Elicit the Values of On- and Off-margin Consumers: Combining Choice Rankings and Auctions

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Introduction

Auctions are commonly used when a seller is unsure about the values that potential buyers attach to the object being sold. Bidders' willingness to pay can be elicited in the form of bids. Many auctions are designed to be truth revealing such that bidders' optimal strategy is to bid their true value. However, people sometimes do not bid sincerely; in particular off-margin bidders, whose values are far below or above the market-clearing price, are often observed not to bid sincerely (Shorgen et al. 2001). Low-value bidders might believe they will never win, while high-value bidders might believe they will never lose. Therefore, off-margin bidders often do not reveal their true values (Miller and Plott, 1985; Franciosi et al. 1993). This paper presents a combined choice ranking and nth-price sealed-bid auction mechanism which reveals the values of both on- and off-margin consumers for seven fruit products. Unlike experimental auctions that use lab-induced values to generate on- and off-margin bidders, the choice rankings reveal bidders' preference and signal their relative positions on the value distributions. We found that low-value bidders tend not to bid attentively while high-value bidders place bids strongly agreeing with their rankings of the products. Our approach provides an effective mechanism to discriminate sincere bidders from casual bidders and improves the reliability of the elicitation of consumer valuations.

Experiment Design

203 Participants were recruited through newspaper and online advertisements in Bryan-College Station area, Texas. Subjects participated in the fruit purchase experiments on seven pomegranate-related fruit products. A combined 11th-price sealed-bid modified-Vickrey auction and nonhypothetical ranking procedures were used to elicit consumer preferences. Subjects were randomly divided in 8 sessions, each with 20 to 30 bidders. They first participated in practice rounds: one bidding round and one ranking round for four soft drink products and then again for four snack products. The winning (11th) prices were posted during the practice rounds to ensure understanding of the mechanism.

Subjects then participated in a series of ranking and auction rounds for fruit products. The first round (baseline round) was to establish a starting point for WTP and preferences. Following the baseline round, all subjects received three information treatments, 1) Tasting: subjects tasted small samples of each product, 2) Health and Nutrition Information: subjects were provided with health and nutrition information for all fruit products, and 3) Anti-Cancer Information: subjects were provided with specific information on the potential anti-cancer properties of pomegranates. After each information treatment, participants were asked to rank each item on a ranking sheet, and submit their bids for each item on a bidding sheet. Participants were asked to rank a total of eight options (in addition to the seven products, an option of "No Product" is included). In the 11th-price auctions, the ten highest bidders all win the products and pay the 11th highest bid.

Dependence between Bids and Rankings

We examine the dependence between submitted ranks and bids using three indices: the correlation, Kendall's Tau and Spearman's Rho. The first one captures linear correlation; the next two are rank-based, nonlinear dependence measures thus not sensitive to outliers in bids. The results show significantly high degree of agreements between ranks and bids. Bids are generally more informative, as they are cardinal, while ranks are only ordinal. On the other hand, since ties are not allowed in the rankings, ranks can be more informative since people have to reveal their ordering of preferences. When rankings and bids are combined, people's willingness to pay may be elicited more precisely.

To shed some lights on the argument above, we look at the dependence between ranks and bids for three subsets of items according to bidders' ranks: (a) the top-three ranked products (high-value bidders); (b) the bottom-three ranked products (low-value bidders); (c) the products that are ranked above "No Product". There is a marked difference in the dependence patterns between the top 3 and bottom 3 choices. For the top 3 choices, the correlation is as high as 0.86. However, there is essentially no correlation between ranks and bids for the bottom 3 choices. This is possibly due to two reasons: (a) participants may bid zero for products they don't like; (b) participants may bid less carefully for products they don't like.

The correlation for products ranked above "No Products" is around 0.75, slightly less than that for the top 3 products only. On average for each participant there are more than 6 products ranked above 'No Product'. The comparison highlights an important merit of including the 'No Product' option. It indicates that we can place relatively high confidence on the bids of products ranked above 'No Product', even when the number of products is relatively large.

	Top 3	Bottom 3	Above no product
Correlation	Mean: 0.65 Median: 0.87	Mean: 0.23 Median: 0.00	Mean: 0.56 Median: 0.77
Kendall's Tau	Mean: 0.64 Median: 0.82	Mean: 0.23 Median: 0.00	Mean: 0.53 Median: 0.69
Spearman's Rao	Mean: 0.66 Median: 0.87	Mean: 0.24 Median: 0.00	Mean: 0.58 Median: 0.79

Regression Analysis

We use regression analysis to investigate how consumers' social economic factors and consumption habit and attitudes affect their willingness pay to fresh fruit products. Because of heavy censoring, we use the tobit model for panel data. We apply our model to three groups: (a) the full sample; (b) the products that are ranked as top 3 ; and (c) the products that are ranked above 'no product'. The results are reported below.

Estimation results (t-values below coefficients)

	Full Sample	Top 3	Above 'no product'
Intercept	0.34	1.23	0.73
	4.99	17.82	11.42
Age: 30-49	0.04	-0.72	-0.10
	1.58	-20.57	-4.31
Age: >49	0.06	-0.32	0.15
	2.51	-9.93	6.98
Education: College	-0.49	-0.31	-0.43
	-17.55	-7.76	-16.11
Education: Post graduate	-0.50	-0.10	-0.46
	-14.42	-2.19	-15.23
Female	-0.10	-0.25	-0.30
	-4.24	-8.81	-15.05
Income: 50-100K	0.09	0.01	0.00
	3.98	0.41	0.06
Income: > 1000K	0.15	0.22	0.18
	4.61	5.54	6.32
Informed Price	0.54	0.65	0.56
	23.49	23.44	25.72
Primary shopper	0.20	-0.27	0.09
	5.54	-7.62	2.93
Ave. fruit/vegetable expense	0.50	0.27	0.29
	24.69	9.55	14.67
Fruit, vegetable on hand	0.17	-0.26	0.53
	5.94	-8.35	20.25
Information_tasting	-0.07	-0.05	-0.02
	-2.43	-1.56	-0.52
Information_health	0.03	0.01	0.02
	1.56	0.35	0.80
Information_cancer	0.09	0.06	0.00
	3.46	1.61	0.09
Log_SD (individual effect)	-0.29	-0.16	-0.27
	-31.11	-12.62	-30.83
Log_SD (residual)	-0.32	-0.58	-0.45
	-93.76	-81.66	-103.02

Concluding remarks

Our results demonstrate that a combination of auction and choice ranking takes the advantages of both methods and avoids some of their limitations. It aids in the discrimination of sincere bidders from causal bidders and therefore facilitate the elicitation of consumers' evaluation. This method is particularly useful in experiments designed to elicit consumers' valuations on multiple objects. Our results indicate a high degree of agreement between auction bids and rankings of top-ranked objects. In the ranking experiments, we included an option of 'no product'. We find that auction bids and rank of objects ranked above 'no product' agree with each other to a degree similar to those of top ranked objects and significantly higher than those top-ranked objects. This finding is useful because it indicates the reliability of auction bids on objects that consumers rank above 'no product', effectively increases the size of the useful sample.

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