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## Short Communication

## Do participants discount products in experimental auctions?



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## ABSTRACT

We compare willingness-to-pay information revealed through bids of the Becker–DeGroot–Marschak (BDM) auction mechanism with inferred valuations and real market prices. Applying nine food products, in three different experiments in which individuals express both bids and inferred valuations, the former were consistently lower than inferred valuations for others (with an average bid discount of 11.6%). We use econometric analysis to point out the importance of the limited number of auctioned products, and related information, on participants' discount behaviour.

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## 1. Introduction

Marketers and behavioural economists due to their incentive compatibility property are increasingly using experimental auctions. Allegedly, experimental auctions provide useful estimates that can guide marketing tests that could reduce the risk of market failure (Depositaro, Nayga, Zhang, & Mariano, 2014). However, since the very beginning, the core question has been how closely results obtained from experimental studies parallel real-world economies (Lusk & Norwood, 2009). Scholars have clearly identified several major limitations of experimental auctions (e.g. De Steur et al., 2014) mainly due to cognitive biases, such as endowment bias, information biases, social behavioural biases (as social desirability bias) and design effects. In addition, previous studies have effectively shown that an individual's willingness to pay for a good in a specific moment depends on several factors that go beyond the expected intrinsic value (Corrigan, 2005). For example, Zhao and Kling (2004) highlight the significance of the timing of the behavioural decision, introducing the term commitment costs (i.e. committing to a decision at the moment of the transaction may represent a cost for the individual). Lusk and Shogren (2007) have also revealed the importance of commitment costs in the lab–field behaviour gap, i.e. the option value associated with

gaining additional information about the good in the future. Nevertheless, a rather limited number of studies have compared non-hypothetical experimental behaviour with real field shopping behaviour (e.g. Lusk, Norwood, & Pruitt, 2006; Shogren, Fox, Hayes, & Roosen, 1999), reaching quite contrasting results on the accuracy of experimental methods to predict real market behaviour. Recently Lusk and Norwood proposed a new method, referred to as inferred valuation,<sup>1</sup> to narrow the potential lab–field gap in estimating individuals' willingness to pay. In particular, inferred valuation asks subjects how much another person is willing to pay for a specific good, avoiding biases related to social concerns and unfamiliarity with the traded good (Lusk & Norwood, 2009). The authors conclude that inferred valuations are similar to bids when people do not derive utility from stating a moralistic response (and when the product is familiar). Furthermore, others have shown that most participants consider that their maximum WTP in experiments should include a discount over market prices, due to a limited offer and due to the fact that individuals may not have planned to buy the product under study at the time of the experiment (Combris, Bazoche, Giraud-Héraud, & Issanchou, 2009). Nevertheless, the bulk of research using experimental auctions to investigate consumer valuations for food products offers a number of goods between 2 and 5

<sup>1</sup> Authors use a modification of Levitt and List's (2007) additive utility model to show that social desirability may produce inflated bids that misrepresent respondents' preferences.

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(Lusk & Shogren, 2007). To the best of our knowledge, there has been no empirical study exploring participants' discount behaviour in non-hypothetical experimental auctions. The current paper seeks to fill this gap in the literature, comparing bids with inferred valuations and real market prices by using a within-subject design.

## 2. Experimental design

Three studies were conducted to elicit individuals' valuations through BDM auctions (Becker, DeGroot, & Marschak, 1964) and inferred valuations. The three studies were all performed at the university canteen during March 2015 and adopted identical experimental procedures. Specifically, the researcher approached subjects individually and asked if they were consumers of the specific product category auctioned (chocolate bars, salty snacks and yoghurts). If so, the respondents were invited to participate in the study. Those who accepted completed a short questionnaire on a tablet device before starting the experiment. In each study three products were offered: one already available on the market and two innovative products, not currently found in stores (Table 1). The amount of the endowments differed in each study (Table 1), as previous scholars have demonstrated that endowments closer to the value of the auctioned good may be more appropriate for compensating auction participants (Loureiro, Umberger, & Hine, 2003). Particular attention was paid to select products that were familiar to participants<sup>2</sup> (to avoid preference learning, e.g. Shogren, List, & Hayes, 2000) and that did not carry any pro-social feature, to minimise possible social desirability effects (e.g. avoiding organic, fair trade or local foods). A short script with essential information<sup>3</sup> on each of the products offered was handed out to participants; no tasting was performed. To circumvent any packaging or branding effect, all the products were served in clear pitchers, and subjects did not see any of the brands used in the experiments. The overall objective of the protocol was to reduce to a minimum commitment costs, while avoiding the influences on valuations of important extrinsic features of the products. The ordering effect was solved through randomisation in each study. In all studies half of the participants elicited inferred valuations and then bids for each of the products auctioned, while in the other half the order of tasks was reversed. The order of the valuation tasks was also tested (through *t*-test and Kolmogorov-Smirnov test) and proved not to be statistically significant.

In the current study a modification of the inferred valuation method applied by Lusk and Norwood (2009) was used: the inferred valuation questions were framed in the current research as: "Assume that an average consumer can buy a XX such as this one. How much do you think s/he would be willing to pay?". By contrast, Lusk and Norwood (2009) asked participants to rank the goods in terms of predicted market share. Respondents were also informed that they would randomly draw only one product and a random price out of a box after they submitted their sealed bids.<sup>4</sup> The whole auction procedure, including a thorough explanation of the BDM auction mechanism, took between 8 and 12 min for each participant. In all, 270 subjects participated in the experimental sessions, most of whom were students; no individual took part in more than one study.

<sup>2</sup> Note that if an individual is very familiar with a good, commitment costs will approach zero (Lusk & Norwood, 2009).

<sup>3</sup> The scripts were kept extremely short, all with the same number of words, and special care was taken to avoid any negative or positive messages that could somehow influence participants.

<sup>4</sup> In our experiments, at the end of the auction, a randomly selected participant picked from a box the binding product (among the three auctioned) and from another box the random selling price (three different distributions were used, ranging from 20 cents to €2 for chocolate bars, from 30 cents to €3 for salty snacks, from 50 cents to €5 for yoghurts).

**Table 1**  
Overview of experimental design.

| Study coding        | Products valued by BDM and inferred valuation | No. of participants <sup>a</sup> | Endowment |
|---------------------|-----------------------------------------------|----------------------------------|-----------|
| Study 1 – Chocolate | 3 milk chocolate bars (80 g)                  | 90                               | € 3 cash  |
| Study 2 – Snacks    | 3 salty snacks (75 g)                         | 90                               | € 5 cash  |
| Study 3 – Yoghurt   | 3 yoghurts (2 packages, 125 g each)           | 90                               | € 7 cash  |

<sup>a</sup> No significant differences in demographic variables were found in the between-subject treatments (according to the ANOVA test for continuous variables and the Pearson chi-square test for categorical variables).

## 3. Results

All the *t*-tests conducted on the means of the auction bids vs. inferred valuations for the nine products showed that the difference between the mean of the two elicitation methods significantly differed from zero at least at the 0.05 level (Table 2) – with discounts in auction bids ranging from over 8% to above 15% (average discount rate of 11.6%). Furthermore, inferred valuations for the conventional goods already available were very close to the real market prices (no statistically significant difference), compared to the relative auction bids.

After the valuation was performed, a brief questionnaire gathered information on participant behaviour. In particular, the participant's likelihood to buy the auctioned products<sup>5</sup> in the near future was investigated, together with individual contentment with the number of products offered<sup>6</sup> and satisfaction with the amount of information<sup>7</sup> on the goods. Basic socio-demographics of the respondents were also collected to better profile the sample (Table 3). Interesting to note is that while the majority of participants were not frustrated with the number of goods auctioned (over 70%) almost the same share of respondents (close to 65%) was not satisfied with the information received during the experiment. Suggesting that participants do not appreciate protocols that do not provide important extrinsic attributes as brands and packaging.

To analyse the possible reasons for this discount, three pooled OLS regressions were applied with the dependent variable as the difference between auction bids and inferred valuations (Table 4). In particular, cluster-robust standard errors were used to correct the assumption of independent and identically distributed regression errors.<sup>8</sup> The models included fixed effects to take into account the differences between the type of product. Explanatory variables included: participant's consumption frequency of the specific product category (FREQ CONS); participant's socio-demographics – gender (FEMALE), age cohort (OVER21), employment status (EMPLOY) and number of individuals in the household (HOUSEH); participant's likelihood to buy the auctioned products in the near future (PRON), participant's satisfaction with the information carried into the auction (SATIS) and participant's frustration with the number of

<sup>5</sup> Dummy variables: "Did you plan to buy a milk chocolate bar/salty snack/yoghurt today or tomorrow?" Yes/No.

<sup>6</sup> Dummy variable with question framed in two different ways. Half the sample was asked "The limited number of auctioned products does not satisfy me. I would have preferred to see also other products on the experimental market." I Agree/I disagree. Or "The number of auctioned products satisfies me." I Agree/I disagree. The effect of the positive/negative framing of the question has been tested and no statistically significant differences have been found.

<sup>7</sup> The satisfaction variable is dichotomous (yes/no) depending on the response: "The amount of information on the auctioned products is adequate".

<sup>8</sup> In the presence of repeated observations of the primary analysis unit (panel data) OLS standard errors need to be adjusted for correlation. Three Tobit estimation models were also applied, using the relative difference between bids and inferred valuation as the dependent variable for each product category. These models were not better at explaining individual discount effects.

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