

Chapter X: Experimental tests of the endowment effect and the Coase theorem

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Abstract: This review summarizes the historical place of the seminal contribution of Kahneman et al. (1990), from origins to theory to catalyst of an entire area of scholarship. This new literature has produced evidence both in concert with the original KKT conclusions as well as evidence refuting certain insights from KKT. The general theme of my summary is that even imperfect papers can have deep impact, both within and outside the academy; a lesson that today's critics should consider as young experimentalists continue to fight the tyranny of the top 5.

Introduction

Stated preference surveys were first proposed by Ciriacy-Wantrup (1947), and have served an important role ever since to generate total values of non-market goods and services (see Bishop et al., 2017). Yet, one anomaly that began to surface in the early 1970s was that willingness to accept (WTA) and willingness to pay (WTP) measures of value for a commodity were systematically different. For example, Hammack and Brown (1974) found that hunters questioned about possible destruction of a duck habitat stated that they would be willing to pay an average of \$247 to prevent the loss but demanded compensation of \$1044 to accept the destruction. Similarly, Rowe et al. (1980) found that WTA values were from 5 to over 16 times higher than WTP values in their survey. These are not cherry-picked examples, as the review of Cummings et al. (1986) shows.

In these stated preference examples, the basic independence assumption naturally leads to the prediction that with small income effects and many available substitutes, the WTA and WTP measures of value should be roughly equivalent. When such data patterns began to surface scholars wondered if a key tenet of neoclassical theory—that preferences are independent of the consumer's current entitlements—was violated.

As one might guess, the initial reaction of many economists was to argue that these early results were a survey artifact and that WTA estimates were unreliable and should not be treated seriously. This is because whether preferences are defined over consumption levels or changes in consumption has serious implications for the discipline of economics. In a normative sense, the basic independence assumption (that preferences are orthogonal to current entitlements), which is used in most theoretical and applied economic models to assess the operation of markets, is directly refuted. In a positive sense, the disparity has considerable relevance. For example, such preferences call into question commonly held interpretations of indifference curves, make cost-benefit analysis illegitimate, change the procedure necessary to resolve damage disputes, and cause a reconsideration of several of

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our other deep intuitions, such as the invariance result of Coase which relies on Hicksian equivalent surplus and Hicksian compensating surplus to be roughly equivalent.

What was needed to help resolve the dispute was an empirical assessment of whether this systematic occurrence of stated values represented real preferences or was indeed an artifact. Relatedly, are these stated values best described by a neoclassical model or do we need to scrap that model and use an entirely new economic paradigm?

On the scene steps Daniel Kahneman, Jack Knetsch, and Richard Thaler. Danny and Dick need no introductions. They are Nobel Prize winners as pioneers of the behavioral economic approach (Danny in 2002 and Dick in 2017), and rightfully so. To my eye, Jack Knetsch is one of the unsung heroes of the behavioral economics movement. One of the most under-appreciated and under-rated economists of the 1980s and 1990s. He was not only a coauthor of the seminal work on the endowment effect that I discuss here but contributed to several other stellar contributions in the 1980s and 1990s (see, e.g., Knetsch and Sinden, 1984; Kahneman et al., 1986a; 1986b, Knetsch, 1989; Kahneman et al., 1991).

From a historical perspective, the big bang for modern behavioral economics was a theoretical paper on preferences over gambles written by Kahneman and Tversky (1979), but the Kahneman et al. (1990; KKT hereafter) work defined and struck a deep empirical chord. This is because KKT reported broad experimental evidence of an *endowment effect*, which was earlier coined by Thaler to denote that people offer to sell a good in their possession at a substantially higher level than they will pay for the identical good not in their possession. Indeed, KKT assert two important conjectures that have had an important influence on the profession: 1) they forward 8 experimental demonstrations that they argue shows evidence of the endowment effect and 2) they argue that their evidence shows the endowment effect is a fundamental characteristic of preferences that will not be eliminated by market experience.

To make my review a “one-stop” shop, the next section provides a “workmanlike” look at the KKT study, which they present as 8 different experiments. With this in hand, Section 3 provides a theoretical exploration showing certain imperfections in their work that might temper one’s enthusiasm for a strong interpretation of their data. I then proceed to explore briefly some work that was catalyzed from their study that shows, from the aggregate evidence, that one can make both arguments in concert with the original KKT conclusions and some that are at odds with KKT. I hope that this approach not only places KKT in proper perspective but provides some relief to those scholars who are making solid incremental advances in a world that seemingly demands every single issue to be tackled in one study. Impatient or well-read scholars familiar with the original KKT work might wish to jump directly to Section 3.

2. KKT Experimental Particulars

In this section, I provide an overview of the various experiments in the original KKT study and the results forwarded by their analysis. I do not return to their data and perform a replication, rather I take as given their results.

KKT EXPERIMENT 1

Description:

In Experiment 1, 44 students in an advanced undergraduate law and economics class at Cornell University faced 11 different markets. The first three markets were conducted for induced-value tokens. Sellers (buyers) were told that they were owners of a token (that they had the opportunity to buy a token), the value it had for them and that the tokens had different values for different individuals. They subsequently were asked to indicate whether they would sell (buy) the token at that price or keep the token and cash it in for the sum of money indicated (not buy the token at that price).

Forms with a distribution of values and prices ranging from \$0.25 to \$8.75 in steps of \$0.50 were prepared for both buyers and sellers. Not all the forms were distributed, as such the induced supply and demand curves were not always symmetric. Subjects alternated between the buyer and seller role in the three successive markets and were assigned a different individual redemption value in each trial. After each market period, the experimenters collected the forms from all participants, and immediately calculated and announced the market-clearing price, the number of trades, and the presence or absence of excess demand or supply at the market-clearing price. Three buyers and three sellers were selected at random after each of the induced markets and were paid according to the preferences stated on their forms and the market-clearing price for that period.

After the three induced-value markets, subjects in alternating seats were given Cornell coffee mugs, which sell for \$6.00 each at the bookstore. The experimenter then informed subjects that four markets for mugs would be conducted using the same procedures as the prior induced market with two exceptions. First, one of the four market trials would be selected at random and only the trades made on this market would be executed. Second, in the binding market trial, all trades would be implemented, unlike the subset implemented in the induced-value markets. The initial assignment of buyer and seller roles was maintained for all four trading periods. The clearing price and the number of trades were announced after each period. After the fourth period the market that “counted” was indicated and transactions were executed immediately. All sellers who had indicated that they would give up their mugs for a sum at the market-clearing price exchanged their mugs for cash, and successful buyers paid this same price and received their mugs. This design was used to permit learning to take place over successive trials and yet make each trial consequential in expectations.

The same procedure was then followed for four more successive markets using boxed ballpoint pens with a visible bookstore price tag of \$3.98, which were distributed to the subjects who had been buyers in the mug markets. Subjects completed a form similar to that used for the induced-value tokens: they were asked to indicate for a list of prices

whether they preferred to sell (buy) the object and receive the price listed or keep the object and take it home (not buy the object at that price).

Results

The markets for induced-value tokens and consumption goods yielded different results. In the induced-value markets, as the authors anticipated, the median buying and selling prices were identical. The ratio of actual to predicted volume (V/V^*) was 1.0 aggregating over the three periods. In contrast, the median selling prices in the mug and pen markets were more than twice the median buying prices. The V/V^* ratio was only 0.20 for mugs and 0.41 for pens. The observed volume did not increase over successive periods in either the mug or the pen markets, providing no indication that subjects could learn to adopt equal buying and selling prices.

KKT EXPERIMENT 2

Description:

Experiment 2 was conducted with an undergraduate microeconomics class with 38 students. The procedure was identical to that of Experiment 1, except that the second consumption good was a pair of folding binoculars in a cardboard frame, available at the bookstore for \$4.00.

KKT EXPERIMENTS 3 AND 4

Description:

Experiments 3 and 4 were conducted in Simon Fraser University undergraduate economics classes, and in these treatments, subjects were asked to provide minimum selling prices or maximum buying prices rather than answering the series of yes or no questions used in Experiments 1 and 2.

The induced-value markets were conducted with no monetary payoffs and were followed by four markets for pens in Experiment 3 and five markets for mugs in Experiment 4. In Experiment 3, subjects were told that the first three markets for pens would be used for practice, so only the fourth and final market would be binding. In experiment 4, one of five markets was selected at random to count, as in experiments 1 and 2.

Results Experiments 2-4

All three experiments yield insights consonant with Experiment 1. Summing over the induced-value markets in all four experiments produced a V/V^* index of 0.91. This performance was achieved even though the participants did not have the benefit of experience with the trading rules, there were limited monetary incentives in Experiments 1 and 2, and there were no monetary incentives in experiments 3 and 4. In the markets for consumption goods, in which all participants faced monetary incentives and experience with the market rules gained from the induced-value markets, V/V^* averaged 0.31, and median selling prices were more than double the corresponding buying prices.

KKT EXPERIMENT 5

Description:

Experiment 5 was carried out similarly to the first four experiments, except that subjects were told that the executed market price would be selected at random. This was made because readers of early drafts of the paper suggested that because of the manner that market prices were determined, subjects might have felt that they had an incentive to misstate their true values to influence the price.

This 5th experiment was conducted in a series of six tutorial groups of a business statistics class at Simon Fraser University with 59 students. The use of small groups was used to ensure that complete understanding of the instructions, and the exercises were conducted per the course of a single day to minimize opportunities for communication between participants. Each group was divided equally: half of the subjects were designated as sellers by random selection, and the other half became buyers.

Results

Empirical results of this experiment were nearly identical to the earlier ones in which the actual exchanges were based on the market-clearing price. In the mugs market, the results again showed a large and significant endowment effect. The V/V^* index was 0.41.

KKT EXPERIMENTS 6 AND 7:**Description:**

Experiments 6 and 7 were conducted to assess the weight of reluctance to buy and reluctance to sell in the under-trading of a good such as the ones used in the earlier experiments.

Subjects in Experiment 6 were 77 Simon Fraser students, randomly assigned to three groups. Members of one group, designated sellers, were given a coffee mug and were asked to indicate whether they would sell the mug at a series of prices ranging from \$0.00 to \$9.25. A group of buyers indicated whether they were willing to buy a mug at each of these prices. Finally, choosers were asked to choose, for each of the possible prices, between a mug and cash.

Experiment 7 was carried out with 117 students at the University of British Columbia. It used an identical design except that price tags were left on the mugs.

Results*Experiment 6*

The results again reveal substantial under-trading, the V/V^* ratio was 0.24. The close similarity of results for buyers and choosers indicates that there was relatively reluctance to pay for the mug.

Experiment 7

Results were consistent with those in Experiment 6. The V/V^* ratio was 0.05.

EXPERIMENT 8:

Description:

The last experiment was a bilateral bargaining variant to test if the individual who is assigned the property right to a good will be more likely to retain it because the marginal rate of substitution between one good and another is affected by the endowment.

Subjects were 35 pairs of students in seven small tutorials at Simon Fraser University. The students were enrolled in either a beginning economics course or an English class. Each student was randomly paired with another student in the same tutorial group, with care taken to ensure that students entering the tutorial together were not assigned as a pair. A game of Nim, a simple game easily explained, was played by each pair of participants. The winners of the game were each given a 400-gram Swiss chocolate bar and told it was theirs to keep. An induced-value bargaining session was then conducted. The member of each pair who did not win the Nim game, and therefore did not receive the chocolate bar, was given a ticket and an instruction sheet that indicated that the ticket was worth \$3.00 because it could be redeemed for that sum.

Ticket owners were also told that they could sell the ticket to their partner if mutually agreeable terms could be reached. The partners (the chocolate bar owners) received instructions indicating that they could receive \$5.00 for the ticket if they could successfully buy it from the owner. Thus, there was a \$2.00 surplus available to any pair completing a trade. The pairs were then given an unlimited amount of time to bargain. Subjects were told that both credit and change were available from the experimenter.

Results:

Of the 35 pairs of participants in the induced value experiment, 29 agreed to an exchange ($V/V^*=0.83$). Alternatively, there were only 7 trades in the chocolate bar treatment ($V/V^*=0.40$).

Taken together, KKT interpret data from their 8 experiments as follows (p. 1335):

As shown in tables 2-4, subjects showed almost no undertrading even in their first trial in an induced-value market. Evidently neither bargaining habits nor any transaction costs impede trading in money tokens. On the other hand, there is no indication that participants in the markets for goods learned to make valuations independent of their entitlements. The discrepant evaluations of buyers and sellers remained stable over four, and in one case five, successive markets for the same good and did not change systematically over repeated markets for successive goods.

And, later in the study they conclude by noting that (1342-1344):

The evidence presented in this paper supports what may be called an instant endowment effect: the value that an individual assigns to such objects as mugs, pens, binoculars, and chocolate bars appears to increase substantially as soon as that individual is given the object.

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The results of the experimental demonstrations of the endowment effect have direct implications for economic theory and economic predictions. Contrary to the assumptions of standard economic theory that preferences are independent of

entitlements,' the evidence presented here indicates that people's preferences depend on their reference positions. Consequently, preference orderings are not defined independently of endowments: good A may be preferred to B when A is part of an original endowment, but the reverse may be true when initial reference positions are changed. Indifference curves will have a kink at the endowment or reference point (see Tversky and Kahneman, in press)...

And, KKT conclude their epilogue with the following passage (p. 1346):

To conclude, the evidence reported here offers no support for the contention that observations of loss aversion and the consequential evaluation disparities are artifacts; nor should they be interpreted as mistakes likely to be eliminated by experience, training, or "market discipline." Instead, the findings support an alternative view of endowment effects and loss aversion as fundamental characteristics of preferences.

3. A Theoretical Exploration of KKT

KKT's cleverness and thorough design should be applauded. As aforementioned, they assert their evidence leads to two important conjectures that have had an important influence on the profession: 1) they forward 8 experimental demonstrations that they argue shows evidence of the endowment effect and 2) they argue that their evidence shows the endowment effect is a fundamental characteristic of preferences that will not be eliminated by market experience.

Clearly this is a seminal piece of scholarship, and the market has shown it as such. Moreover, for me personally this work represents my inauguration into the field of experimental and behavioral economics. Yet, this is a review piece and I owe it to the reader to ask if their evidence is airtight on these two conjectures. This section focuses on whether from their data they can conclusively claim that the observed behavior is in line with prospect theory rather than neoclassical theory. Rather than focus on nitpicks of their various designs in terms of incentive compatibility, flat-payoff issues, hypothetical bias, multiple-price lists, multiple hypothesis testing, whether open form bargaining models of their type are even solved theoretically, etc., etc., I will focus on a simple neoclassical economic argument.

As I describe more patiently in List (2004a), which I draw on heavily in this section, considering the major theoretical predictions of neoclassical and endowment theory side by side allows us to compare predictions in experiments like those of KKT. Assume that an individual derives utility, $u=u(g,x)$, from consuming two goods, X and G , where X could be viewed as a composite commodity, quantities of which could be measured in money units, and G is a particular consumption good such as mugs, candy bars, or binoculars.

In Figure 1, I assume perfect substitution exists between X and G . In this case, neoclassical theory predicts $WTA=WTP$: minimum WTA (or Hicksian equivalent surplus) of x_1-x_0 is equivalent to maximum WTP (or Hicksian compensating surplus) of x_0-x_2 . If one relaxes

the strict substitutability assumption and assumes quasi-concave utility functions, these linear indifference curves become strictly convex to the origin, as presented in Figure 2.

In this case, there are well known results from the literature that demonstrate the WTA/WTP disparity depends on the “price flexibility of income”: the elasticity of the marginal valuation of g with respect to x . Indeed, the “price flexibility of income” is analytically equivalent to the ratio of the ordinary income elasticity of demand for the good to the Allen-Uzawa elasticity of substitution between the good and the numeraire.²

As such, the large WTA/WTP disparities that are observed in KKT can, in principle, be reconciled with neoclassical theory. Using Figure 2 and measuring WTA (WTP) for changes in G from g_1 to g_0 (g_0 to g_1), one can illustrate this result: $WTA = x_1 - x_0 > x_0 - x_2 = WTP$. Because of income (movement to a higher indifference curve) and substitution (curvature of the indifference curves) effects, neoclassical theory predicts value divergences (recall that for price changes, the difference between the compensating and equivalent variation depends simply on the income effect).

Insights on the disparity are identical if one considers movements along different segments of the same indifference curve. One can gain this intuition by choosing any point along either convex indifference curve in Figure 2 and moving equidistant (in g) along the indifference curve in opposite directions. Instead of both income and substitution effects causing the divergence, in this case the divergence is caused purely by convexity of the indifference curve. Depending on the structure of the utility function, the divergence observed along different segments of the same indifference curve can be greater or smaller than differences observed when moving along different indifference curves. In practice, the substitution effect likely holds more prominence in shaping the value disparity than would the income effect. The intuition behind this thought is contained in the Engel aggregation condition, which requires that the income elasticities of demand for g and x , weighted by their respective budget shares, sum to one. While this certainly limits the size of the income effect associated with g , the substitution effect can range from zero to infinity.³

From a review of the literature, a majority of the WTA/WTP experimental studies in the literature fall into one of these two categories, having subjects moving along either different indifference curves or different portions of the same indifference curve. This means that it is impossible to distinguish between theories in such empirical exercises.

² The astute reader will note that the curvature of the indifference curves could be thought of as merely a reflection of convexity of the expenditure function in g . And, if one assumes utility is quasi-convex in g , then a corner solution emerges rather than an interior solution. In this case, indifference curves are concave and the substitution effect becomes positive, rather than negative.

³ Care should be taken not to dismiss income effects out of hand, however. Under certain scenarios, the spacing of the indifference curves is quite important. While in Figure 2 I have implicitly assumed a unitary income elasticity by making the indifference curves for U_0 and U_1 parallel displacements, if I assumed an income elasticity greater than 1, or that the marginal rate of substitution increased along any ray from the origin, the WTA/WTP disparity would increase. The opposite would occur, of course, if G were an inferior good—the marginal rate of substitution would decrease along any ray from the origin.

But, what about KKT? A closer inspection of their study shows that every one of their 8 experiments fall into one of these two buckets (Experiments 6 and 7 are the closest to testing the theories cleanly if you compare choosers versus sellers). This means that if one desires a strict test of neoclassical theory versus endowment theory, then the 8 KKT experiments are not air tight. Does that mean the KKT paper fails to provide invaluable insights? Absolutely Not! The KKT paper catalyzed an entire research agenda that shows the import of these original insights. Let's turn to that next with a consideration of what has stood the test of time and what has not.

4. KKT, the catalyst for an entire research area

So if KKT does not do the trick, then how might one go about testing whether such value disparities are best described by endowment theory or neoclassical theory? The solution comes in two forms: one for individual statements of value and one for individual trading rates.

To explore statements of value, the simple intuition behind the neoclassical arguments in Section 3 can be tested by appropriately compensating subjects who do not receive the good so that they state their maximum WTP to move from g_0 to g_1 along the *same* indifference curve as the endowed group (see List 2004a). Consider KKT Experiments 3 and 4 and assume that Group 1 is not given a mug and asked to state their maximum WTP and that Group 2 receives a mug and is asked to state theory minimum WTA. As such, in Figure 2, X is money and G is mugs.

In Figure 2, a test of theory is achieved by endowing Group 1 subjects at point (g_0, x_1) and asking those subjects to state their maximum WTP to move from g_0 to g_1 . Comparing these endowment-adjusted WTP values with WTA statements from Group 2 yields a (relatively) clean test of whether the indifference curve is reversible, as neoclassical theory predicts. Such an exercise naturally controls for both income (different indifference curves) and substitution (curvature of the indifference curves) effects.

In this experiment, if preferences are defined over changes in consumption, then one could envision a kink for Group 1 subjects at point (g_1, x_0) ; this kink would cause the indifference curve for Group 1 subjects to pivot from U_1 to U_1^E , as displayed in Figure 3. Under neoclassical arguments, WTA should be measured as $x_1 - x_0$, but assuming the endowment effect induces the indifference curve to pivot, WTA becomes $x_3 - x_0 > x_1 - x_0$, which illustrates the agent's aversion to sacrifice a good once it becomes part of her endowment. The WTA/WTP disparity would be exacerbated if a similar kink formed for Group 2 subjects, as it would pivot their indifference curves counterclockwise from point (g_0, x_1) . This seems unlikely if X represents money; nevertheless, this is the general intuition behind the endowment effect, which implies that a good's value increases once it becomes part of an individual's endowment

If one desires, the neoclassical explanation can be pushed further by exploiting the relationship between the WTA/WTP disparity and the predicted effect of income on WTP (see Sugden, 1999; List, 2004a). One advantage of such an exercise is that it provides a

further use of the observed WTA/WTP ratio and permits an examination of whether the observed ratio is consistent with economic intuition. To add structure to the argument, I continue with Figure 2 and assume that the initial endowment is (g_0, x_0) . As previously suggested, the individual's WTP to move from g_0 to g_1 is defined as follows.

$$u(g_1, x_0 - WTP(x_0)) = u(g_0, x_0), \quad (1)$$

where $WTP(x_0) = x_0 - x_2$. Similarly, endowment-adjusted WTP is

$$u(g_1, x_1 - WTP(x_1)) = u(g_0, x_1), \quad (2)$$

where $WTP(x_1) = x_1 - x_0$. WTA is defined analogously, thus

$$u(g_0, x_0 - WTA) = u(g_1, x_0), \quad (3)$$

Using the intuition that $x_1 - x_0 = WTA$, and these simple definitions of WTA and WTP, the following relationship is derived:

$$u(g_1, x_0 + WTA - WTP(x_0 + WTA)) = u(g_0, x_0 + WTA) = u(g_1, x_0) \quad (4)$$

Equality of the first and third expressions implies $x_0 + WTA - WTP(x_0 + WTA) = x_0$, or $WTP(x_0 + WTA) = WTA$. A first-order approximation of $WTP(x_0 + WTA)$ yields $WTA \approx WTP + WTA \frac{\partial WTP}{\partial y}$ (where y is income). Rewriting this leads to the basic relationship

$$\frac{\partial WTP}{\partial y} \approx 1 - \frac{WTP}{WTA}. \quad (5)$$

Equation 5 provides a convenient test of neoclassical theory, as $[1 - WTP/WTA]$ values can be compared to data on $\partial WTP/\partial y$, which are widely available.

A further test making use of individual statements of value can be explored by examining the shape and structure of Hicksian equivalent surplus and Hicksian compensating surplus measures. For example, List (2006) explores curvature of the value function by examining individual valuation of a number of items simultaneously. This approach permits a stark test of the competing theories because in such cases the two major theories have contradictory predictions. Prospect theory predicts that Hicksian equivalent surplus will exceed Hicksian compensating surplus and that compensation demanded is *concave* in the number of relinquished goods due to “diminishing sensitivity.” Neoclassical theory predicts equivalence of surplus measures and that compensation demanded is *convex* in the number of relinquished goods due to quasi-concavity of preferences.

If one would rather explore individual trading rates rather than statements of value, then the intuition is similar. Consider List (2003), who examined trading patterns of sports memorabilia on the floor of a sportscard show, and trading patterns of collector pins in a market constructed by Walt Disney World at the Epcot Center in Orlando, Florida. In one

treatment a subject is endowed with good *A* and has the option to trade it for good *B*. In a second treatment, a different subject is endowed with good *B* and has the option to trade it for good *A*. Since subjects are allocated to one of the two treatments randomly, for preferences to be consistent, the proportion of subjects who choose *B* over *A* should be equal to one minus the proportion who choose *A* over *B*. Such a comparison permits a strict test of endowment theory versus neoclassical theory because it explores whether indifference curves are reversible (the interested reader should also see Knetsch, 1989, which KKT cite). I will not belabor the summary of this line of inquiry because Matthias Sutter graciously summarized my 2003 study in his generous article (Sutter, 2020).

So, after all of these years, where are we concerning KKT's two main conjectures? From this author's perspective, they were correct on one conjecture and missed on the other. They were correct on the fact that the endowment theory helps to organize some of the received data: even when the experimental issues discussed in Section 3 are corrected, there is a lot of evidence in favor of endowment theory, especially for inexperienced subjects. For instance, in List (2004a) I find that for inexperienced consumers the ratio of WTA/ WTP ranges from 4.4 to 8, which is consistent with previous experimental studies, but at odds with conventional economic theory. Using Equation 5 these ratios suggest that if an agent were instantly endowed with \$100, he/she would spend approximately \$80 on the used sports ticket stub I was valuing in the experiment. I suspect that even the most ardent of neoclassical supporters would find this figure implausibly high. Likewise, in the case of trading rates in List (2003) I find that an inefficiently low number of trades occur for naive traders, consistent with endowment theory. The literature broadly conforms to these sorts of data patterns.

Yet, where KKT seemingly overinterpreted their data was in their second conjecture: that their evidence shows the endowment effect is a fundamental characteristic of preferences that will not be eliminated by market experience. In a series of early papers (List, 2003, 2004a, 2004b), I found that market experience mattered a lot in that as people with vast market experience behaved much less in accord with endowment theory and much more in line with neoclassical theory (and, in the lab see, e.g., Shogren et al., 1994; 2001). The thrust of those early experience results have been broadly replicated in both the lab and the field (see, e.g., Feng and Seasholes, 2005; Kermer et al., 2006; Dhar and Zhu, 2006; List, 2006; De Sousa and Munro, 2012; Greenwood and Nagel, 2009; Gächter et al., 2009; Choe and Eom, 2009; Engelmann and Hollard, 2010; Seru et al., 2010; List, 2011; Isoni et al., 2011; Ratan, 2013; Tuncel and Hammitt, 2014; Metilda, 2014; Brown et al., 2015; Humphrey et al., 2017; Anagol et al., 2018; Lindsay, 2019—see also Sutter, 2020). And, there is now neurological evidence supporting the result and providing a basis for the experience insights (Tong et al., 2016—see next section).

5. Epilogue

The theory of riskless choice, as pioneered by Jeremy Bentham and James Mill, characterizes utility maximization as an individual process whereby decision makers' preferences follow key tenets. Behavioral economics has provided us with a toolkit to understand when such tenets hold and when they are systematically violated. KKT

provided key early evidence on what has proven to be an important consideration: the basic independence assumption.

Whether or not certain aspects of the KKT study are right or wrong in some sense short-changes KKT's contribution. In this spirit, KKT represented a key cog to both stimulate broad recognition of behavioral economics, but more parochially it represented a key catalyst that continued important work on non-standard preferences. In this manner, it played an integral role in the give and take between theory and empirical work that represents the crux of scientific advance.

In this sense, while we will all certainly have a different view of how this literature has matured in economics, my longitudinal view goes as follows: from the field arose data from surveys (contingent valuation) that suggested anomalous behavior existed and that individual endowments might matter, Kahneman and Tversky (1979) created seminal theory, there was important laboratory work in the 1980s and 1990s that showed such behaviors conformed to endowment theory (KKT was a key paper in this regard), people took this to the field and found that the endowment effect is not a fundamental characteristic of preferences that is immutable by market experience (List 2003, 2004a,b), lab and field studies replicated the experience result (see earlier citations), and new insightful theory has been introduced (e.g., Koszegi and Rabin, 2006).

Yet, the process did not stop there. Tong et al. (2016) have gone back to the lab and dug a bit deeper into the experience results of List (2003; 2004a,b). They conducted two functional MRI (fMRI) studies to investigate how experience changes neural correlates of the endowment effect. In Study 1, professional and inexperienced traders indicated the price that they were willing to pay to buy (WTP) and willing to accept to sell (WTA) each of several different products using a slider bar. They scanned these participants while they made decisions about buying and selling these items at different prices. In Study 2, they scanned inexperienced traders on the Study 1 paradigm before and after incentivizing the participants to sell items on eBay over a two-month period.

In both studies they find that experience matters in a spirit similar to what List reported. But, more importantly, they report convergent evidence that the influence of trading experience on the endowment effect is mediated in part by lower sensitivity of the right anterior insula during selling. This result is robust across both studies despite the different populations, procedures, and incentives used, as well as corresponding differences on behavioral effect size and other whole-brain effects. The decreased insula activity suggests that trading experience causes agents to experience less loss aversion during selling. This finding is consistent with List's (2003, 2004a) observation that most inexperienced traders have substantial buying but not selling experience. Overall, these findings suggest that trading mitigates negative affective responses in the context of selling, consonant with the literature on experience effects that finds convergence of WTA and WTP because of WTA lessening with experience (2004a).

In the end, does the conclusion that market experience attenuates the endowment effect lead one to conclude that KKT has no value outside of theory? Absolutely not. Parochially,

in my own work I have taken the ideas from the literature to the field with meaningful success. In Hossain and List (2012), we collaborated with a Chinese electronics company, implementing a simple framing experiment where a random subsample of workers was promised a bonus to be paid at the end of the week if a productivity threshold is met. Others were provisionally given a salary enhancement, which was claimed back at the end of the week in case of low productivity. We find that even such a weak framing treatment raises productivity of teams of workers relative to the economically isomorphic bonus treatment, framed in a conventional sense (see also the insightful work of Abeler et al., 2011). Fryer et al. (2012) complement this work by providing financial incentives to school teachers to increase productivity as measured by the performance of their students. They find that leveraging loss aversion via a penalty regime is quite effective. Similar results are obtained when incentivizing students, rather than teachers (Levitt et al. (2012)).⁴

Clearly the story is not complete and will continue to evolve, but what is satisfying about this literature's maturation is the give and take between theory and empiricism, between lab and field, between scholars and practitioners, and between scholars across quite disparate literatures. This is not synchronicity; rather an amalgamation of studies over time, without knowing it each serving a principle purpose of knowledge generation that the conductor, KKT, served to orchestrate.

⁴ Loss aversion does not always appear to affect behavior. Hossain and List (2012) fail to document that the claw-back regime enhances the productivity of individual (as opposed to teams of) workers, and List and Samek (2015) do not find that loss aversion helps dieticians to affect children's food choice. Understanding the boundary conditions of loss aversion remains an important yet under-researched line of work. The interested reader should also see Imas et al. (2016), De Quidt (2018), and Bulte et al. (2019).

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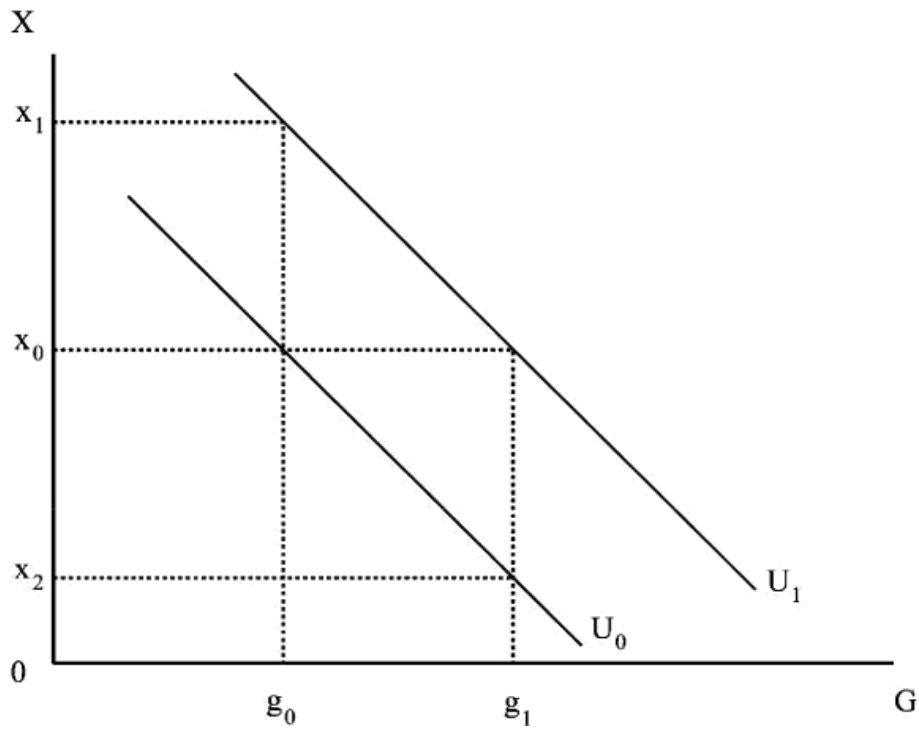


Figure 1. Linear indifference curves and WTA/WTP.

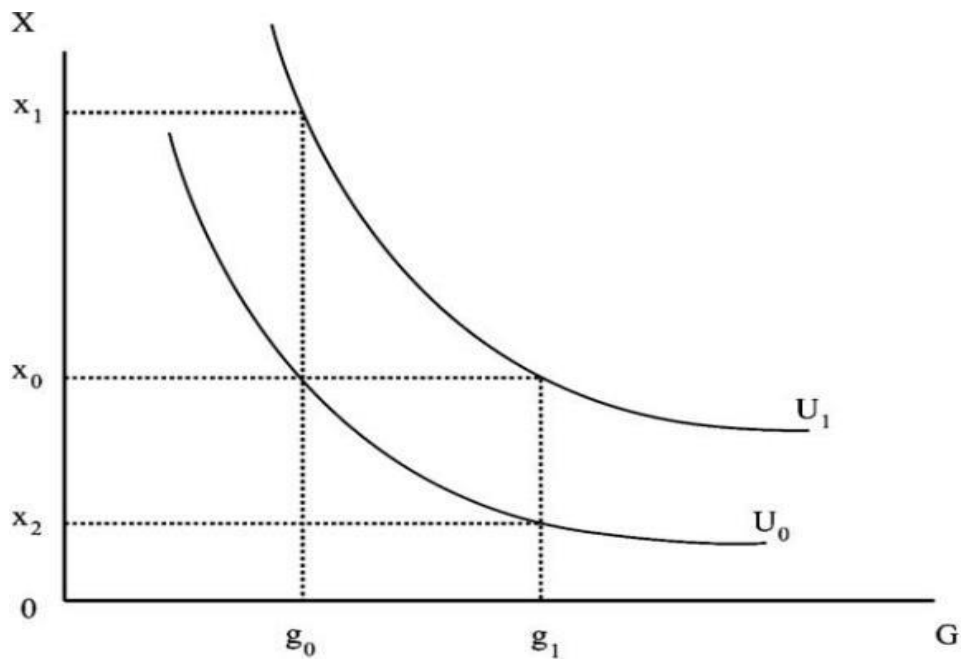


Figure 2. Convex to the origin indifference curves and WTA/WTP.

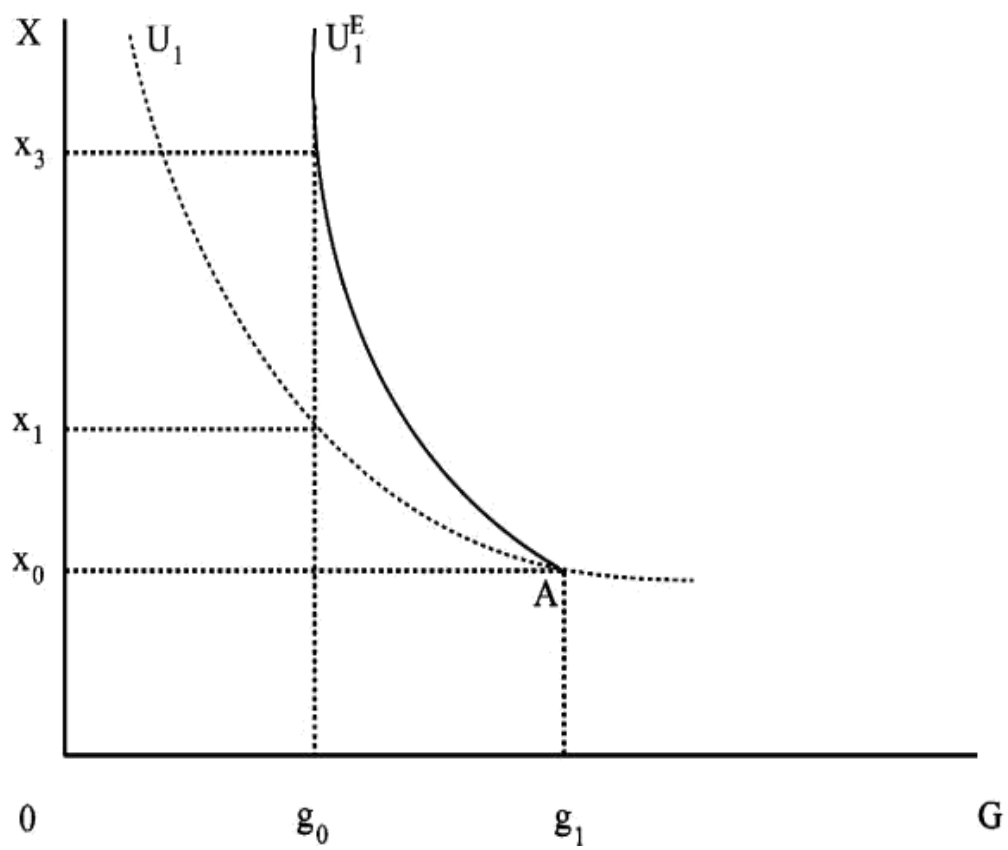


Figure 3. Endowment effects and the WTA/WTP disparity.