

Valuation Using Multiple Price List Formats

by

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Abstract. We examine the properties of a popular method for elicitation of valuations from experimental subjects, the multiple price list format. The main advantages of this format are that it is relatively transparent to subjects and provides simple incentives for truthful revelation. The main disadvantages are that it only elicits interval responses, and could be susceptible to framing effects. We consider extensions to address and evaluate these concerns in the context of eliciting willingness to pay for products. We find that the multiple price list can elicit relatively precise valuations for products, and that those valuations are robust to possible framing effects. It therefore offers an attractive procedure for eliciting valuations for goods.

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The literature in experimental economics has been dominated by the use of one important design feature: experimenter-induced values. Inducing values allows researchers to exercise control over otherwise unobservable confounds when studying properties of market institutions and game structures. The explosion of experimental applications in recent decades testifies to the inferential power that induced values provides.¹ More recently, however, experimental methods have been used when researchers are interested in the subjective values themselves, and therefore attempt to *elicit the homegrown values* of decision makers for commodities that exist outside the laboratory. The adjective “homegrown” simply means “not induced,” and refers to values that are neither controlled nor known *a priori* by the experimenter. The elicitation of homegrown values is particularly central to the fields of marketing,² environmental damage assessment,³ and the general estimation of individual preferences.⁴

Using laboratory experiments, we examine closely the properties of one procedure which has been widely used to elicit homegrown values: the Multiple Price List (MPL).⁵ The MPL is a relatively simple procedure for eliciting values from a subject. In the context of eliciting a willingness to pay (WTP) for some commodity, it confronts the subject with an array of ordered prices in a table, one per row, and asks the subject to indicate “yes” or “no” to accept the offer for each price. The experimenter then selects one row at random, and the subject’s choice is implemented. We examine the behavioral properties of the MPL elicitation institution, as well as some variants on the basic design, in the elicitation of willingness to pay for four different products: Heinz ketchup, Heinz organic ketchup, Lindt chocolate truffles, and a Muvo Creative Labs MP3 player. We display pictures of each below.

¹ Book-length surveys by Davis and Holt [1993], Friedman and Sunder [1994] and Kagel and Roth [1995] predominately report induced-values experiments.

² For example, see Hoffman, Menkhous, Chakravarti, Field and Whipple [1993] and Lusk and Hudson [2004].

³ See Shogren [2004] or Harrison [2005] for reviews. In this literature the elicitation of homegrown values for a lab commodity is used either as a proxy for the field environmental good, as a way to calibrate field survey responses, or as a methodological test to measure the extent of hypothetical bias in contingent valuation surveys.

⁴ For example, see Coller and Williams [1999], Harrison, Lau and Williams [2002], Holt and Laury [2002] and Harrison, Lau, Rutström and Sullivan [2005].

⁵ Kahneman, Knetsch and Thaler [1990] appear to be the first to use it to elicit valuations for a commodity. The use of the MPL also has a longer history in the elicitation of hypothetical valuation responses in “contingent valuation” survey settings, as discussed by Mitchell and Carson [1989; p. 100, fn. 14].



The MPL has several attractive characteristics as an elicitation procedure. First, it is easy to explain to subjects. Second, it is easy to implement. Third, it is relatively easy for subjects to see that truthful revelation is in their best interests: if the subject believes that his responses have no effect on which row is chosen, then the task collapses to a binary choice in which the subject gets what he wants if he answers truthfully.

The MPL has three possible disadvantages. The first is that it only elicits valuations in an interval, rather than “point” valuations. The second is that subjects can switch back and forth from row to row, implying *potentially* inconsistent valuations. The third is that it could be susceptible to framing effects, as subjects are drawn to the middle of the ordered table irrespective of their true values. Subsequent MPL tasks might also be influenced by previous valuation tasks, and hence by the ordering of the valuation tasks.

We consider each of these disadvantages as well as order effects, propose extensions of the MPL approach which can address each, and evaluate those extensions in controlled laboratory experiments where we elicit WTP for the various products. We find that the multiple price list can elicit relatively precise valuations for products, and that those valuations are robust to possible framing effects. It therefore offers an attractive procedure for eliciting valuations for goods.

1. Possible Problems Using Multiple Price Lists

A. Interval Responses

The problem of interval responses is that one only elicits WTP intervals from the subject rather than point estimates of WTP. Thus one does not have as precise a response as might be obtained by some other method that elicits the point response, such as an open-ended Vickrey auction. Since there is some controversy over the ability to elicit valuations too precisely using methods that elicit a point

response (Harrison [1992]), it could be that the best one can do anyway is elicit an interval response. There are two methods for addressing the issue of interval response.

The first is simply to use statistical methods that recognize that the response is interval-censored. These methods are an extension of traditional Tobit models, which recognize that a dependant variable may be right or left censored at some fixed value. Tobit models can be extended to allow for right *or* left censoring that varies with the subject. A further extension allows each subject's response to be left-censored *and* right-censored, which is just another way of saying that the subject's response is interval-censored. This statistical approach has been used by Collier and Williams [1999], Harrison, Lau and Williams [2002], and Harrison, Lau, Rutström and Sullivan [2005].

The second way to address the interval response issue is to extend the MPL to allow more refined elicitation of the true valuation. To allow more refined elicitation of the true preferences, and yet retain the transparency of the incentives of the basic multiple price list, we used a computerized variant on the MPL format which we call an Iterative MPL (iMPL). The basic MPL is the standard format in which the subject sees a fixed array of paired options and chooses one for each row. It allows subjects to switch back and forth as they like, and has already been used in many experiments. The iMPL format extends this by first asking the subject to simply choose the row at which he wants to first switch from being willing to accept the offer, assuming monotonicity of the underlying preferences to automatically fill out the remaining choices. The second extension of the MPL format is to then allow the individual to make choices from refined options within the option last chosen. That is, if someone decides at some stage to switch from accepting the offer between an offer of \$10 and \$20, the next stage of an iMPL would then prompt the subject to make more choices *within* this interval, to refine the values elicited.⁶

The iMPL uses the same incentive logic as the MPL. After making all responses, the subject has one row from the first table selected at random by the experimenter. In the MPL, that is all there is,

⁶ If the subject always chooses A, or indicates indifference for any of the decision rows, there are no additional decisions required and the task is completed. Furthermore, the iterative format has some "smarts" built into it: when the values being elicited drop to some specified perceptive threshold (e.g., 10 cents), the iMPL collapses down to an endogenous number of final rows and the elicitation task stops iterating after those responses are entered.

and the subject then plays out their choice in that row. In the iMPL, that is all there is if the row selected at random by the experimenter is *not* the one that the subject switched at. If it *is* the row that the subject switched at, another random draw is made to pick a row in the second table, and so on.

B. Multiple Switch Points

A potential inferential problem arises if some subjects switch back and forth as they move down the rows of the MPL. This is only a problem for inference if one wants to impose a certain structure on the subject's responses that might not be justified by the underlying theory. For example, few of the existing MPL implementations allow subjects to report indifference. It is quite possible that switching behavior is the result of the subject being indifferent between the options. The implication here is that one should use a "fatter" interval to represent the WTP response of this subject, defined by the first row that the subject switched at and the last row that the subject switched at. In standard utility theory, this is simply saying that preferences are only required to be weakly convex rather than strictly convex. However, this interpretation of possible switching behavior in the MPL institution implies that we should allow an explicit indifference option in the implementations of the iMPL institutions.

C. Framing Effects

A natural concern with the MPL is that it might encourage subjects to pick a response in the middle of the table, independent of true valuations. There could be a psychological bias towards the middle. In a valuation setting, the use of specific values at either end of the table could signal to the subject that the experimenter believes that these are reasonable upper and lower bounds.

One solution to this task which we find unattractive is to randomize the order of the rows.⁷ This is unattractive for two reasons. First, if there is a purely psychological anchoring effect towards the middle, this will do nothing but add noise to the responses. Second, the valuation task is fundamentally harder from a cognitive perspective if one shuffles the order of valuations across rows. We are not interested in testing if subjects have the ability to re-order the valuations *and* identify their preferred

⁷ For example, see Kirby and Maraković [1996] and Kirby, Petry and Bickel [1999].

valuation. Our interest is only in the latter question.

Framing effects can be relatively easily evaluated by varying the cardinal scale of the basic MPL table, or by varying the number of intervals within a given cardinal range. For example, assume valuations were being elicited with the initial cardinal scale between \$1 and \$50. Give this MPL task to one set of subjects, and then give an MPL task in which there were additional rows going up to \$100. If there is a difference in response between the two samples, it will be easy to identify statistically and then to correct for it in the data analysis.

We would not be surprised to find framing effects of this kind. They do not necessarily indicate a failure of the traditional economic model, so much as a need to recognize that subjects in a lab setting use all available information to identify a good valuation for a commodity.⁸ Thus it is critical to be able to estimate the quantitative effect of certain frames and then correct for them in subsequent statistical analysis. In other words, the existence of a bias due to a particular frame should ideally just lead to a statistical “calibration” of the responses to correct for the particular frame. We devise a test for framing effects by varying the cardinal scale of the MPL.

Two asymmetric frames are developed: “skew high” treatment offers initial scaling of (0.3, 0.5, 0.7, 0.8, 0.9 and 1), while “skew low” offers scaling of (0.1, 0.2, 0.3, 0.5, 0.7, and 1), where the cardinal scale of 1 is the maximum price offered for WTP tasks. The frames are designed to raise (lower) the valuations since the mid-row is designed to be higher (lower), than the mean of the price list. Subjects choosing the mid-row of the asymmetric frames thus gives a higher (lower) valuation than if they chose the mid-row in the symmetric MPL.

2. Experimental Design

A. The Basic Elicitation Procedure

The MPL is a relatively simple procedure. In the context of eliciting a WTP for some commodity, it confronts the subject with an array of ordered prices in a table, one per row, and asks the subject to indicate “yes” or “no” to accept the offer for each price. Indicating “yes” in a row where the

⁸ See Harrison, Harstad and Rutström [2004] for further discussion of these channels.

price is set to X reveals that the subject are willing to pay X currency units for the product. We consider four products, as noted earlier: Heinz ketchup (HK), Heinz organic ketchup (HOK), Lindt chocolate truffles (LCT) and a Muvo Creative Labs MP3 player (MP3)

Our elicited responses of WTP might be *censored* by market prices. To explain the censoring problem, assume that you value ketchup at \$3, which is to say that if you had to pay \$3 for the ketchup you would. If asked whether or not you are willing to pay \$2.50 for *lab* ketchup, your response will depend on whether or not there is a market price of *field* ketchup (assumed to be the same as the lab ketchup) lower than \$2.50. If the market price of the field ketchup is \$2.00, and you know that you can buy it outside the lab at this price, then you would never rationally reveal that you would pay \$2.50 for the lab ketchup. In this case we say that your response is censored by the market price (Harrison [1992; p.1432]). Following Harrison, Harstad and Rutström [2004], responses in our analysis can be censored in two ways. First, subjects may have a WTP that is above the market price as in the example above. In this case, their true WTP is not observable. The highest WTP they would express in the lab would be the market price. Secondly, if the market outside of the lab has resell opportunities, subjects who express a WTP below a field reselling price of the product may merely be indicating the presence of such a profitable arbitrage opportunity rather than a true subjective valuation. We allow our responses to be censored by both field opportunities. The market price of the goods at the time of the experiment was \$3.77 for the LCT, \$1.39 for the 24 oz HK, \$1.99 for the 24 oz. HOK, and \$59.95 for the MP3. The market reselling price is set on an *a priori* basis at \$0.05 for the first three products, and \$10 for the MP3 player.⁹ Subjects were not informed of market prices, since this could affect the WTP elicited.

B. Our Experiment

Our basic design explores each of the components of the MPL elicitation format reviewed above. We examine the performance of the two MPL institutions (MPL and iMPL) for each of the three framing conditions (“skew low”, symmetric, and “skew high”). We deal with the possibility of

⁹ Figure 1 shows which observations are censored. The results do not change significantly if the reselling prices are set at other levels.

switching due to indifference by simply including an explicit option to express indifference. Thus we have a 2×3 design. The first treatment was implemented between-subjects, so that any one subject only experienced one of the MPL institutions, while the second treatment was implemented within-subjects.¹⁰ All subjects faced four WTP tasks, one for each product.

In addition, we had two treatments that were applied equally to all subjects in each session. One was a randomization of their initial endowment. Each subject received a guaranteed \$10 to participate. In addition, we randomly assigned each subject an extra amount between \$1 and \$10, chosen from a discrete uniform distribution in increments of \$1.¹¹ Following Rutström [1998], the purpose of this treatment is to determine if there are endowment or “house money” effects on behavior, at least within the range considered here. No subject knew the additional amount received by any other subject, but knew that the same random process was applied to all subjects.

The second treatment was a randomization of the four WTP tasks. The first three products were randomized in order, while the fourth, the much higher valued MP3 player, was always the last WTP task. There are six possible sequences of the WTP tasks, of which four were selected.¹² Each subject was assigned to one of the four sequences randomly at each session. Subjects were presented with all products, and they were encouraged to investigate each product as these were publically displayed.¹³ The valuation of each product was undertaken independently, and there was a one-in-ten chance of each valuation task being implemented. The random choice of task implementation was done

¹⁰ To avoid session effects interacting with treatment effects, we would have to provide instructions on the two elicitation formats in one of several ways. Either they would have to be completely private, using fully-computerized or written instructions. Thus we could randomly assign subjects to treatment within each session. Or we could have designed our instructions so that they would introduce subjects to both institutions, and then just implement one at random with a given subject. Neither of these alternatives were attractive, since we wanted to use public instruction to ensure that subjects were paying attention rather than relying solely on their reading comprehension and some quiz questions. Introducing both formats could have introduced a treatment effect for iMPL itself. We decided to assume that any session effects are picked up by the mix of observable characteristics identifying the sample that we have in each session, and controlling for those characteristics when comparing treatments. This is a good “second best” to controlling for session effects, but a reasonable one given the alternatives.

¹¹ This treatment was implemented by the private roll of a 10-sided die before presenting the valuation tasks to the subjects.

¹² Only four of the sequences were selected for practical reasons. The four WTP sequences chosen are (1,2,3,4), (2,3,1,4), (3,2,1,4) and (3,1,2,4).

¹³ To encourage a serious evaluation of the products, all of the subjects came up to the public display where experimenters encouraged them to pick up and examine the products.

separately for each subject using a ten-sided die after all 4 valuation tasks were completed. In the end, we sold 2 LCT, 4 HK, 2 HOK and 7 MP3.

We recruited 116 subjects from the University of Central Florida in February 2004, divided across 6 sessions. All subjects were recruited using the ExLab software.¹⁴ The average age was 20.0 years and ranged from 18 to 32 years, and 47 of the 116 subjects were female.

3. Results

We examine the effects of our treatments on the average measures of elicited WTP. Figure 1 shows the observed distribution of WTP using raw mid-points of the elicited intervals. All values are generated with the final iteration of the MPL or the iMPL. In the MPL the initial and final iteration coincide, but there may be several levels of iterations in the iMPL. The vertical lines indicate the field censoring from market prices (retail and resale prices). Several things are clear from these pictures: there is a great deal of heterogeneity in valuations, and many subjects express a WTP beyond the censoring points. In our regression model we therefore apply censoring points that differ across individuals, allowing for subjectively perceived transactions cost in market transactions. A subject who expresses a WTP above the market price will be censored at this value rather than at the market price, and a subject who expresses a WTP below the assumed resale value will similarly be censored at his WTP rather than at the resale value.

Table 1 displays estimates from an interval regression model of the elicited WTP.¹⁵ Across all products the iMPL treatments provide the same valuations as the MPL. The iterative process in the iMPL thus does not have any behavioral effect on the average elicited valuation. The initial random endowment has an effect on the elicited valuation of LCT, but not on the other products, at least within the range of income considered here. An initial endowment of \$1 raises the WTP for LCT by

¹⁴ This recruitment software is available for academic use at <http://exlab.bus.ucf.edu>. In addition, all instructions and data are provided for review at the ExLab Digital Library at the same location.

¹⁵ All statistical analyses are undertaken using version 8.2 of *Stata*, documented in StataCorp [2003]. The dependent variable WTP is only observed as intervals, and the statistical method used is therefore an interval regression. We allow for the possibility that responses may be censored by field market opportunities adjusted for subjectively perceived transactions costs.

only \$0.10, but this small quantitative effect is significantly different from zero (p -value = 0.04). None of the valuations are affected significantly by the frames designed to raise or lower the valuations, and we therefore see no tendency for subjects to choose the mid-row due to “anchoring effects.”

For the LCT we control for the absolute ordering of the product, and for the two types of ketchup we control for the relative ordering of the products. We do this to examine whether ordering has different effects on products that are close substitutes. We find order effects on the average elicited LCT valuation: when second or third, valuations increase by \$1.49 ($p=0.06$) and 1.34 ($p=0.10$) respectively. For the ordinary ketchup we find an order effect increasing valuations by 44 cents between the second and third order ($p=0.039$).¹⁶ However, Table 1 shows that there is no statistically significant effect on valuation by the relative ordering of the two ketchup products that are close substitutes.

We find some demographic variables to be significant on the valuations of the products sold in the lab. Subjects with an Asian heritage value the LCT \$0.66 and HK \$0.48 less, subjects living in a city value HK \$0.37 less. Females value the HOK \$0.38 higher, but value the MP3 \$8.15 less. We see that only a few of the observed individual characteristics are significantly correlated with the elicited valuations in our experiment. Our lab sample is relatively homogeneous with respect to many observable individual characteristics, such as age and education level. Thus one would expect that it would be harder to detect differences statistically, even if they were present in the broader population.¹⁷

Andersen, Harrison, Lau and Rutström [2004a] show that responses in iMPL are not always consistent with responses in MPL when eliciting risk attitudes. The iMPL procedure may result in some order and framing effects in that context, although it did not result in any such effects when eliciting individual discount rate responses. It is therefore reassuring to see that when used for valuing goods,

¹⁶ This result is obtained from a regression controlling for the absolute order. The estimates in Table 1 control for relative order. The complete set of results are available at the ExLab Digital Library at <http://exlab.bus.ucf.edu>.

¹⁷ Andersen, Harrison, Lau and Rutström [2004b] examines the effects of using a field sample instead of the usual convenience lab sample of university students. They find that demographic effects are better explained using the field sample, including interaction effects between demographics and treatments. Their analysis examines elicited attitudes to risk and elicited individual discount rates. We conjecture that the same qualitative results would hold for elicited valuation of goods.

behavior also appears more robust to the use of the iMPL procedure.

4. Conclusions

Both the standard form of the MPL, and its extended form iMPL, appear to elicit robust valuations in the laboratory. One exception is that the Lindt Chocolate Truffles exhibits both an income and an order effect, with both effects resulting in increases in the WTP. The other exception is that the ordinary Heinz ketchup exhibits a similar order effect. Otherwise, the expressions of WTP are not sensitive to variations in the frame or to the use of MPL or iMPL procedures. The latter finding is important since it implies that one can elicit more precise valuation responses than was possible with the MPL, and without introducing a behavioral bias. Contrary to findings with respect to eliciting risk attitudes, the iMPL is an unambiguous improvement on the MPL when eliciting valuations. Valuation exercises should always build in checks for order and framing effects, but our evidence suggests that they are not likely to be severe or pervasive.

References

- Andersen, Steffen; Harrison, Glenn W.; Lau, Morten Igel, and Rutström, E. Elisabet, “Elicitation Using Multiple Price Lists,” *Working Paper 04-08*, Department of Economics, College of Business Administration, University of Central Florida, 2004a.
- Andersen, Steffen, Harrison, Glenn W.; Lau, Morten I; and Rutström, E. Elisabet, “Preference Heterogeneity in Experiments: Comparing the Field and Lab,” *Working Paper 04-21*, Department of Economics, College of Business Administration, University of Central Florida, 2004b.
- Coller, Maribeth, and Williams, Melonie B., “Eliciting Individual Discount Rates,” *Experimental Economics*, 2, 1999, 107-127.
- Davis, Douglas D., and Holt, Charles A., *Experimental Economics* (Princeton, NJ: Princeton University Press, 1993).
- Friedman, Daniel and Sunder, Shyam, *Experimental Methods: A Primer for Economists* (New York: Cambridge University Press, 1994).
- Harrison, Glenn W., “Theory and Misbehavior of First-Price Auctions: Reply,” *American Economic Review*, 82, December 1992, 1426-1443.

- Harrison, Glenn W., "Experimental Evidence on Alternative Environmental Valuation Methods," *Environmental & Resource Economics*, 2005, forthcoming.
- Harrison, Glenn W., Harstad, Ronald M., and Rutström, E. Elisabet, "Experimental Methods and Elicitation of Values," *Experimental Economics*, 7(2), June 2004, 123-140.
- Harrison, Glenn W.; Lau, Morten I; Rutström, E. Elisabet, and Sullivan, Melonie B., "Eliciting Risk and Time Preferences Using Field Experiments: Some Methodological Issues," in J. Carpenter, G.W. Harrison and J.A. List (eds.), *Field Experiments in Economics* (Greenwich, CT: JAI Press, Research in Experimental Economics, Volume 10, 2005).
- Harrison, Glenn W.; Lau, Morten Igel, and Williams, Melonie B., "Estimating Individual Discount Rates for Denmark: A Field Experiment," *American Economic Review*, 92(5), December 2002, 1606-1617.
- Hoffman, Elizabeth; Menkhous, Dale J.; Chakravarti, Dipinkar; Field, Ray A., and Whipple, Glen D., "Using Laboratory Experimental Auctions in Marketing Research: A Case Study of New Packaging for Fresh Beef," *Marketing Science*, 12(3), Summer 1993, 318-338.
- Holt, Charles A., and Laury, Susan K., "Risk Aversion and Incentive Effects," *American Economic Review*, 92(5), December 2002, 1644-1655.
- Kagel, John, H., and Roth, Alvin E. (eds.), *The Handbook of Experimental Economics* (Princeton: Princeton University Press, 1995).
- Kahneman, Daniel; Knetsch, Jack L., and Thaler, Richard H., "Experimental Tests of the Endowment Effect and the Coase Theorem," *Journal of Political Economy*, 98, December 1990, 1325-1348.
- Kirby, Kris N. and Maraković, Nino N., "Delay-discounting Probabilistic Rewards: Rates Decrease as Amounts Increase," *Psychonomic Bulletin & Review*, 1996, 3:1, 100-104.
- Kirby, Kris N.; Petry, Nancy M., and Bickel, Warren K., "Heroin Addicts Have Higher Discount Rates for Delayed Rewards than Non-drug-using Controls," *Journal of Experimental Psychology: General*, 1999, 128:1, 78-87.
- Lusk, Jayson L., and Hudson, Darren, "Willingness-to-Pay Estimates and Their Relevance to Agribusiness Decision Making," *Review of Agricultural Economics*, 26(2), June 2004, 152-169.
- Mitchell, Robert C., and Carson, Richard T., *Using Surveys to Value Public Goods: The Contingent Valuation Method* (Baltimore: Johns Hopkins Press, 1989).
- Rutström, E. Elisabet, "Home-Grown Values and the Design of Incentive Compatible Auctions," *International Journal of Game Theory*, 27(3), 1998, 427-441.
- Shogren, Jason F. "Experimental Methods and Valuation," in K-G. Mäler and J. Vincent (eds.), *Handbook of Environmental Economics. Volume 2: Valuing Environmental Changes* (Amsterdam: North-Holland, 2004).
- StataCorp, *Stata Statistical Software: Release 8.0* (College Station, TX: Stata Corporation, 2003).

Table 1: Statistical Model of Willingness to Pay

Interval regression, with the final WTP interval chosen by the subject as the dependent variable.

Variable	Description	Lindt Chocolate Truffles N=116		Heinz Ketchup N=115		Heinz Organic Ketchup N=116		Muvo Creative MP3 Player N=116	
		Estimate	<i>p</i> -value	Estimate	<i>p</i> -value	Estimate	<i>p</i> -value	Estimate	<i>p</i> -value
Constant	Reference willingness to pay on product	-0.35	0.75	1.22	0.01	1.40	0.01	25.57	0.04
impl	Effect of iteration of MPL	-0.08	0.79	-0.24	0.19	-0.23	0.24	3.86	0.40
Endowment	House money endowment	0.10	0.04	0.03	0.24	0.01	0.82	1.05	0.16
skewHI	Frame designed to raise WTP	0.36	0.28	-3.17	0.97	0.58	0.15	3.07	0.52
skewLO	Frame designed to lower WTP	0.87	0.30	-0.29	0.19	-0.20	0.42	6.87	0.21
Task2	Order effect of task being second	1.49	0.06						
Task3	Order effect of task being third	1.34	0.10						
SecKetchup	Second ketchup offered			3.45	0.97	-0.31	0.16		
female	Female	-0.01	0.97	0.06	0.72	0.32	0.07	-8.15	0.05
single	Lives alone	0.37	0.24	0.14	0.46	0.18	0.39	-3.80	0.46
african	African-American heritage	0.00	0.99	0.34	0.20	0.12	0.69	8.83	0.19
asian	Asian heritage	-0.66	0.08	-0.48	0.03	-0.40	0.12	-1.90	0.75
mixed	Mixed heritage	0.09	0.86	0.10	0.76	0.32	0.36	2.27	0.77
nhhd	Number in household	0.09	0.46	-0.08	0.32	-0.01	0.90	0.11	0.96
city	Lives in a city	-0.53	0.16	-0.37	0.09	-0.24	0.35	-1.70	0.78
Owner	Owens home or apartment	0.36	0.23	0.21	0.26	0.14	0.50	-1.94	0.69
student	Student	0.04	0.90	0.16	0.46	0.11	0.65	1.22	0.83
IncLow	Household income less than \$25000	0.21	0.65	-0.27	0.36	-0.40	0.20	2.82	0.70
IncHigh	Household income higher than \$50000	0.07	0.89	-0.26	0.41	-0.44	0.20	1.22	88

Note: The data and statistical code to replicate these results, and additional statistical analyses referred to in the text, are available at the ExLab Digital Library at <http://exlab.bus.ucf.edu>.

Figure 1: Willingness to Pay by Product

Midpoints of elicited values

