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Catherine L. Kling
John A. List
Jinhua Zhao

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ABSTRACT

Evidence from laboratory experiments suggests that important disparities exist between willingness to pay (WTP) and compensation demanded for the same good. This study advances, and experimentally tests, a new explanation of the WTP/WTA disparity—a dynamic theory based on the presence of commitment costs. We find that the commitment cost theory combined with a simple behavioral anomaly is able to lend insights into the causes and severity of the WTA/WTP disparity. Further, we find that market experience attenuates the behavioral anomaly, consistent with the notion that no value disparity exists for agents with sufficient market experience.

Catherine L. Kling
Iowa State University
568D Heady Hall
Ames, IA 50011-1070
ckling@iastate.edu

John A. List
Department of Economics
University of Chicago
1126 East 59th
Chicago, IL 60637
and NBER
jlist@uchicago.edu

Jinhua Zhao
Michigan State University
jzhao@msu.edu

A fundamental tenet in neoclassical theory is the basic independence assumption: an individual's preferences are assumed to be measured over levels, not changes. While most theoretical and applied economic models invoke this assumption, a wealth of data from laboratory experiments refutes this premise, as systemic empirical disparities have been observed between willingness to pay (WTP) and willingness to accept (WTA) for the same good (e.g., Kahneman et al., 1990), with WTA often observed to be many times larger than WTA. In an influential line of work, Hanemann (1991) argues that the large WTA/WTP disparities that have been observed in the literature can be reconciled with static neoclassical theory via income and substitution effects;[1] but the empirical evidence to date has not conformed well to Hanemann's (1991), or any other, neoclassical-based model.[2] If the observed value disparity is inconsistent with neoclassical explanations and is found to be a fundamental component of individual's preferences, as per reference dependent theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1991), then a re-evaluation of a good deal of economic analysis is necessary.

In this paper, we provide a different explanation for the WTA/WTP disparity—a *dynamic* theory based on the presence of commitment costs and possibly asymmetric beliefs about market opportunities. When the value of a good is uncertain, WTP and WTA will logically reflect compensation for the possibility of learning that the good has a different value than believed at the time of purchase or sale and the cost associated with reversing th purchase or sale decision. In its simplest form, our model predicts that with objective

[1] Hanemann's (1991) work extended that of Randall and Stoll (1980), who demonstrated that the WTA/WTP disparity depends on the "price flexibility of income." Hanemann proved that 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. Thus, for low elasticity of substitution values, the "price flexibility of income" is large, suggesting that the WTA/WTP ratio is also large.

[2] See, for example, Sugden (1999), Horowitz and McConnell (2003) who show that the typical WTA and WTP disparity observed cannot be reasonably reconciled with the neoclassical explanation of Hanemann (1991).

(symmetric) beliefs about market opportunities (and with perfect substitutability and no income effects), there should be no value disparity. Intuitively, the *objective* cost of delaying the purchase (or alternatively reversing the purchase) for prospective buyers is isomorphic to the *objective* cost of reversing (or delaying) the sale for prospective sellers. This symmetry necessarily leads to WTA=WTP, consistent with the neoclassical paradigm.

Importantly, however, it is an agent's *perception* of the delay and reversal costs that motivates behavior. If agents behave in a manner consistent with the developing literature on cognitive dissonance and/or limited memory, it is quite plausible for individuals to display an *asymmetric* perception of the relative costs of selling later, depending upon whether they are placed in the role of a buyer or seller.[3] This type of asymmetry alone can yield the systematic value divergences observed in the literature; indeed, we show that even with only slight asymmetries in beliefs of perceived costs, our theory can generate considerable value divergences because the actual divergence will depend upon the interaction of this asymmetry with the degree of value uncertainty, time preference, and lost value of consumption.

We explore the predictive power of our theory by examining WTA and WTP statements of value from consumers in a competitive marketplace—the sportscard market. While we do not consider the sportscard marketplace particularly worthy of study in its own right, it is useful for our purposes for several reasons. First, it is a natural setting for an examination of preference structures since it provides a rich pool of subjects making decisions in a familiar environment, with uncertainty and future learning about the values of traded goods. Second, we can identify factors that arise endogenously, such as market experience,

[3] We point the interested reader to Wicklund and Brehm (1976) for an overview of cognitive dissonance, and Akerlof and Dickens (1982), Konow (2000) and Oxoby (2004) for its application in economics. Rubinstein (1998) provides an overview of bounded rationality, including limited memory, and Wilson (2005) applies a limited memory model to explain over-confidence and confirmatory biases.

and impose the remaining controls necessary to implement a clean experiment to explore whether such factors attenuate the value disparity through the channels predicted by our theory.

Our data are striking in that agents display an asymmetric perception of the relative costs of selling later, depending upon whether they are placed in the role of a buyer or seller. In particular, prospective buyers report that it will be more difficult to sell in the open market (after the experiment) than prospective sellers report. Interestingly, all of the asymmetries in perceptions occur on the sell-side, where agents have relatively little experience—perceptions of "buying later" are similar across both sellers and buyers. In this spirit, our results tie neatly back to the results from (List, 2003; 2004), who observed that the convergence in WTA/WTP values occurs entirely because of lower Hicksian equivalent surplus values. Upon more closely examining our data, we find that the delay/reversal perceptions become symmetric as experience intensifies. This provides a potential explanation of the empirical results from the lab that suggest market repetition attenuates the value disparity (e.g., Knez et al., 1985; Coursey et al., 1987; Brookshire and Coursey, 1987; Myagov and Plott, 1997). Lending further support to our theory is our confirmation of several comparative static predictions: WTP (WTA) increases (decreases) in the degree of difficulty of delay and decreases (increases) in the degree of difficulty of reversing the transaction.

We view these results as fundamental to both normative and positive issues. First, our findings suggest that the basket of tools associated with Hicksian welfare measurement can be fundamentally preserved, albeit with additional care given to the presence and interpretation of commitment costs and their welfare effects. Second, the value disparity disappears as market experience intensifies via attenuation of the behavioral bias, restoring commonly held

interpretations of indifference curves, cost/benefit analysis, and the procedures necessary to resolve damage disputes.

I. Theoretical Background

Zhao and Kling (2001, 2004) present an explicitly dynamic theory of the formation of WTP and WTA and commitment costs under uncertainty and future learning. In this section, we extend that model to the setting of actual market experiments. We derive the conditions needed for commitment costs to arise and use these conditions to design experimental tests for the presence of commitment costs.

Consider a subject who formulates her WTP or WTA facing a trading opportunity in an experiment, knowing that the same good (or a reasonable substitute) can be traded in the marketplace. To add structure, assume that a WTP (WTA) subject is one who must state a WTP (WTA) value in an incentive compatible institution. Let $v \in [v_l, v_h]$ be her own (uncertain) valuation of the good, and let $R \in [R_l, R_h]$ be her information about the market price of the good. That is, she does not know v or R with certainty, but knows their distributions. For simplicity, we assume that she can learn both v and R with certainty later (e.g., after the experiment).[4]

Consider an experiment in which subjects can purchase a good. If a subject decides to purchase the good in the experiment, but later (after learning v and R) decides the good is not worth keeping, she can sell it at the realized market price, R. Doing so incurs a transaction cost c_p^r, however, where subscript p denotes WTP, and superscript r denotes "reversing the trade." In contrast, if she decides not to buy the good in the experiment, she can purchase it

[4] This assumption can be relaxed without changing the key results of our model. If the uncertainty is only partially resolved, the magnitude of the commitment cost effect will be smaller than if the resolution is complete, but the qualitative results will remain unchanged.

later in the regular market if she chooses to, paying the market price R while incurring a transaction cost c_p^d, where the superscript d denotes "delay." In experiments where subjects can sell the good, let c_A^r and c_A^d be the transaction costs of reversing the transaction (or buying the good back in the regular market) and delaying the decision (or selling the good later in the market).

Formulation of WTP and WTA

A subject's WTP is defined as the maximum price she is willing to pay to buy the good in the experiment, knowing that she can later learn about her valuation v and the market price R. Suppose she buys at price P: if after the experiment her realized value of the good v is lower than $R - c_P^r$, she can sell the good and realize the gain $R - c_P^r - v$. Thus her expected payoff of buying at price p in the experiment is

$$U_1 = E(v) + E_{v<R-c_P^r}(R - c_P^r - v) - p, \tag{1}$$

where the second expectation is taken over both v and R in the region $v < R - c_P^r$, and represents the option value of reversing the purchasing transaction. To facilitate discussion, we denote this option value by O_P^r, or

$$O_P^r = E_{v<R-c_P^r}(R - c_P^r - v). \tag{2}$$

If the subject delays or declines to purchase at price p, she still has the option of buying the good later. She will then gain v, but pay the market price R plus the transaction cost c_P^d. Thus her expected payoff is

$$U_2 = O_P^d \equiv E_{v>R+c_P^d}(v - R - c_P^d), \tag{3}$$

where the expectation is again taken over the region $v > R + c_P^d$, and O_P^d denotes the option value of buying the good later.

The subject's WTP is the unique *p* that equates U_1 and U_2. Hence

$$WTP = E(v) - (O_P^d - O_P^r) = E(v) + E_{v<R-c_P^r}(R - c_P^r - v) - E_{v>R+c_P^d}(v - R - c_P^d). \qquad (4)$$

The term $O_p^d - O_p^r$ is the commitment cost, representing the net loss of option values in committing to the purchase now. Notice that *WTP* can be higher or lower than *E(v)*, the expected value of the good, depending on the value of the two options and thus the sign of the commitment cost. If the agent expects that the cost of reversing c_P^r is high but the cost of delaying c_P^d is low, then O_P^r is low and O_P^d is high, yielding $WTP < E(v)$. If $c_P^r = c_P^d$, and the random value *R*-*v* (the negative of the consumer surplus) is symmetric around zero, then we expect the two option values to be equivalent, and $WTP = E(v)$. Equation (4) also suggests that WTP is increasing in the cost of delay c_p^d, but decreasing in the cost of reversal c_p^r.

The formation of WTA follows a similar logic: a subject's WTA is defined as the minimum price she is willing to accept to give up the good in the experiment. Suppose she sells the good at price *P*. She still has the option of buying the good back in the regular market (i.e., reversing her trade) at the market price *R* plus the transaction cost c_A^r, the value of which is denoted as O_A^r. Thus her expected payoff is

$$\pi_1 = P + O_A^r - E(v) = P + E_{v>R+c_A^r}(v - R - c_A^r) - E(v). \qquad (5)$$

If she does not sell the good during the experiment, she retains the opportunity to sell at the market price, incurring transaction cost c_A^d. Thus her expected payoff is

$$\pi_2 = O_A^d = E_{v<R-c_A^d}(R - c_A^d - v), \qquad (6)$$

where O_A^d denotes the option value of selling the good later.

Again, equating π_1 and π_2, we obtain WTA as

$$WTA = E(v) + O_A^d - O_A^r = E(v) + E_{v<R-c_A^d}(R - c_A^d - v) - E_{v>R+c_A^r}(v - R - c_A^r), \qquad (7)$$

and $O_A^d - O_A^r$ is the associated commitment cost. Similar to WTP, WTA can be below or above *E(v),* depending on the magnitude of O_A^d and O_A^r. If the subject expects that there is a small cost of delaying the transaction but a high cost of reversing it, or c_A^d is small and c_A^r is high, O_A^d is high and O_A^r is low, leading to $WTA > E(v)$. Further, WTA is increasing in the cost of reversal c_A^r but decreasing in the cost of delay c_A^d.

WTP/WTA Divergence

From (4) and (7), we know that

$$WTA - WTP = (O_A^d - O_A^r) + (O_P^d - O_P^r). \qquad (8)$$

Therefore, the divergence between WTP and WTA equals the sum of the two commitment costs. Further, WTA>WTP if at least one of the commitment costs is (sufficiently) positive. If subjects believe that reversing a transaction is more costly than conducting the transaction, then regardless of whether they are thinking about buying or selling, we would expect $O_A^d > O_A^r$ and $O_P^d > O_P^r$, and thus $WTA > WTP$. Notice, however, that reversing the selling decision is similar to delaying the buying decision: both involve buying the good later. In this case, we may have $c_A^r = c_P^d$. Similarly, reversing the purchasing decision is similar to delaying the selling decision: both involve selling the good on the open market. Then we may have $c_P^r = c_A^d$. In this case, $O_A^d = O_P^r$ and $O_P^d = O_A^r$, and thus $WTP = WTA$.

The growing literature on cognitive dissonance and bounded rationality provides several reasons why we might observe an asymmetry in beliefs across these two scenarios. The theory of cognitive dissonance posits that agents may choose beliefs to reconcile with their actions and/or positions (Wicklund and Brehm, 1976). A cognitively dissonant subject

may believe that her trading position, be it a seller or a buyer, is a "good" one in that it is not too unusual or atypical. Thus, a subject in the WTA treatment may choose to believe that it is easier to sell in the future, compared with one in the WTP treatment. Alternatively, a subject may have limited memory of her earlier trading experiences, and perceive the difficulties of selling and buying based on more recent experiences in the spirit of Piccione and Rubinstein (1997) and Wilson (2005). While agents typically have rich experiences in buying, they tend to have much less experience in selling. Those in the WTA treatment, however, gain immediate selling experience: they learn about the psychic, and other transaction, costs of selling in the experiment. This experience, being the most recent, carries more weight than past experiences, in affecting perceived difficulties of selling. In this sense, asymmetry in the number of recent buying and selling experiences may lead to asymmetry in perceived difficulties of buying and selling in the future. Regardless of the source, whether such asymmetric perceptions exist in practice is ultimately an empirical question which we investigate.

II. Experimental Design and Hypotheses

Our objectives in designing the field experiment were twofold: (i) to investigate whether subjects behave dynamically in forming their WTP and/or WTA values; that is, whether they take potential opportunities for delay or reversal into account when forming their bids or offers; and (ii) to examine whether conditions exist such that the dynamic formulation can explain the WTP/WTA value disparity. Two distinct field experiments were undertaken to explore these issues. The first experiment uses data on subjects' *perception* of how difficult it would be to delay or reverse the proposed transactions. The second experiment exogenously varies the degree of delay and reversal difficulties associated with the formation of WTA.

Field Experiment I: Perceptions Treatments

The first set of field treatments was carried out on the floor of a sportscard show in a large eastern city and includes two distinct treatments. A total of 90 subjects were recruited for two treatments. In both treatments (denoted WTA and WTP), each subject's experience typically followed four steps: (1) consideration of an invitation to participate, (2) inspection of the card, learning the auction rules, and placing actual bid (offer), (3) survey completion, and (4) debriefing.[5] There were 41 subjects in the WTA treatment and 49 in the WTP treatment. In Step 1 of both treatments, the monitor approached potential subjects and inquired about their interest in participating in an experiment. If the subject agreed, the experimenter then invited the potential subject to take about five minutes to participate in an auction. For both treatment types, we chose a Cal Ripken Jr., 1983 *Topps* baseball card, which has a book value of approximately $12. Both treatments displayed the same sportscard to all bidders—a Cal Ripken Jr., PSA graded "PSA 8 near mint/mint" baseball card. This particular choice of goods was appropriate as we conjectured that there would be a mix of subjects in this pool who would opt to sell or trade the card if they left the experiment with the good.

In step 2, the monitor explained the rules of the random *n*th-price auction. As described in List (2002), the random *n*th-price auction can be characterized by four simple steps: (1) each bidder submits a bid (offer); (2) each bid (offer) is rank-ordered from lowest to highest; (3) the monitor selects a random number (n) uniformly distributed between 2 and Z (Z bidders); and (4) in the WTP case, the monitor sells one unit of the good to each of the (n-1) highest bidders at the *n*th-price; in the WTA case, the monitor buys one unit each from the (n-1) lowest bidders and pays the *n*th-lowest bid. The random n^{th} price auction is incentive

[5] We randomized participants into one of the two treatments by changing the treatment type at the top of each hour. Subjects participated in only one treatment.

compatible: it is a player's (weakly) dominant strategy to bid her true value (Shogren et al.), The monitor informed the participant that her bid would not be opened until after the show and that all bids would be destroyed when the research project was completed.

In the WTA treatment, after the monitor physically gave the subject the card, the subject made her offer. At this point, the reader will recognize that due to income (shifts in the indifference curve) and substitution (curvature of the indifference curves) effects, static neoclassical theory predicts value divergences. We, therefore, endowed WTP subjects with $12 (which is equivalent to book value and approximately the average WTA from a pilot experiment) before they placed their auction bid so they would be moving (roughly) along the same segment of the same indifference curve as WTA subjects. In this case, static neoclassical theory, which posits that indifference curves are perfectly reversible, predicts WTA=WTP.

In step 3 the monitor asked the subject to complete a confidential survey that would be used for "statistical purposes only." The survey was used to obtain important information about what the subject planned to do with the good if she won the auction (WTP) or did not sell in the auction (WTA).[6] The choices included "keep," "trade," or "sell." The survey also obtained information about the subject's perceptions of ease of trade or sale, ease of purchase, etc. In the fourth stage of the experiment, the monitor explained that the participant would be contacted within three days after the show if he or she was among the n-1 highest (lowest) bidders (offerers). Each subject was further informed that winners would receive the card after he or she had sent a check or money order for the amount of the *n*th highest bid. The random n chosen was 24 for the WTP treatment and 30 for the WTA treatment. Within three

[6] The Appendix contains the WTP survey. The WTA survey is similar, but with the necessary changes.

days the winners of each auction were notified by phone or email, and when the monitor received the check (card), he mailed out the card (check).

Field Experiment II: Exogenous Treatments

The second set of field treatments was also carried out on the floor of a sportscard show in a large eastern city. The same basic procedures were followed as described for the first set of treatments, with several key differences. First, instead of using a sportscard, we used an unopened pack of sportscards as the good. The pack of sportscards had a retail value of approximately $3, and had recently been introduced to the market, providing a sense of value uncertainty. Second, only WTA values were elicited and there were three distinct treatments which differed by the ease of reversal or delay of the transaction. A total of 112 subjects participated.

The first treatment (with 55 subjects) serves as a control and links these results to the perceptions treatments in that subjects simply were given the pack of sportscards and were asked to state their minimum WTA in a random *n*th-price auction. In the second treatment (with 32 subjects), subjects were informed that if they sold their pack at the auction, they would be allowed to return the following week and re-purchase the pack from the monitor at the selling price (or subjects were informed that upon receipt of payment the monitor would mail the pack, postage paid). We denote this treatment as the "goods-back-guarantee" (GBG) treatment—it was designed to reduce the cost to the subject of reversing a transaction, should the subject wish to do so.

In the third treatment (with 25 participants), the subject was informed that if he did not sell his pack at the auction, he could return the following week and use space on the monitor's dealer table to attempt to sell the pack. We term this treatment the "table treatment"; it is designed to reduce the cost to the subject of delaying the transaction.

Hypotheses

With these field data we are able to test two types of hypotheses. First, we examine whether subjects form their WTP and WTA values dynamically:

Hypothesis 1: *WTP (WTA) increases (decreases) in the delay difficulty* c_P^d (c_A^d) *and decreases (increases) in the reversal difficulty* c_P^r (c_A^r).

In the first field experiment, we test this hypothesis in terms of the perceived delay and reversal difficulties. In the second field experiment, we study the effects of both the perceived and actual delay and reversal difficulties.

Second, we test whether the observed WTP/WTA divergences, if any, relate to the delay and reversal difficulties:

Hypothesis 2: *(i) WTA>WTP if subjects in both WTP and WTA treatments perceive that it is more difficult to reverse than to delay the respective transaction:* $c_P^r > c_P^d$ *and* $c_A^r > c_A^d$;
(ii) WTA<WTP if subjects in both treatments perceive that it is easier to reverse than to delay the respective transactions: $c_P^r < c_P^d$ *and* $c_A^r < c_A^d$;
(iii) WTA=WTP if subjects perceive the same selling (or buying) difficulties across the WTP and WTA transactions: $c_P^r = c_A^d$ *and* $c_P^d = c_A^r$.

Here, only the first set of field treatments is relevant, as data on both WTP and WTA are necessary, and perceptions of the delay and reversal difficulties are critical to the predictions. Note that even if the respondents behave according to the commitment cost theory, WTA is greater than WTP only when the perceived delay and reversal difficulties satisfy certain conditions. Otherwise, it is possible that WTA is *less* than WTP.

III. Experimental Results

Table 1 summarizes relevant statistics from field experiment I. Column 1 contains statistics for the overall sample, while columns 2 and 3 contain information for the WTP and WTA treatments. Data in the first row reveals that the average WTA ($12.37) is much larger

than the average WTP ($7.46)—this difference is statistically significant at conventional levels using both parametric and non-parametric tests.[7] Thus, the value divergence commonly found in the literature is certainly present in our field experiment I.

Data presented in rows 2 and 3 suggest that WTA and WTP subjects who plan to keep the card behave differently from one another: average WTA values ($15.39) are much larger than comparable WTP values ($7.00), and this difference is statistically significant. Yet even for those who plan to trade/sell the card, a nontrivial value disparity exists: WTP = $7.67 versus WTA = $10.00; this difference is statistically significant only at the $p < .05$ level using a one-sided alternative, however. This result provides initial evidence that the Kahneman et al. (1990, p. 1328) intuition. that "there are some cases in which no endowment effect would be expected, such as when goods are purchased for resale rather than for utilization," does not hold ubiquitously.[8]

Table 2 summarizes the relevant statistics for field experiment II, which was designed with treatments that *exogenously* varied the delay and reversal difficulties in the WTA treatment. The reversal cost c_A^r is reduced in the GBG treatment, and the delay cost c_A^d is reduced in the Table treatment. Subjects' perceptions of the delay and reversal costs are also elicited via a survey instrument, as in field experiment I.

As Table 2 suggests, mean offers for "keepers"—those who indicated that they expected to keep their pack if they did not sell it in the auction—as well as average values for "non-keepers" qualitatively mimic results contained in Table 1. In all cases, keepers report a higher average WTA than non-keepers; further, keepers perceive that it is harder to reverse

[7] Unless otherwise noted, all claims are supported by statistical tests at the 5% level. For every unconditional comparison, we employ a two-sample (parametric) t-test and a two-sample (non-parametric) Wilcoxon rank-sum test.

[8] Average values of the subject-specific characteristics are similar across the two subsamples, indicating that our experimental procedure was successful at placing subjects randomly in the two treatments.

the trade and easier to delay selling the pack than non-keepers. This asymmetric perception about the ease of delay and reversal is consistent with a higher WTA value for keepers, based on the commitment cost theory.

Hypothesis 1

Using data from field experiment I, we run a series of simple ordinary least squares bid/offer regressions, including reported reversal and delay difficulty, treatment indicators, gender, and whether the subject was a sportscard dealer as regressors. Reported results are robust to inclusion of other variables that were gathered via the survey. Table 3 (4) presents estimation results for six WTP (WTA) specifications, where the dependent variables are the individual bids (offers). Specifications [1] and [2] estimate the effects of the difficulties of delaying and reversing the transaction on the WTP and WTA values; specifications [3] and [4] estimate the effects of being a keeper and dealer; and specifications [5] and [6] combine these models.[9]

Empirical results support our theoretical predictions: reversal difficulty and delay difficulty are statistically significant at conventional levels, and their signs are consistent with predictions of the commitment cost theory for both WTP and WTA and across the specifications. For example, reversal difficulty reduces WTP and increases WTA, while delay difficulty reduces WTA and increases WTP.

In field experiment II, as shown in Table 2, the mean reported WTA for those with GBG is $3.23, which is statistically different from the mean WTA of the control group ($4.66) at conventional levels. Since a GBG reduces the reversal difficulty, this result is consistent with Hypothesis 1. Results for the "Table" sub-sample are directionally consistent

[9] Since "keepers" answered only the question of whether they would purchase the good in the future, only delay difficulty is included for WTP and only reversal difficulty is included for WTA in specifications [5] and [6].

with Hypothesis 1, but the mean WTA of $3.98 is not significantly different from $3.23 at conventional levels.

As in field experiment I, we run a set of OLS regressions and report summary estimates in Table 5. Table 5 includes a series of specifications that generally provides insights consonant with Hypothesis 1. For example, in specification [1], while the Table dummy variable is directionally correct, though not significant at conventional levels, the GBG dummy is highly significant and negative, consistent with Hypothesis 1. Further, empirical results in columns [2] and [3] of Table 5 show that the coefficient of reversal difficulty is positive and significant at conventional levels. Specifications [4] and [5] provide insight into the robustness of the statistical significance of the treatment dummies with respect to the dealer and gender variables; in each case the GBG dummy variable remains statistically significant and negative. Specifications in columns [6] – [8] report regression results using models that include delay difficulty and whether the subject planned to keep the good.[10] Neither the perceived delay difficulty nor the table dummy is statistically significant at conventional levels. However, the perceived reversal difficulty is statistically significant, and its sign is consistent with Hypothesis 1.[11]

Hypothesis 2

We return to the field experiment I data to examine WTP and WTA values for various combinations of the perceived delay/reversal difficulties. Table 6 pools subjects into three

[10] The number of observations considerably decreases in these specifications due to the fact that many subjects left responses to these questions blank.

[11] Overall, in experiment II, the effects of the GBG and the perceived reversal difficulty provide support for Hypothesis 1, but the "Table" treatment and the perceived delay difficulty variables are consistently insignificant. There are at least two possible explanations for this result. One is that respondents did not view the offer to use the monitor's table the next week as a significant decrease in the cost of delaying their transaction to notably lower their commitment costs (they would still have to take the time to come and use the table with an uncertain outcome). Alternatively, respondents may not have been considering the delay possibility when forming their WTA values.

categories specified in Hypothesis 2. Data summarized in Row [1] supports Hypothesis 2(i): the average WTA of $13.33 is larger than the average WTP of $5.84 for those who perceive a higher reversal difficulty than delay difficulty, and this difference is statistically significant at conventional levels. Row [3] of Table 6 confirms Hypothesis 2(ii): WTP ($13.93) > WTA ($6.25) for the case of reversal difficulty being smaller than the delay difficulty. Again, the difference is statistically significant at conventional levels. We find this result provocative, as it suggests the strength of the dynamic option-based theory—aligning groups of subjects by the degree of delay/reversal difficulty yields average WTP values that are *greater* than average WTA values, precisely as the commitment cost theory predicts.[12]

Several pieces of evidence from Table 6 are relevant for Hypothesis 2(iii). First, for subjects who perceive a higher difficulty to sell than to buy in both WTP and WTA, average WTP ($5.84) is not significantly different from average WTA ($6.25); and, for those perceiving a higher difficulty to buy, average WTP ($13.93) is not statistically different from average WTA ($13.33). Both null results are consistent with Hypothesis 2(iii). Yet results summarized in row [2] of Table 6 do not confirm 2(iii): although our theory predicts WTP = WTA when the delay and reversal costs are equivalent, the data indicate WTA > WTP.

Table 7 makes a finer split of the data by comparing specific levels of reversal/delay difficulties. Each cell represents WTP (top value) and WTA (bottom value) values for subjects who perceived certain degrees of buying and selling difficulties. For Hypothesis 2(i), the relevant comparisons are the WTP values in cells below the diagonal and WTA values in cells above the diagonal. These are subjects who perceive a higher reversal difficulty than

[12] Care should be taken not to push this result too hard, however. Even though we are using a completely randomized field experiment where the subjects are drawn from the same population, these groupings are determined by individual reports, hence more than the cost of delay and reversal might differ between the individuals sampled.

delay difficulty in both WTP and WTA transactions. In these data it is clear that WTA> WTP in either pair-wise comparisons or in aggregate, supporting Hypothesis 2(i).

Similarly, Hypothesis 2(ii) is confirmed by a comparison of the WTP values in cells above the diagonal with WTA values in cells below the diagonal. Further, since the WTP and WTA values in the same cell are formed under beliefs about selling and buying difficulties that are consistent across the WTP and WTA treatments, Hypothesis 2(iii) predicts that the two values should be equivalent in each cell. Among the eight cells where both values are reported, the average WTP is similar to the average WTA in six cells (WTA is higher than WTP in the other two cells). This observation supports Hypothesis 2(iii).

Table 1 shows that in experiment I, subjects in the WTP and WTA treatments perceive different difficulties in selling the card in the future ($2.41 for subjects in WTP and $1.96 for WTA). This asymmetry combined with Hypothesis 2(i) provides an explanation for the observed WTP and WTA divergence. In Table 8, we illustrate how this asymmetry is attenuated as the subjects become more experienced in trading. We grouped the subjects according to two measures of experience: the number of years they have been active in the sportscard market, and the number of sportscard shows they typically attend *and trade in* per year. When the experience is measured by the annual number of shows they typically participate in, inexperienced subjects (with the number of shows < 6) in WTP and WTA treatments report statistically significantly different difficulties of selling. This difference disappears for experienced subjects, who typically trade in more than 6 shows a year. This pattern does not hold when experience is measured by years of attending sportscard shows: the reported difficulties of selling remain statistically insignificant across the two treatment groups, regardless of the years of attendance. This finding suggests that it may be the actual

trading instead of simple attendance that reduces the asymmetry in perceived costs of selling across the WTP and WTA treatments.

IV. Concluding Remarks

The divergence of compensation demanded and willingness to pay measures of value has prompted many economists to pause and contemplate whether the basic tenets of neoclassical theory are satisfied. Some influential commentators have used the vast empirical evidence to call into question the fundamental building blocks of neoclassical theory. While static neoclassical theories have been proposed to explain the observed preferences, the data have generally not matched predictions from these theories. In this paper, we examine whether a dynamic neoclassical theory based on the presence of commitment costs can explain the behavior of individuals within a competitive marketplace. In a nutshell, we ask whether we have been observing dynamic values but interpreting them as static. To provide insight into this query, rather than impose all of the experimental controls exogenously on a convenience sample of undergraduates, we find a population in the field in which an important factor, market experience, arises naturally, where it can be identified easily, and then add the necessary controls.

We find several pieces of evidence that are in favor of the commitment cost theory. First, our field data suggests that a value disparity exists, even for those consumers who plan to purchase the good for resale. Second, in both data sets we find that the comparative static predictions of the theory perform quite well: WTP (WTA) increases (decreases) in the difficulty of delay and decreases (increases) in the difficulty of reversing the transaction. Third, even under the most stringent of our theoretical conjectures—including cases where WTP is predicted to *exceed* WTA—our data are consistent with the theory.

More generally, we have presented clear evidence that agents form their WTP and WTA values dynamically. When agents' transactional positions systematically influence their perceived level of difficulty of resale on secondary markets, this dynamic behavior can explain the WTP/WTA behavioral anomaly. Further, we lend insight into the causes and severity of the WTA/WTP disparity and provide formal structure to previous results on the effects of market experience on market anomalies.

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Appendix WTP Survey

These questions will be used for statistical purposes only. THIS INFORMATION WILL BE KEPT CONFIDENTIAL AND WILL BE DESTROYED UPON COMPLETION OF THE STUDY.

1. How long have you been active in the sportscard and memorabilia market? _____yrs

2. Are you a sportscard or sports memorabilia professional dealer?_____

3. How many sportscard or memorabilia shows do you attend in a typical year? _____

4. In how many of those do you typically trade? _____

5. Gender: 1) Male 2) Female

6. Age _____ Date of Birth _____

7. What is the highest grade of education that you have completed. (Circle one)
   1) Eighth grade 3) 2-Year College 5) 4-Year College
   2) High School 4) Other Post-High School 6) Graduate School Education

8. What is your approximate yearly income from all sources, before taxes?
   1) Less than $10,000 5) $40,000 to $49,999
   2) $10,000 to $19,999 6) $50,000 to $74,999
   3) $20,000 to $29,999 7) $75,000 to $99,999
   4) $30,000 to $39,999 8) $100,000 or over

9. What do you think is the likely market value of the good (a range is fine)?_____

10. If you win the auction:
    A. What do you plan to do with the good? Sell it ____ Trade it ____ Keep it _____

    B. If you plan to sell/trade the good, how easy do you think it will be to sell/trade?

    1 (very easy) 2 3 4 5 (almost impossible)

    C. If you decide to sell the good, which of the following do you think is true? You could
       (a) recoup the full bid_____
       (b) take a loss _____
       (c) earn a profit _____

11. If you do not win the auction:
    A. How easy do you think it will be to obtain the good (or a close substitute) later?

    1 (very easy) 2 3 4 5 (almost impossible)

    B. If you were to purchase the good (or a close substitute) later, which of the following do you think is true? The purchase price would be
       a. Above my bid _____
       b. Below my bid _____
       c. About the same as my bid _____

Table 1. Summary Statistics: Field Experiment I*

Variable	Total Sample	WTP Subsample	WTA Subsample
Bid/Offer Value	$9.69 (90) [6.74]	$7.46 (49) [4.64]	$12.37 (41) [7.35]
Value for Keepers		$7.00 (15) [3.89]	$15.39 (18) [8.07]
Value for Non-keepers		$7.67 (34) [4.97]	$10.00 (23) [5.89]
Years of Experience	8.42 (90) [5.5]	8.27 (49) [6.03]	8.61 (41) [4.87]
Dealer	0.11 (90) [.32]	0.14 (49) [0.36]	0.07 (41) [0.26]
Gender	0.90 (90) [0.31]	0.92 (49) [0.28]	0.88 (41) [0.33]
Age	34.61 (90) [11.48]	33.47 (49) [11.41]	35.98 (41) [11.56]
Education	15.18 (90) [15.17]	15.06 (49) [3.22]	15.32 (41) [2.55]
Keep	0.37 (90) [0.37]	0.31 (49) [0.47]	0.44 (41) [0.50]
Delay Difficulty	1.68(72) [0.82]	1.55 (49) [0.74]	1.96 (23) [0.92]
Delay Difficulty for Keepers		1.20 (15) [0.41]	-
Delay Difficulty for Non-keepers		1.71 (34) [0.80]	1.96 (23) [0.93]
Purchase	2.22 (90) [0.91]	1.92 (49) [0.99]	2.59 (41) [0.63]
Reversal Difficulty	1.95 (75) [1.01]	2.41 (34) [1.10]	1.56 (41) [0.74]
Reversal Difficulty for Keepers		-	1.56 (18) [0.86]
Reversal Difficulty for Non-keepers		2.41(34) [1.10]	1.57 (23) [0.66]
Income	$53,765 (83) [26,154]	$55,640 (43) [22,827]	$51,750 (40) [23,137]
Outcome	2.26 (41) [2.27]	2.27 (49) [0.95]	N.A.
Market Value	$12.69 (81) [7.20]	$14.46 (45) [7.56]	$10.47 (36) [6.13]

* The table presents the sample means of the variables, with the number of sample points in parentheses and the standard deviations in square brackets.

Table 2. Summary Statistics: Field Experiment II*

Variable	Total Sample	Base Subsample	GBG Subsample	Table Subsample
WTA Value	$4.10 (112) [2.29]	$4.66 (55) [2.18]	$3.23 (32) [2.18]	$3.98 (25) [2.36]
Value for Keepers	$4.60 (27) [2.46]	$4.69 (13) [2.09]		$4.50 (14) 2.84
Value for Non-keepers	$3.48 (23) [1.55]	$3.62 (12) [1.72]		$3.32 (11) [1.42]
Years of Experience	11.74 (112) [10.37]	12.76 (55) [12.60]	10.62 (32) [7.96]	8.61 (41) [4.87]
Dealer	0.10 (112) [0.30]	0.16 (55) [0.37]	0.00(32) [0.00]	0.08 (25) [0.26]
Gender	O.875 (112) [0.33]	0.87 (55) [0.31]	0.88 (32) [0.34]	0.88 (25) [0.33]
Age	38.58 (112) [13.52]	39.6 (55) [14.79]	36.75 (32) [12.61]	38.68 (25) [11.89]
Education	15.05 (112) [2.46]	15.09 (55) [2.40]	15.06 (32) [2.82]	14.96 (25) [2.17]
Keep	0.54 (50) [0.50]	0.52 (25) [0.51]		0.56 (25) [0.51]
Delay Difficulty[1]	3.12 (41) [1.38]	3.04 (24) [1.20]		3.24 (17) [1.64]
Delay Difficulty for Keepers	2.88 (24) [1.42]	2.92 (13) [1.32]		2.82 (11) [1.60]
Delay Difficulty for Non-keepers	3.47 (17) [1.28]	3.18 (11) [1.08]		4.00(6) [1.55]
Reversal Difficulty	1.77 (89) [0.88]	1.86 (43) [0.94]	1.67 (21) [0.87]	1.72 (25) [0.79]
Reversal Difficulty for Keepers	2.11 (27) [0.93]	2.31 (13) [1.11]		1.93 (14) [0.73]
Reversal Difficulty for Non-keepers	1.52(23) [0.73]	1.58 (12) [0.67]		1.45 (11) [0.82]
Income	$59,085 (112) [30,657]	$54,545 (55) [30,112]	$68,672 (32) [30,848]	$58,800 (25) [30.04]
Market Value	$4.49 (112) [2.15]	$4.98 (55) [2.31]	$4.24 (32) [2.08]	$3.51 (25) [1.54]

* The table presents the sample means of the variables, with the number of sample points in parentheses and the standard deviations in square brackets.

[1] Delay difficulty and intent to keep was collected only for the "Table" sub-sample and corresponding base sub-sample as explained in the text.

Table 3: Willingness-to-Pay Regressions: Experiment I						
Specifications	[1]	[2]	[3]	[4]	[5]	[6]
Constant	7.75** (3.27)	8.39** (3.08)	7.66** (9.56)	7.69** (8.45)	6.37* (1.92)	6.12* (1.75)
Reversal Difficulty[a]	-1.82** (-2.75)	-1.93** (-2.73)				
Delay Difficulty[b]	2.52** (2.76)	2.42** (2.57)			1.90* (1.93)	1.95* (1.92)
Keep (=1 if keep)			-0.66 (-0.46)	-0.69 (-0.45)	0.56 (0.38)	0.68 (0.44)
Dealer (=1 if a dealer)		-0.97 (-0.50)		-0.11 (-0.06)		0.50 (0.26)
Gender (=1 if male)					-2.21 (-0.87)	-2.15 (-0.84)
R^2	0.34	0.34	0.00	0.06	0.13	0.13
N	34	34	49	49	49	49

Numbers in parentheses are t-statistics. *: significant at 10%, **: significant at 5%

[a] This is the response to question 10b

[b] This is the response to question 11a

Table 4: Willingness-to-Accept Regressions: Experiment I						
Specifications	[1]	[2]	[3]	[4]	[5]	[6]
Constant	12.55** (3.24)	14.10** (3.08)	10.00** (6.93)	9.85** (6.29)	5.00 (1.29)	4.73 (1.20)
Reversal Difficulty[a]	2.38 (1.49)	2.08 (1.23)			4.40** (3.31)	4.47** (3.33)
Delay Difficulty[b]	-3.21** (-2.82)	-3.61** (-2.76)				
Keep (=1 if keep)			5.39** (2.47)	5.54** (2.43)	5.47** (2.85)	5.83** (2.92)
Dealer (=1 if a dealer)		-2.26 (-0.66)		1.15 (0.26)		2.70 (0.70)
Gender (=1 if male)					-2.18 (-0.73)	-2.38 (-0.79)
R^2	0.40	0.41	0.14	0.09	0.36	0.37
N	23	23	41	41	41	41

Numbers in parentheses are t-statistics. *: significant at 10%, **: significant at 5%

**significant at 5% level

[a]Response to question 11a (note this is different from the WTP table)

[b] This is the response to question 10.

Table 5: Willingness-to-Accept Regressions: Experiment II

Specifications	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Constant	4.66** (15.56)	2.85** (5.12)	2.57** (4.54)	4.49* (14.01)	4.26** (6.75)	4.18** (9.63)	3.60** (6.84)	3.05* (2.51)
GBG Dummy	-1.43** (-2.89)	-1.60** (-2.94)	-1.33** (-2.40)	-1.26** (-2.49)	-1.27** (-2.49)			
Table Dummy	-0.68 (-1.27)	-0.38 (-0.74)	-0.21 (-0.41)	-0.59 (-1.11)	-0.60 (-1.11)	-0.20 (-0.33)	-0.24 (-0.41)	0.45 (0.68)
Reversal Difficulty[a]		0.88** (3.53)	0.88** (0.25)					1.16** (2.85)
Delay Difficulty[b]								-0.35 (-1.51)
Keep (=1 if keep)							1.12* (1.87)	0.05 (0.67)
Dealer (=1 if a dealer)			1.29* (1.92)	1.04 (1.45)	1.00 (1.37)			
Gender (=1 if male)					0.27 (0.43)			
R^2	0.07	0.21	0.25	0.09	0.09	0.00	0.07	0.29
N	112	89	89	112	112	50	50	41

Numbers in parentheses are t-statistics. *: significant at 10%, **: significant at 5%

[a] Response to question 11a.

[b] Response to question 10b.

Table 6: Effects of Relative Reversal and Delay Difficulties, Experiment I*

Relative Difficulties	WTP		WTA	
	Mean	N	Mean	N
[1] Reversal Difficulty > Delay Difficulty	\$5.84 (3.11)	19	\$13.33 (5.47)	6
[2] Reversal Difficulty = Delay Difficulty	\$6.50 (4.07)	8	\$15.00 (6.12)	5
[3] Reversal Difficulty < Delay Difficulty	\$13.93 (5.42)	7	\$6.25 (3.05)	12

* Numbers in parentheses are standard deviations.

Table 7: Perceptions of Reversal/Delay Difficulties, Experiment I*

		Difficulty of buying later (Delay Diff. for WTP, or Reversal Diff. for WTA)				
		1	2	3	4	5
Difficulty of selling later (Rev. Diff. for WTP, or Delay Diff. for WTA)	1	\$3.5 (2) \$13.3 (3)	\$16.0 (3) \$13.0 (4)	\$15.0 (1) \$14.0 (2)		
	2	\$6.8 (5) \$7.4 (5)	\$9.0 (5) \$17.5 (2)	\$12.5 (2) ---	\$9.5 (1) ---	
	3	\$5.5 (6) \$4.3 (4)	\$8.3 (3) \$9.0 (2)			
	4	\$4.0 (2) ---	\$5.0 (1) \$3.0 (1)			
	5		\$5.0 (1) ---	\$1.0 (1) ---		

*The first entry is the average WTP, and the bottom entry is the average WTA; the sample size is in parentheses.

Table 8: Effects of Experience on Reported Difficulties of Selling

Reported Difficulty of Selling: by years of trading experience[1] (higher numbers indicate higher perceived difficulty of selling)			
	WTP	WTA	Difference
Experienced (years of trading > 8)	2.18 (0.81) n=17	1.87 (0.83) n=15	0.30 (0.29) df=29
Inexperienced (years < 8)	2.65 (1.32) n=17	2.13 (1.13) n=8	0.52 (0.51) df=16

Reported Difficulty of Selling: by number of trades[1]			
	WTP	WTA	Difference
Experience (#trades > 6)	2.13 (0.83) n=8	2.25 (0.89) n=8	-0.12 (0.43) df=14
Inexperienced (#trades < 6)	2.48 (1.20) n=23	1.61 (0.77) n=13	0.97*** (0.33) df=33

1. standard errors in parentheses
df represents the degree of freedom in calculating the t-statistics of Difference
*** indicates significance at 1%