^{***}		0.30^{***}	
		(.076)	(.066)	(.07)	(.067)		(.088)	
Lottery Equivalent	FM	−0.03	0.05	0.09	-0.14^{*}	-0.19^{**}	-0.45^{***}	
		(.07)	(.066)	(.069)	(.07)	(.075)	(.048)	
	2L	0.12^{*}	-0.17^{***}	-0.13^{*}	-0.21^{***}	-0.15^{*}	-0.28^{***}	0.41^{***}
		(.072)	(.066)	(.072)	(.073)	(.077)	(.061)	(.062)

Notes: ***, **, * denote statistical significance at the 1%, 5%, and 10% level, unadjusted for multiple hypotheses. Each cell in the table is an ORIV correlation with standard errors in parentheses. All measures except WTA and WTP are (re-)coded so that higher values correspond to more risk aversion.

will give up for the lottery—and it is thus related to our measure of WTP, which is explicitly framed as buying. It is worth noting that our measure of WTP is an MPL with a fixed lottery, thus implicitly framed as a WTA measure. This suggests that the explicit framing of buying dominates the implicit effect of the question structure.

This interpretation provides a rationale for the patterns in Table 5: the primary organizing principle for these risk measures is whether a question is framed—implicitly or explicitly—as WTA or WTP. Thus, it further validates the approach suggested in Hershey and Schoemaker (1985) and Sprenger (2015).

Thus, Table 5 further supports Finding 2—that WTA and WTP are unrelated. In Table 5, measures of WTA and WTP are largely unrelated regardless of whether the framing is implicit or explicit. The correlation between Urn (or Gain) and FM is statistically indistinguishable from zero. This is also true of the correlations between the explicitly-framed WTA measure and the implicitly-framed WTP measure (FM), and between the explicitly-framed WTP measure and the two implicitly-framed WTA measures (Urn and Gain).

The approach of Hershey and Schoemaker (1985) and Sprenger (2015) also provides an explanation for the pattern of correlations we see between our various measures of loss aversion and WTA and WTP, mentioned in Section 4.1. Under this interpretation, the negative relationship between WTA and Mixed, which is not predicted by the theories in Section 2, occurs because the latter is a certainty equivalent measure. Similarly, the negative relation between WTP and FM-Mixed is consistent with the latter being a lottery equivalent measure. It is important to note that WTP is less correlated with FM-Mixed than it is with other lottery equivalent measures (−0.18, in Study 3 vs. −0.45 for FM and −0.28 for 2L, from Table 5). If loss aversion were driving both WTP and the increase in risk aversion for lotteries including both gains and losses, we would expect a stronger relationship between WTP and FM-Mixed than between WTP and FM or 2L, as neither of the latter two includes losses. The observed opposite pattern is, once again, inconsistent with loss aversion driving both WTP and the increase in risk aversion for lotteries that include both gains and losses.

5 Other Theories of the Endowment Effect

Our results are incompatible with the most common explanation of the endowment effect in economics—that it is driven by loss aversion. We briefly discuss some of the many alternative models proposed in economics and psychology, focusing on those that have the potential to fit our findings (see also Morewedge and Giblin 2015 for a review of psychological theories). While our studies were designed to test loss-aversion-based explanations and not to separate other models, our results are nonetheless useful to narrow the space of plausible theories. As we describe below, models of Salience and Cautious Utility explicitly incorporate loss aversion for risky prospects and the endowment effect as possibly disjoint phenomena and are broadly compatible with our results. Several other theories propose different explanations of the endowment effect without modeling risk preferences. These theories cannot be falsified by our findings, but it may be possible to extend these models to account for them.

Salience. Individuals may attach disproportionate weight to the features of goods that "stand out," as in Salience theory (Bordalo, Gennaioli, and Shleifer, 2012a).[27] If, when given a good for free—as in endowment effect experiments—individuals compare it to having nothing, they focus on the positive aspects. This increases the value of the good, leading to a higher WTA, and to the endowment effect. This divergence will be more pronounced for individuals whose choices are more affected by salience. If there is no relationship between the value of a good when focusing on positive aspects and the value when all characteristics are equally salient, then WTA and WTP will be independent as well.

Loss aversion for risky prospects can be generated by allowing individuals to overweight losses, either as a feature of utility or because losses are more salient (Bordalo, Gennaioli, and Shleifer, 2012b). This asymmetry may also increase the endowment effect. The endowment effect and loss aversion for risky prospects can be uncorrelated if the extent to which individuals overweight losses—which increases both loss aversion and the endowment effect—is negatively correlated with the extent to which salience affects other choices, namely those leading to the endowment effect.

Cautious Utility. In Cautious Utility (Cerreia-Vioglio, Dillenberger, and Ortoleva, 2021), individuals may be unsure of their own trade-off between different goods, modeled using a set of utility functions. When making a choice, individuals then adopt the criterion of *caution*: the value they assign to each good is the lowest given by the utilities in the set.[28] This leads to the endowment effect. For example, consider an individual who is unsure of their own value for an object—it could be $2 or $5. When selling, caution induces the individual to ask for at least $5, as they are worried about foregoing something valuable. In contrast, when buying, the individual is unwilling to pay more than $2, as caution induces them to worry about overpaying. In this model, the endowment effect is related to uncertainty about trade-offs, and not to the asymmetry between gains and losses. The model also generates an endowment effect for lottery tickets when individuals are unsure about the tradeoffs between the lottery and sure amounts of money—that is, when they are uncertain of precisely how risk-averse they should be. It is also compatible with a lack of correlation between WTA

[27]In this model, values are calculated by aggregating the utility of a good's attributes, as in the standard model, but individuals overweight the good's salient attributes at the expense of the non-salient ones. The salience of an attribute for a good depends on the distance between the good's attribute and the average value of that attribute in the set of options under consideration.

[28]Formally, individuals have a set of utility functions $\mathcal{W}$ and evaluate each option, expressed in terms of changes relative to the reference point, by $V(x) = \inf_{v \in \mathcal{W}} v_1^{-1}(v(x))$, where v_1^{-1} is the monetary certainty equivalent.

and WTP, as long as the low and high values implied by the set of utility functions are unrelated.[29]

This model also generates loss aversion for risky prospects when different utility functions disagree on how to aggregate gains and losses. Crucially, while both loss aversion and the endowment effect stem from the same conceptual sources—caution and uncertainty about preferences—they need not be empirically related. If uncertainty about trade-offs between a good and money is unrelated to uncertainty about how to aggregate gains and losses, Cautious Utility leads to loss aversion for risky prospects that is unrelated to the endowment effect (see Cerreia-Vioglio, Dillenberger, and Ortoleva, 2021, for a more extensive discussion). For completeness, Appendix D includes a simple example from Cautious Utility of a distribution of parameters such that the endowment effect for lotteries and loss aversion for risk prospects are uncorrelated.

There are several other models of the endowment effect that are not based on loss aversion. However, these models typically do not examine choice over risky prospects. As such, they cannot be falsified by our findings, but may be extended to relate to them. These models include:

Incomplete Preferences. The endowment effect may be due to preference incompleteness, which assumes individuals may be unable to confidently compare some alternatives. When paired with a form of inertia—individuals stay with their endowment unless they find an alternative they know they like better—incompleteness leads to status quo bias and the endowment effect (Bewley, 1986; Masatlioglu and Ok, 2005, 2014; Ortoleva, 2010).[30] Intuitively, and similar to Cautious Utility, if someone with incomplete preferences is unsure of how to compare a lottery with a range of monetary values, they will require the highest to sell, but would be willing to pay only the lowest to buy. These models are also compatible with WTA and WTP being uncorrelated, following the same logic as in Cautious Utility.

Reference Prices and Strategic Pricing. Alternatively, individuals may have a well-defined, unique value of the object v. However, in determining WTA and WTP they may also consider a reference price r and have a reluctance to trade with terms that seem unfavorable based on a comparison of prices and the reference price (Weaver and Frederick 2012; see also Thaler 1985; Isoni, Loomes, and Sugden 2011). When $r > v$, individuals are not willing to pay more than v—they don't want to purchase an object for a price above the value they assign to it. However, they are also unwilling to accept less than r to sell it, as that would feel like a "bad deal." If r and v are independent, so too are WTA and WTP. A related approach is described in Smitizsky, Liu, and Gneezy (2021): participants have a unique value for the object that does not depend on ownership, but act strategically, aiming

[29]Cerreia-Vioglio, Dillenberger, and Ortoleva (2021) also discuss an alternative version of the model, called "incautious," in which individuals consider the highest value in the set. This would be compatible with the negative endowment effect documented for a subset of our participants.

[30]A related approach relies on preference imprecision instead of incompleteness, see Dubourg, Jones-Lee, and Loomes (1994); Butler and Loomes (2007); Cubitt, Navarro-Martinez, and Starmer (2015).

for a high price when selling and a low price when buying.

Biased Information Processing. Another group of theories focuses on how buying and selling frames evoke different information. It is well known that people access different information—from memory and/or the environment—when confronted with different tasks. This can generate the endowment effect if the act of selling increases the availability of information that indicates the good has a high value, or that it should be kept, while the opposite happens during the activity of buying (Carmon and Ariely, 2000; Nayakankuppam and Mishra, 2005; Johnson, Häubl, and Keinan, 2007; Ashby, Dickert, and Glöckner, 2012; Pachur and Scheibehenne, 2012).[31] As these models assume that WTA and WTP are based on different information, they are compatible with the lack of correlation between the two.

Distinct Cognitive Processes. A more speculative approach is suggested by recent work in neuroscience, which finds evidence of two different neural processes governing buying and selling. An early fMRI study found distinct activity in the medial prefrontal cortex (mPFC) when making a buying decision at a low price and (more weakly) a selling decision at a high price (Knutson et al., 2008). This region encodes abstract integrated types of value, which is consistent with a value for being relatively confident in getting a good deal. There is further evidence that WTP is processed by the medial orbitofrontal cortex (mOFC), while WTA is processed by a more lateral portion of the OFC (the lOFC, see De Martino et al., 2009). Finally, Tong et al. (2016) find overlapping neural activity processing high prices during selling and low prices during buying. They also find that participants with trading experience have lower WTAs for consumer goods, but similar WTPs. These studies do not form a simple, integrated neuro-psychological picture, but all show neural processing differences between buying and selling, which is likely to be clarified further by future research.

Evidence consistent with different cognitive processes is found in response times to our own questions. In our experiments, the two WTA questions had much shorter response times than the two WTP questions: median response time for both WTA questions together was 88 seconds, against 122 for WTP.[32] This difference is large: WTP has the longest median response time of the eight sets of risk aversion questions, while the two Gain questions had the shortest (74 seconds). This difference is compatible with the idea that different processes are involved in buying and selling.

[31]For example, buyers of pens and lotteries recall fewer positive and more negative attributes than sellers do (Nayakankuppam and Mishra, 2005; Saqib, Frohlich, and Bruning, 2010). Similarly, buyers of basketball tickets tend to consider the costs of attending the game, while sellers consider the benefits of attending (Carmon and Ariely, 2000).

[32]This difference was true question-by-question as well. Moreover, this difference is unlikely to be driven by the slightly longer instructions of the WTP questions, which, based on similar length instructions elsewhere, likely only added 5 seconds to the WTP question. Moreover, although participants take longer on earlier modules, even when the WTP module is randomly selected to be later in the survey, it still takes longer than WTA when WTA is randomly selected to be earlier in the survey.

6 Relationship with the Literature

Finding 1. Despite being the core prediction of the leading theories of the endowment effect, little empirical work investigates the relationship between the endowment effect and loss aversion for risky prospects. We are aware of only three studies, which reach different conclusions: two (Dean and Ortoleva 2019, henceforth DO, and Gächter, Johnson, and Herrmann 2022, henceforth GJH) find a correlation between the two, and one (Fehr and Kübler 2022, henceforth FK) does not.[33]

Some patterns emerge from considering these studies together with ours, although it is difficult to draw solid inferences by comparing only four studies with many points of difference. The most apparent pattern is that the studies that use larger and more representative samples find no correlation between the endowment effect and loss aversion. Our study has 4,000 participants from a representative sample of the U.S. population, and FK studies 3,146 households from a representative sample of the German population. In contrast, DO use data elicited from 190 students from Brown University, and GJH considers 360 randomly selected customers from a German car dealership.

Other aspects of these studies do not seem relevant to explaining differing results. The presence of a correlation does not seem to depend on the type of good over which the endowment effect is measured—that is, lotteries or physical goods. Our study and DO use lotteries, while GJH and FK use physical goods (of similar value to our lotteries). FK, DO, and GJH use in-person elicitations, while we use an online panel. FK uses hypothetical lotteries to elicit loss aversion over risky prospects with relatively larger (hypothetical) stakes. Finally, the elicitation method does not seem relevant, as both our study and DO use extremely similar MPLs.

The biggest difference between our study and DO is the population studied. To examine whether there is evidence that this difference is driving contrasting results, we first examine subgroups in our data. Note that DO study a highly selected student sample, their measure of loss aversion for risky prospects is quite similar to FM-Mixed, and measure the endowment effect as WTA−WTP. We find some evidence that groups with measured intelligence in the top 5–10% of the U.S. population have a more positive correlation between loss aversion for risky prospects and the endowment effect, as discussed in Section 4.1. Note, however, that we do not find evidence for a positive correlation among the most educated participants in our study.

Additionally, we can examine the correlation in a student sample from the University of Pittsburgh (described in Section 4.1). Table 6 replicates Table 2 in data from two studies in this population ($N = 806$). There is a marginally significant positive correlation between the endowment effect and loss aversion for risky prospects, but only when loss aversion is measured as FM-Mixed,

[33]Fehr and Kübler (2022) was initiated after our initial working paper and primarily focuses on the role of expectations in the endowment effect. It does not have the rich data on WTA, WTP, and risk aversion that allows us to show Findings 2 and 3. In a recent working paper, Campos-Mercade et al. (2022) find a modest positive correlation between loss aversion for risky prospects and labor supply decisions.

Table 6: Correlations between the endowment effect, and loss and risk aversion in two student samples.

Dependent Variable:	WTA/WTP		WTA−WTP	
Panel A: DOSE (Student Study 1 & 2; N = 806)				
Loss Aversion (λ)	0.01	0.01	0.03	0.03
	(.035)	(.035)	(.035)	(.035)
Risk Aversion ($1-\alpha$)		0.07**		0.03
		(.035)		(.035)
Panel B: FM-Mixed (Student Study 2; N = 437; ORIV)				
Loss Aversion	0.09	0.10	0.12	0.15*
(FM-Mixed)	(.091)	(.082)	(.083)	(.077)
Risk Aversion		−0.12		−0.26**
(Gains)		(.114)		(.102)
Panel C: Mixed (Student Study 1 & 2; N = 806; ORIV)				
Loss Aversion	−0.11**	−0.10**	−0.12***	−0.07
(Mixed)	(.051)	(.048)	(.048)	(.047)
Risk Aversion		−0.02		−0.16**
(Gains)		(.083)		(.075)

Notes: ***, **, * denote statistical significance at the 1%, 5%, and 10% level with standard errors in parenthesies.

and the endowment effect is WTA−WTP.

Overall, these results suggest that an important driver of differences between studies is the population examined.[34] It appears that a positive correlation between the endowment effect and loss aversion for risky prospects may be present in selected samples but does not extend broadly. Moreover, even within selected groups, it may be that correlations are positive only using certain measures but not others, pointing to some fragility of those results.

Finding 2. There is very little examination of the correlation between WTA and WTP; perhaps because most studies of the endowment effect use between-subjects designs that do not allow the calculation of a within-person correlation. We know of only two studies that report the correlation between WTA and WTP for lotteries: One finds a small positive correlation (Borges and Knetsch, 1998) in a very small (N = 45) sample, and the other a small negative correlation (Brown et al.,

[34] Note that differences in correlations across populations is not inconsistent with Snowberg and Yariv (2021). While that paper finds that many correlations are the same in representative and student samples, others (23 out of 55) are significant in one sample and insignificant in the other.

2017) measured over hypothetical annuities.

To understand the plausibility of our findings in light of the existing literature, in Appendix C.2, we examine the correlation of WTA and WTP in published studies containing within-subject incentivized measures of the endowment effect for lotteries. We found only five experiments (total $N = 790$) with available data. These studies differ from ours in several ways, including elicitation methods and participant pools. Compiling the data across all five studies, we find a correlation between WTA and WTP of 0.13, a similar magnitude, although of the opposite sign, as in our data. This is also quite similar to the correlations observed in our sample of University of Pittsburgh students, as shown in Appendix Table C.1.

Finding 3. Finding 3 relates to several papers. First, as discussed in Section 4.3, existing evidence shows how multiple price lists may generate reference effects (Hershey and Schoemaker, 1985; Sprenger, 2015). Thus, Finding 3 suggests a different way to measure the endowment effect: using certainty equivalents as measures of WTA and lottery-equivalents as measures of WTP. This should correlate with the endowment effect, and it does: the ORIV correlation between the WTA minus WTP and Urn minus FM is 0.54. This provides a novel way to elicit the endowment effect that may be simpler to use in some contexts.

Second, as also discussed in Section 4.3, our data relates to the literature on the multi-dimensionality of risk preferences. This literature is discussed in more detail in a companion paper, Chapman et al. (2023), which studies the pattern of correlations across a large number of behavioral regularities, including measures of social preferences and overconfidence.

Finally, FK, described above, find that their measure of the endowment effect is correlated with economic behaviors outside their survey—namely moving and owning equities—suggesting, in line with our Finding 3, that features of the endowment effect are useful predictors of other economic behaviors.

7 Conclusion

The endowment effect occupies a prominent role in behavioral economics as it directly contradicts the core tenet of classical economic decision-making: that purchasing decisions and trade are guided by individuals having a unique, well-defined value for an object. Identifying the endowment effect's causes is central to developing theories that better explain economic decision-making, to improving our understanding of the endowment effect's implications, and to identifying how it can be reduced or eliminated using policy intervention. This paper empirically tackles questions related to the origin of the endowment effect using multiple large, representative, incentivized surveys to document several new findings about WTA, WTP, the endowment effect, and loss aversion for risky prospects.

Consistent with the earlier literature using convenience samples, we find that a majority of the general population exhibit an endowment effect for lotteries. However, we document three new facts: i) the endowment effect is unrelated to loss aversion for risky prospects, contradicting the standard explanation that ascribes the endowment effect to loss aversion; ii) WTA and WTP are not only different, but largely uncorrelated; and iii) WTA and WTP are related to different, independent features of risk preferences.

To reconcile theory with our data, the endowment effect needs to be decoupled from loss aversion under risk, and WTA and WTP need to be able to vary independently. To our knowledge, out of prominent alternative theories, only Salience and Cautious Utility accommodate these features, and thus provide the most complete accounting of our results. More work is needed to test these theories as rigorously as we have tested the standard explanation of the endowment effect.

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