ELSEVIER

Economics Letters 79 (2003) 27–34

economics letters

www.elsevier.com/locate/econbase

Value elicitation in retail and laboratory environments

Jayson L. Lusk*, John A. Fox

Department of Agricultural Economics, P.O. Box 5187, Mississippi State University, Mississippi, MS 39762, USA

Received 21 February 2002; received in revised form 8 September 2002; accepted 17 September 2002

Abstract

An increasing number of studies have begun conducting economic experiments in field, rather than laboratory settings. We directly compare results from laboratory and field valuation experiments. After controlling for unengaged bidders, results indicate field valuations were greater than laboratory valuations. Results are discussed in the context of recent literature on commitment costs.

Keywords: Experimental economics; Field experiment; Lab experiment; Willingness-to-pay; Valuation

JEL classification: C91; C93; Q0

1. Introduction

For the past few decades, economists have been turning to the lab to test economic theories under a wide variety of situations. One vein of laboratory study has focused on auction theory and its use in the valuation of non-market goods. Laboratory valuation has been used for estimating the values of improvements in food safety, pesticide reduction in produce, non-genetically modified foods, improvements in environmental amenities, and other novel food products and technologies.[1]

However, it has not yet been established whether values elicited in the lab accurately predict consumer behavior in a retail setting—which, in many situations, is the ultimate goal of the experiment. As a result, some recent experimental work has begun to elicit values in a field or retail setting (e.g. Bohm, 1994; List and Lucking-Reiley, 2000; List, 2001; Lusk et al., 2001b). Moving the valuation setting to more familiar territory for the respondent might be advantageous for a number of reasons. Field valuation potentially: (a) allows the researcher to better target the population of interest,

*Corresponding author. Tel.: +1-662-325-3796; fax: +1-662-325-8777.
E-mail address: jlusk@agecon.msstate.edu (J.L. Lusk).
[1]For examples see Fox et al. (1998), Hayes et al. (1995), Lusk et al. (2001a), and Roosen et al. (1998).

0165-1765/02/$ – see front matter
doi:10.1016/S0165-1765(02)00284-7

thereby reducing sample selection bias, (b) reduces costs of experimental work because of lower compensatory fees, (c) decreases bias associated with high or non-uniform compensatory fees (Rutström, 1998), and (d) puts subjects in a context where typical purchasing decisions are made. In a laboratory, subjects have limited opportunity to purchase substitute goods and may have little knowledge of competing prices that can appropriately anchor valuation and promote consistency with retail behavior.

To date, however, few if any studies have directly compared values elicited in a lab and retail settings. Field valuation, although beneficial in many respects, may produce undesirable results because of lack of environmental control relative to the laboratory. This paper reports results of a study that directly compares auction bids elicited in a laboratory setting to values obtained in an in-store, field setting. In a separate treatment, we elicited hypothetical willingness-to-pay values for the same goods. Results suggest that the valuation setting had a significant effect on bids, and consistent with prior research, hypothetical bids were greater than non-hypothetical bids.

2. Experimental design

The study was conducted on the Mississippi State University campus. The University convenience store and bakery (the fountain) agreed to participate in the study and offered three new cookies that had yet to be offered for sale. The fountain is centrally located on campus and sells numerous items including cookies, cakes, sodas, coffee, donuts, and ice cream. The new cookies were ideal for this analysis because their retail prices had not been established and the ready availability of substitutes in the store had the potential to influence in-store valuation in a manner that would not occur in the lab. The three new cookies valued in the analysis were Chocolate Chocolate Cherry (Cookie A), Island Delight (Cookie B), and Oatmeal Scotchie (Cookie C). The value elicitation procedures were identical across in-store and lab settings and are explained below.

Firstly, participants were recruited by offering a free pencil printed with the University logo and mascot. We considered offering cash as an inducement, but decided to offer a relatively low-valued item (worth about $0.40) that was unlikely to influence values. Next, we asked participants to complete a short survey, which elicited demographic information. Then we informed participants that we were interested in their preferences for three new cookies the fountain was considering selling. Participants were told to take a minute to examine the new cookies and small samples were provided for taste testing. Next, we informed participants that we would conduct an ‘auction’ for a cookie, where they would have the opportunity to purchase *one* cookie. Because subjects participated individually in the in-store setting, we utilized the Becker et al. (1964) (BDM) valuation mechanism. Bids for each of the three cookies were elicited and a random drawing determined which of the three cookies was actually sold. Randomly drawing the cookie (A, B, or C) allowed us to focus on demand for only one cookie and eliminated potential problems with demand reduction or ‘wealth’ effects. Auction instructions were provided orally and in writing and are provided in Appendix A.

For the laboratory valuation, students were recruited from introductory economics and agricultural economics classes. Laboratory sessions were held immediately following classes and students were offered a free pencil with the University logo in exchange for 5 to 10 min of their time. Groups of students (anywhere from eight to 20) participated in a laboratory session. At the fountain, participants were individually recruited, although it was not uncommon to have more than one subject participate

at the same time. Efforts were made to solicit only students in the in-store setting to provide homogeneous samples across the in-store and in-lab settings. Other than the setting (in-store versus in-lab), procedures were identical for all participants in the non-hypothetical auctions.

In a separate hypothetical laboratory treatment, all procedures were identical to those outlined above, except the verbiage in the instructions was altered to reflect the hypothetical nature of the auction. Following the instructions, subjects were told, 'If you were to participate in an auction such as this, what would be the most you would be willing to pay?'

3. Results

Forty subjects participated in the retail experiment and 57 in the lab. An additional 22 subjects took part in the hypothetical treatment in the lab. Table 1 reports summary statistics for the three samples. Because of the slightly different sample make-ups, particularly with regard to gender, it will be important to control for differing subject-specific effects prior to drawing any conclusion about differences in bids across experimental treatments.

Bid data for all treatments are reported in Table 2. A number of subjects in the non-hypothetical treatment bid zero for all three cookies. Such behavior might arise either because subjects were budget constrained[2] or because they were disinterested in the experiment (e.g. unengaged). In either case, bids would not reflect the individual's preferences for the cookies per se.[3] Thus, we examine

Table 1
Summary statistics

Variable	Definition	Non-hypothetical		Hypothetical
		In store	In lab	In lab
Gender	1 if female; 0 if male	0.55	0.23	0.18
		(0.50)[a]	(0.42)	(0.39)
Age	Age in years	22.4	20.9	19.7
		(5.2)	(2.0)	(1.2)
Shop	1 if previously shopped in University	1.0	0.5	0.5
	fountain; 0 otherwise	(0.0)	(0.5)	(0.5)
Income	Monthly disposable income (dollars)	279	229	131
		(227)	(176)	(131)
Number of observations		40	57	22

[a] Numbers in parentheses are standard deviations.

[2]Many in-store subjects indicated they only made purchases by credit card and did not have any cash. Likewise, in post-experimental debriefing, several in-lab participants commented they would have bid a positive amount if they had had some cash.

[3]It might also be argued that the elicitation environment *caused* the zero bidding perhaps because of the larger number of substitute goods. Results of a probit model designed to identify whether zero bidding for all three cookies was more likely in the store or lab suggests that in-store participants were significantly ($P=0.054$) more likely to bid zero for all three cookies than in-lab participants. Given the current experimental design, we cannot be certain whether this is a result of more subjects being cash constrained or 'disinterested' in the store or whether the store environment itself caused a greater frequency of zero bidding.

Table 2
Willingness-to-pay in store and in laboratory

Item		All bids			Engaged bidders[a]		
		Non-hypothetical		Hypothetical	Non-hypothetical		Hypothetical
		In-store	In-lab	In-lab	In-store	In-lab	In-lab
Cookie A	Mean	$0.23	$0.17	$0.31	$0.35	$0.22	$0.31
	S.D.	(0.27)	(0.21)	(0.23)	(0.26)	(0.21)	(0.23)
	Median	0.10	0.00	0.33	0.38	0.20	0.33
	% Zero	47%	51%	27%	19%	35%	27%
Cookie B	Mean	0.22	0.23	0.49	0.33	0.30	0.49
	S.D.	(0.22)	(0.23)	(0.21)	(0.19)	(0.22)	(0.21)
	Median	0.17	0.25	0.50	0.40	0.25	0.50
	% Zero	45%	33%	5%	15%	12%	5%
Cookie C	Mean	0.26	0.19	0.52	0.40	0.26	0.52
	S.D.	(0.25)	(0.22)	(0.25)	(0.21)	(0.22)	(0.25)
	Median	0.27	0.10	0.50	0.50	0.25	0.50
	% Zero	42%	39%	9%	12%	19%	9%
No. of observations		40	57	22	26	43	22

[a] Excludes those individuals that bid zero for all three cookies.

separately willingness-to-pay conditional on subjects bidding a positive amount for at least one of the cookies. This will allow us to focus solely on the effect of the elicitation environment without the confounding effect of cash constraints or bidder disinterest.

Although data in Table 2 are useful in identifying differences in basic data composition across treatments and cookies, simple *t*-tests cannot account for potential non-normality in bid data or correlation of bids across cookies. To account for these factors, three models were estimated, where data for each of the three cookies were pooled. A model including all bidders and a model including only 'engaged' bidders, those that bid at least some positive amount for one of the cookies, were estimated using a random effects tobit. The random effects tobit model is given by the latent variable model in Eq. (1)

$$\text{bid}_{it}^{*} = \alpha' \boldsymbol{x}_{it} + v_{it} + u_i, \tag{1}$$

where the latent variable, bid_{it}^{*}, is only observed at positive values, the subscripts represent the *i*th consumer and the *t*th cookie, $\boldsymbol{x}_{it}$ is a vector of independent variables, α is a conformable vector of coefficients, u_i is an individual specific disturbance for subject *i*, and v_{it} is the overall error term. A third model was estimated that included only positive bids. This model was estimated using a standard random effects OLS model.

Table 3 reports the results of random effects models that control for differences in demographic variables across valuation setting. To test for differences across treatments, we created two dummy variables—an 'in-store' variable for subjects who participated in the in-store environment, and a 'hypothetical lab' variable for subjects who participated in the hypothetical treatment. After controlling for gender, age, income, and shopping behavior (having previously shopped at the store), results suggest that lab and in-store valuations were not statistically different for unconditional bids.

Table 3
Influence of demographics and experimental setting on willingness-to-pay

Variable	All bidders[a]	Engaged bidders[b]	Positive bidders[c]
Constant	−0.300	0.140	0.175
	(0.243)[d]	(0.182)	(0.091)
Cookie B	0.098**	0.102**	0.006
	(0.029)	(0.034)	(0.030)
Cookie C	0.095**	0.100**	0.022
	(0.032)	(0.035)	(0.031)
Gender	−0.093	−0.026	−0.001
	(0.067)	(0.050)	(0.030)
Age	0.013	0.002	0.008
	(0.011)	(0.009)	(0.004)
Shop	0.018	−0.097*	−0.058*
	(0.081)	(0.046)	(0.029)
Income (in 100s)	−0.031	0.019	0.048
	(0.018)	(0.014)	(0.079)
In-store	−0.024	0.150**	0.102**
	(0.081)	(0.061)	(0.034)
Hypothetical lab	0.400**	0.214**	0.192**
	(0.107)	(0.050)	(0.031)
Sigma(v)[e]	0.203**	0.210**	
	(0.008)	(0.009)	
Sigma(u)[f]	0.273**	0.136**	
	(0.032)	(0.024)	
Number of observations	357	273	224

Dependent variable is willingness-to-pay * and ** represent 0.05 and 0.01 levels of statistical significance, respectively.
[a] Includes all observations; random effects tobit.
[b] Excludes those individuals that bid zero for all three cookies; random effects tobit.
[c] Includes only positive bids; random effects OLS.
[d] Numbers in parentheses are standard errors.
[e] Standard deviation of individual specific error.
[f] Standard deviation of overall error.

However, when we consider only behavior of engaged bidders (those bidding at least something for one of the goods), we find that willingness-to-pay in the retail store was significantly greater than that in the lab. Results of the model that only includes positive bids also indicates that willingness-to-pay in the retail store was significantly greater than that in the lab. Finally, for all three models, we find positive and statistically significant coefficient estimates for the 'hypothetical lab' variable, indicating that the change from real to hypothetical valuation introduces an upward bias in valuations. This is consistent with a number of previous studies (e.g. Fox et al., 1998; List and Shogren, 1998).

4. Conclusions

After controlling for unengaged bidders, results indicate that in-store bids were greater than laboratory bids. Bearing in mind that our samples are relatively small and cannot support any

definitive conclusion we note that this result is consistent with recent literature on the effect of commitment costs on willingness-to-pay.

Zhao and Kling (2001) contend that compensating variation may not always be equivalent to willingness-to-pay because most valuation exercises force participants to make a commitment before they might otherwise choose to do so. Thus, participants must be compensated if forced to make an early commitment—and in our context this would be expressed in a lower bid. Zhao and Kling (2001) suggest willingness-to-pay should increase (commitment costs decrease) when consumers are more certain about a good's value, more impatient about consuming the good, and expect less information can be gathered about a good's value in the future. In our retail setting, subjects entered the store ready to make a purchase. In this regard, they were likely more impatient about making a purchase than subjects in a laboratory, which might result in greater bids in the store setting. In addition, the store setting has more information about substitute prices, which should make subjects more certain about a good's relative value and decrease the chance that more information will be gathered later. According to the commitment cost theory, this would have the effect of making store valuations greater than laboratory valuations.

Our results also indicate a greater percentage of individuals bid zero for all goods in the store (35%) than in the lab (25%). We cannot be certain whether this is a result of more subjects being cash constrained or 'unengaged' in the store or whether the store environment caused a greater frequency of zero bidding perhaps because of the large number of substitute goods. Future research might use small cash inducements, survey consumers on cash constraints, or allow credit purchases to identify whether the store environment itself is to blame for the greater frequency of zero bidding. Our results show that in-store bidding was greater than lab bidding, given that an individual decided to 'play the game' and bid at least something for one of the cookies. Certainly, more data and further study is needed to confirm this finding. One clear result from our study is that elicitation context (hypothetical versus non-hypothetical) has a larger influence on results than elicitation environment (store versus lab)

The possibility of consistent and systematic differences in values attributable to the elicitation environment has important implications for future research. The question becomes 'which environment will produce the more relevant results?' Perhaps a more significant implication of differing behavior in field and lab settings is that it may imply that tests of certain economic theories, previously rejected in the lab, may hold in the context of a more routine and realistic environment.

Acknowledgements

This research was partially funded by USDA-NRICGP grant #2001-35400-10557.

Appendix A. Auction instructions

We are now interested in your preference for three *new* cookies the fountain is considering selling. Please take a minute to examine the new cookies, Chocolate Chocolate Cherry, Island Delight, and Oatmeal Scotchie, which are labeled A, B, and C, respectively. Now, we will conduct an 'auction' for

the cookies, where you will have the opportunity to purchase one cookie. For reference, similar sized cookies are currently selling for $0.55 in the fountain.

In a moment, you will be asked to indicate the *most* you are willing to pay for each cookie by writing these amounts in the spaces below. After you write these amounts, the auction will proceed as follows.

1. By pressing a button on the lap top computer, you will randomly draw a letter (A, B, or C) to determine which cookie to actually auction. For example, if you draw the letter B, then I will only auction cookie B (Island Delight) and will ignore your willingness to pay for cookies A (Chocolate Chocolate Cherry) and C (Oatmeal Scotchie). It is important to realize that you will only have the opportunity to buy *one* cookie.
2. Once the 'binding' cookie has been determined, you will randomly draw a number ranging from $0.00 to $1.00 by pressing a key on the computer.
3. If your willingness to pay for the randomly selected cookie is *greater* than the randomly drawn number, then you **will purchase the cookie** from me for a price equal to the randomly drawn number. Note: payment *will actually take place*.
4. If your willingness to pay for the randomly selected cookie is *less* than the randomly drawn number, then you **will not purchase the cookie** and will walk away with no cookie. If you do not wish to purchase one or more of the cookies, simply bid $0.00 for that cookie.

Do you have any questions?
The *most* I am willing to pay for . . .
Cookie A (Chocolate Chocolate Cherry) is $_____
Cookie B (Island Delight) is $_____
Cookie C (Oatmeal Scotchie) is $_____

References

Becker, G.M., DeGroot, M.H., Marschak, J., 1964. Measuring utility by a single-response sequential method. Behavioral Science 9, 226–232.

Bohm, P., 1994. Behavior under uncertainty without preference reversals: a field experiment. Empirical Economics 19, 85–200.

Fox, J.A., Shogren, J.F., Hayes, D.J., Kliebenstein, J.B., 1998. CVM-X: calibrating contingent values with experimental auction markets. American Journal of Agricultural Economics 80, 455–465.

Hayes, D.J., Shogren, J.F., Shin, S.U., Kliebenstein, J.B., 1995. Valuing food safety in experimental auction markets. American Journal of Agricultural Economics 77, 40–53.

List, J.A., 2001. Do explicit warnings eliminate the hypothetical bias in elicitation procedures? Evidence from field auctions for sportscards. American Economic Review 91, 1498–1507.

List, J.A., Lucking-Reiley, D., 2000. Demand reduction in multiunit auctions: evidence from a sportscard field experiment. American Economic Review 90, 961–972.

List, J.A., Shogren, J.F., 1998. Calibration of the differences between actual and hypothetical valuations in a field experiment. Journal of Economic Behavior and Organization 37, 193–205.

Lusk, J.L., Daniel, M.S., Mark, D.R., Lusk, C.L., 2001a. Alternative calibration and auction institutions for predicting consumer willingness-to-pay for non-genetically modified corn chips. Journal of Agriculture and Resource Economics 26, 40–57.

Lusk, J.L., Fox, J.A., Schroeder, T.C., Mintert, J., Koohmaraie, M., 2001b. In-store valuation of steak tenderness. American Journal of Agricultural Economics 83, 539–550.

Roosen, J., Hennessy, D.A., Fox, J.A., Schreiber, A., 1998. Consumers' valuation of insecticide use restrictions: an application to apples. Journal of Agricultural and Resource Economics 23, 367–384.

Rutström, E.E., 1998. Home-grown values and incentive compatible auction design. International Journal of Game Theory 27, 427–441.

Zhao, J., Kling, C.L., 2001. A new explanation for the WTP/WTA disparity. Economics Letters 73, 293–300.