

**DO EXPERIMENTAL AUCTION ESTIMATES FOR QUASI-PUBLIC GOODS  
PASS THE SCOPE TEST?**

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## **DO EXPERIMENTAL AUCTION ESTIMATES FOR QUASI-PUBLIC GOODS PASS THE SCOPE TEST?**

Although scope insensitivity is a problem that may be present in any valuation method, most previous literature has focused on evaluating scope sensitivity within the context of contingent valuation (CV) applications. Nevertheless, it is necessary to understand the demand-revealing properties of experimental auctions since they are increasingly used to value goods. In this paper, we test explicitly whether estimates coming from experimental auctions may pass a scope test. We conduct experimental auctions on products with a subset of attributes (part) and a comprehensive set of attributes (whole) related to animal welfare. Results show that elicited willingness to pay estimates do not pass the scope test, and these are robust to the experimental auction approach used. Implications of these findings are discussed.

Key words: scope test, endowment, experimental auctions, quasi-public goods

## **DO EXPERIMENTAL AUCTION ESTIMATES FOR QUASI-PUBLIC GOODS PASS THE SCOPE TEST?**

Critics have argued, on the basis of many empirical studies, that certain valuation methods (such as contingent valuation) are incapable of showing scope sensitivity, and are therefore unreliable in obtaining useful information about individuals' preferences [20, 13, 12]. Scope sensitivity refers to responsiveness to the amount of the commodity or attributes offered to respondents. Based on the premises of economic theory, it is expected that larger amounts of a good are associated with higher WTP estimates, as long as preferences are rational and the valued item is a normal good. As a response to these criticisms, a considerable number of studies have presented evidence about scope sensitivity, providing arguments against other studies claiming insensitivity to scope [7, 8, 23] among others. Nowadays, scope anomalies are studied to understand how to better improve valuation procedures [17].

Although scope insensitivity is a problem that may be present in any valuation method, most previous literature has focused on evaluating scope insensitivity within the context of stated preferences, and particularly in the area of contingent valuation (CV) methods. However, and particularly after the 1990s, other valuation methods based on revealed preferences (e.g., experimental auctions) are becoming widely used by practitioners in the field. Most previous literature has highlighted the incentive-compatibility criteria of such elicitation mechanisms based on revealed preferences, mainly in the context of private goods [28]. However, little is known about the demand-revealing properties of experimental auctions when used in valuing quasi-public goods. Quasi-public goods are those that share characteristics between private and public

goods. Specifically, for quasi-public goods, the cost of providing the good increases less than proportionately to the number of individuals who benefit from it; and additionally, there are some difficulties in excluding those who do not pay from the benefit of the good. As Chambers et al. [9] suggest, the price paid by quasi-public goods does not reflect the total value of the good. The nature of such goods may suggest that free-riding and other types of opportunistic behaviour could be present when valuing quasi-public goods such as organic, eco-labeled and animal welfare products.

Due to the lack of literature in this area and the increasing use of experimental auctions in the valuation of quasi-public goods, it is then worthwhile to explore whether valuation estimates from experimental auctions provide consistent estimates in terms of scope, according to the underlying principles of economic theory. Scope tests have been widely used as internal validity tests in the same vein as construct validity. Construct validity or theoretical validity expects the estimates to vary accordingly with the underlying principles of economic theory. As far as we know, only one published paper has assessed whether estimates elicited via experimental auctions pass the scope test [11]. This paper, however, used pure private goods. Specifically, Corrigan and Rousu [11] investigated valuations for a second unit of an auctioned good, when participants are endowed with the first unit. In their study, the auctioned goods were “Plain-labeled chips”, “American-labeled chips” and “Salsa”. In all three cases, valuations for the second unit were higher than those for the first unit, thereby passing a quantitative scope test. However, in spite of these encouraging findings, no other study has evaluated the issue of scope test in experimental auctions using quasi-public goods.

In our paper, we assess the valuation for a qualitative, rather than quantitative, improvement in the nature of a quasi-public good. Qualitative improvements have been valued in multiple CV studies [15, 27], choice experiments [24, 30] and experimental

auctions [16, 25]. A qualitative scope refers to improvements on the number of attributes of a given good, holding the number of goods constant across treatments. The qualitative scope test conducted here is much in the same vein as previous part-whole bias tests ([1], but relying solely on qualitative improvements. Therefore, based on this literature, the present work sheds light into the validity of welfare estimates elicited via experimental auctions, and more precisely, on whether such valuations are internally consistent.

With this aim, we conducted experimental auctions on two versions of a product: a cured ham labeled “*Ham Produced Using Good Animal Housing*,” (hereby referred to as “good animal housing condition product”) and a cured ham with a more comprehensive animal welfare label “*Ham Produced with Animal Welfare Practices, including Good Housing, Human-Animal Relations and Transport Conditions*” (hereby referred to as “comprehensive animal welfare product”). Previous studies on animal welfare have employed stated preference valuation methods, such as CV, choice experiments or matching methods [4, 5, 6, 10] and to our knowledge this is the first animal welfare valuation study employing experimental auctions. Our subjects were informed that in order for a cured ham product to get the comprehensive animal welfare product label, both the good animal housing condition as well as the good human-animal and transport conditions must be met. Precise information was provided to participants in order for them to fully understand the meaning of each claim with respect the regular baseline product. (The exact verbatim information provided to participants can be found in the Appendix for the three types of labeling). In this setting, our research hypothesis is to test whether elicited bids for the comprehensive animal welfare product (whole) are higher than those for the good housing condition product (part).

The structure of this paper is as follows. First, the data and experimental design are presented. These are then followed by our research hypothesis, data analysis, empirical modeling, and results. The last section presents the conclusions and implications of the findings.

### **Data and Experimental Design**

The experimental auctions were conducted during spring 2008 in the region of Aragón (Spain), in the town of Zaragoza. Recruitment of subjects was conducted via consumer associations. All our subjects claimed to eat cured ham at least occasionally. At the beginning of each session, participants were informed that the length of the session would be between 60 to 75 minutes and we were also told that they would receive 10€ each as participation fee after the experiment. Our design includes two treatments, containing two types of goods: 100-gram smoked cured ham labeled “*Ham Produced Using Good Animal Housing*,” (referred to as good animal housing condition product), which is a part of the second good: a 100-gram smoked cured ham with the more comprehensive (whole good) “*Ham Produced with Animal Welfare Practices, including Good Housing, Human-Animal Relations and Transport Conditions*” label (referred to as comprehensive animal welfare product). We utilized the random  $n^{\text{th}}$  price mechanism since it engages both the on and off the margin bidders and because it helps ensure that consumers reveal their demand truthfully [29]. The key characteristic of the random  $n^{\text{th}}$  price auction is a random but endogenously determined market clearing price. Two sessions were conducted for each treatment.

Each session included between 14 to 20 participants who were randomly assigned to the session. After initial instructions were given, subjects were first asked to complete a survey requesting information on socioeconomic and demographic

characteristics, cured ham shopping and eating behavior, and several questions on knowledge, attitudes, and intention to purchase animal welfare products, as well as consumers' lifestyles. Before the actual auction of cured ham products was conducted, a chocolate bar auction was used to familiarize participants with the experimental auction procedure.

The random nth price auctions were conducted with the following steps:

*Step 1:* Subjects were endowed with 100 grams of regular cured ham (non-animal welfare product).

*Step 2:* Subjects were asked to indicate the amount they were willing to pay to exchange their 100 grams of regular cured ham with the animal welfare labeled product.

*Step 3:* Four additional rounds were conducted. After each round, the monitor ranked the bids and randomly picked a number "n" between 1 and number of participants in the session. This number (i.e., random nth rank) and the corresponding bid (i.e., random nth price) were then posted in front of the room and subjects who bid above this random nth bid were declared the winners for the round.

*Step 4:* At the completion of the fifth round, a number between one and five was randomly drawn to determine the binding round.

*Step 5:* Once the binding round was determined, the winning bidders in the binding round were declared the auction winners and will have to pay the binding bid (nth price) to exchange the regular cured ham product with the animal welfare ham product.

### **Research Hypothesis**

Our research hypothesis is related to the magnitudes of the elicited mean bids or willingness to pay (WTP) estimates in each treatment. We expect that if valuations are

internally consistent, then the WTP values for the “comprehensive animal welfare product” should be higher than the WTP values for the “good animal housing condition product”. Consequently, the null hypothesis is:

$$H_0: WTP(\text{comprehensive animal welfare}) = WTP(\text{good animal housing conditions}) \quad (1)$$

### **Estimation Methods and Results**

Elicited bids per round are graphically represented in Figure 1. As can be observed, bid values drop after the first round and the gap between the elicited values for the two different products seems to converge. Table 1 reports descriptive statistics of the elicited bids for the two information treatments or labeling claims. As suggested by the statistical results provided by the t-tests and the corresponding p-values, no statistically significant difference is found between the WTP estimates for the comprehensive animal welfare and the good animal housing condition products. Therefore, after this preliminary inspection, we can conclude that elicited valuations from the auctions do not pass the scope test.

Nevertheless, it is necessary to assess whether such results hold after we control for differences in terms of socio-demographic variables of participants. Hence, we modelled the elicited bids from each individual as a function of socio-demographic variables using a random effects tobit model. Table 2 presents the main socio-demographic characteristics of participants that were employed in the empirical regression.

The tobit model incorporating random effects is as follows:

$$Bid_{it} = \max(0, \alpha + \beta' x_{it} + u_i + \varepsilon_{it}) \quad (2)$$

where  $Bid_{it}$  is the auction bid for the  $i^{\text{th}}$  consumer in the  $t^{\text{th}}$  bidding round;  $x_{ij}$  is a vector of independent variables which includes dummy variables identifying the comprehensive animal welfare label, and socio-demographic variables, including income, gender, education, household composition, and other shopping habits. Moreover,  $u_i$  is the individual specific disturbance for the  $i^{\text{th}}$  consumer constant through time and  $\varepsilon_{ijt}$  is the overall error term.

Table 2 (the top part) presents the definition of the variables used in the specification and estimation of the tobit model. Means for the continuous variables and percentages for the dummy variables are included. Most participants are female (62%), , with an average age of about 54 year, and nearly 19% belong to a high income group. Furthermore, about 22% of the subjects have university degrees.

The model defined in equation (1) with the variables contained in Table 2 was estimated with STATA 10.0. Empirical results are presented in Table 3. Estimates in Table 3 suggest that after controlling for different socio-economic conditions and consumers' characteristics, the "*comprehensive animal welfare label*" is valued less than the "*good housing condition label*". Hence, these valuations do not pass the scope test, since a higher valuation was expected for the comprehensive animal welfare label (whole) as opposed to the good housing condition label (part). Other variables that are statistically significant in explaining the valuations are income (HIGH\_INCOME), the education variable (UNIVERSITY), and whether the individual eats ham (EAT-HAM). No statistically significant differences were found across gender and participants coming from households of different sizes.

There are several possible reasons why our WTP values do not pass the scope test. First, the moral dimension of the goods may have been deemed by our subjects as

quite similar in both animal welfare labelled products. Consequently, valuations may have been affected by a similar moral concern, which was independent on the amount of welfare improvement provided in each treatment. Bennett and Blaney [3] investigated the issue of social morals in a CV exercise of production based on animal welfare standards and showed that greater social consensus increases elicited values. Moral dimension could also be related to the emotions caused by the valuation scenario. Burger et al. [4] investigated the rationality of elicited values from a CV study related to animal welfare improvements. They found that respondents provide rational responses useful for cost-benefit analysis. However, their valuation scenario was based on a survey mechanism and not on actual market participation with real exchange of goods, and hence may have not triggered emotions that most likely existed in our current study. Such emotions may also be correlated with valuation anomalies. Biel et al. [2] have shown that emotions play a significant role when understanding the disparity between welfare estimates when valuing public goods. A second reason that may help us understand the results is related to the *evaluability* of the different attributes, or whether it is easier to value the attributes jointly or separately [18, 19]. This implies that attributes that are easier to evaluate, and not necessarily the most important are used when an individual values a good in isolation [22]. A third potential reason points out to informational effects and the lack of attention of participants to appreciate the differences between both informational treatments. Kleinmuntz and Schkade [21] demonstrate that informational displays influence decision making processes. In particular, they show that a decision maker balances the desire to maximize accuracy against the desire to minimize effort. In our case, a saturation effect linked to the information provided about animal practices may have been present. Other potential effects are related to the particular nature of quasi-public goods, which include a

potential free-riding effect by those subjects that feel that they would prefer the establishment of more restrictive animal-welfare practices, but would prefer not to pay for such improvements themselves. In any case, the possible existence of these effects may have made our valuation estimates not pass the scope test, thereby making them less useful for cost-benefit analysis.

### **Robustness Check**

Our results above show that the good housing condition label is valued more than the comprehensive animal welfare label, which then implies that these valuations do not pass the scope test. Remember that in our experiments above, we asked our subjects to bid on “upgrading” from one endowed good (i.e., regular cured ham) to another good (i.e., cured ham with animal welfare attribute(s)). An advantage of this approach is that it mitigates outside-market influences [26]. However, valuations from this approach may also be reference-dependent. That is, subjects, due to loss aversion effects, might place greater value on a good if they possess it than if they do not. It is then possible that our valuation estimates depended on the subject’s initial reference point.

Hence, to test the robustness of our findings, we conducted additional experiments using a different elicitation approach: multi-product auctions (or full bidding approach). In multi-product auctions or full bidding approach, subjects bid simultaneously to obtain one of two goods but to avoid demand reduction effects, only one of the goods is randomly selected and sold. We also conducted these multi-product auction experiments using random nth price auction mechanism at the same time and place as the experiment presented earlier. In addition, the socio-demographic mean profile of our participants is very similar to the experiment described earlier (See Table

2 bottom part). Most participants in these multi-product auctions are female (82%), with an average age of 52 years, and 32% have a University degree, belonging 24% of them to the high-income class.

In our multi-product experiments, instead of endowing the subjects with the regular product (i.e., 100 grams of cured ham), no endowment was provided and the subjects were asked to bid simultaneously for both products, the regular cured ham and the cured ham with animal welfare label. The implicit WTP estimates for the animal welfare labelled product is obtained by subtracting the elicited bids for the regular ham product from the bids for the product with animal welfare label. The means of these implicit WTP values elicited by treatment are presented in Figure 2. Although a different trend emerges from earlier results, once again the elicited estimates do not pass the scope test in any of the rounds. Lusk et al. [25] also report differences in estimates across different auction procedures. Consistent with our earlier results, we fail to reject our null hypothesis for each of the rounds conducted. Results presented in Table 4 suggest that we do not find statistical evidence to support that valuations associated with a comprehensive animal welfare label are higher than those for the good housing condition label. Furthermore, and after controlling for participants socio-demographic characteristics and consumption habits, we find that the coefficient associated with the COMPREHENSIVE animal welfare label is not statistically significant either. Other results with respect to the effect of the variables AGE, UNIVERSITY studies, and EAT-HAM resemble those previously obtained, being positive and statistically significant.

Based on these findings, we can definitively conclude that our experimental auction WTP estimates for the quasi-public good we evaluate do not pass the scope test. This finding is novel in the literature since as far as we know, no other work has

explored the demand revealing properties of experimental auctions with quasi-public goods.

## **Conclusions and Implications**

Many currently available techniques for eliciting WTP values for goods suffer from hypothetical bias. Consequently, many economists are now using experimental auctions given that they involve actual exchange of real money and products in an active market. Our objective in this study is to investigate the existence of anomalies when employing experimental auctions with quasi-public goods. Scope insensitivity has been an issue intensively dealt with in other valuation techniques, such as CV, although as shown it may be present in experimental auctions.

No other study has evaluated the scope sensitivity of value estimates from experimental auctions for quasi-public goods. In our study, we investigated the sensitivity of elicited WTP estimates with respect to two animal welfare labels and assessed the validity of such estimates. Specifically, we tested whether people are willing to pay higher amounts of money for more comprehensive animal welfare schemes. Our results generally suggest that experimental auction value estimates for a quasi-public good, at least for animal welfare products, do not pass the scope test. This finding is consistent in both the endowment and full bidding auction approaches we conducted. Furthermore, in the case of endowment auctions there are clear signs of preference reversal, where the less valuable product obtained a higher mean WTP. A justification that may help us to understand the better performance of the multi-product auctions (in which preference reversal are not at least present) is the fact that the goods were valued juxtaposed with each other, so that the reference attributes are better defined, allowing the subject to focus attention on the distinct characteristics.

The obtained findings are both of theoretical and practical importance. Theoretically, and as earlier suggested by Hsee [18], Hsee et al. [19] and others, they corroborate the mounting evidence that preferences may not always be consistent or stable in actual choice decision making. Furthermore, they are reference dependent and depend significantly on the information provided, level of experience with respect to the transactions made, and potential ethical conflicts. However, all things considered, it seems difficult to prevent preference reversals from happening. List [22] documented the phenomenon of preference reversal in an actual market, and even with super-experienced consumers. An additional element to consider is the existence of clear differences provided by valuations coming from between-subject and within subject studies. In this regard, Frederick and Fischhoff [14] have shown much greater sensibility of estimates in within-subjects experiments, where participants value different goods differing in their scale.

All these issues should be further investigated in the future. Current results should encourage practitioners to further assess the demand revealing properties of experimental auctions. Additional reliability tests related to internal versus external scope tests should also be conducted.

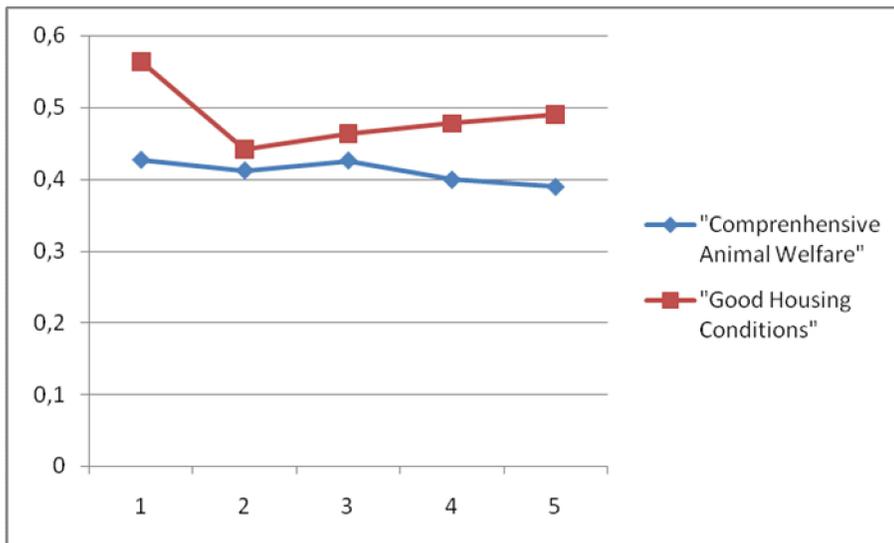
## References

- [1] I. Bateman, A. Munro, B. Rhodes, C. Starmer and R. Sugden, Does Part-Whole Bias Exist? An Experimental Investigation. *The Economic Journal* 107 (441) (1997) 322-332.
- [2] A. Biel, O. Johansson-Stenman and A. Nilsson, Emotions, Morality and Public Goods: The WTA-WTP Disparity Revisited. Working Papers in Economics, n° 193, Department of Economics, School of Business, Economics and Law, Göteborg University, 2006.
- [3] R. Bennett and R. Blaney, Social Consensus, Moral Intensity and Willingness to Pay to Address a Farm Animal Welfare Issue. *Journal of Economic Psychology* 23 (2002) 501-520.
- [4] D. Burgess, W.G. Hutchinson, T. McCallion and R. Scarpa, Choice Rationality in Stated Preference Methods Applied to Farm Animal Welfare Improvements. Paper presented at Applied Environmental Economics Conference, 26 March 2004.
- [5] F. Carlsson, P. Frykblom and C.J. Lagerkvist, Farm Animal Welfare-Testing for Market Failure. *Journal of Agricultural and Applied Economics* 39(1) (2007) 61-73.
- [6] F. Carlsson, P. Frykblom and C.J. Lagerkvist, Consumer Willingness to Pay for Farm Animal Welfare: Mobile Abattoirs Versus Transportation to Slaughter. *European Review of Agricultural Economics* 34(3) (2007) 321-344.
- [7] R.T. Carson and R.C. Mitchell, Sequencing and Nesting in Contingent Valuation Surveys. *Journal of Environmental Economics Management* 28(2) (1995) 155-173.
- [8] R.T. Carson, Contingent Valuation Surveys and Tests of Insensitivity to Scope in Determining the Value of Non-Marketed Goods: Economic, Psychological, and Policy Relevant Aspects of Contingent Valuation Methods (R.J. Kopp, W. Pommerhene and N. Schwartz, Eds.), Kluwer, Boston, 1997.
- [9] C.M. Chambers, P.E. Chambers and J. C. Whitehead, Contingent Valuation of Quasi-Public Goods: Validity, Reliability, and Application to Valuing a Historic Site. *Public Finance Review* 26(2) (1998) 137-154.
- [10] S.M. Chilton, D. Burgess, and W.G. Hutchinson, The Relative Value of Farm Animal Welfare. *Ecological Economics* 59(2006): 353-363.
- [11] J.R. Corrigan and M.C. Rousu, The Effect of Initial Endowments in Experimental Auctions. *American Journal of Agricultural Economics* 88 (2) (2006) 448-547.
- [12] W.H. Desvousges, F.R. Johnson, R.W. Dunford, K.J. Boyle, S.P. Hudson and K.N. Wilson, Measuring Natural Resource Damages with Contingent Valuation: Tests of Validity and Reliability, in *Contingent Valuation: A critical assessment* (J.A. Hausman Ed.), North-Holland, Amsterdam, 1993.
- [13] P.A. Diamond and J.A. Hausman, Contingent Valuation: is Some Number Better than no Number? *Journal of Economic Perspectives* 8 (1994) 45-64.

- [14] S. Frederick and B. Fischhoff, Scope (in)Sensitivity in Elicited Valuations, *Risk Decision and Policy* 3(2):109-123.
- [15] N. Hanley, F. Schläpfer and J. Spurgeon, Aggregating the Benefits of Environmental Improvements: Distance-Decay functions for Use and Non-use Values. *Journal of Environmental Management* 68 (2003) 297–304.
- [16] D.J. Hayes, J.F. Shogren, S.Y. Shin and J.B Kliebenstein, Valuing Food Safety in Experimental Auction Markets. *American Journal of Agricultural Economics* 77 (1995) 40–53.
- [17] T.A. Heberlein, M.A. Wilson, R.C. Bishop and N.C. Schaeffer, Rethinking the Scope Test as a Criterion for Validity in Contingent Valuation. *Journal of Environmental Economic and Management* 50 (2005) 1-22.
- [18] C. Hsee, Less is Better: When Low-value Options are Valued more highly than High-value Options. *Journal of Behavioral Decision Making* 11 (1998) 107-121.
- [19] C.K. Hsee, G.F. Loewenstein, S. Blount and M.H. Bazerman, Preference Reversals Between Joint and Separate Evaluations of Options: A Review and Theoretical Analysis. *Psychological Bulletin* 125 (5) (1999) 576-590.
- [20] D. Kahneman and J.L. Knetsch, Valuing Public Goods: the Purchase of Moral Satisfaction. *Journal of Environmental Economics and Management* 22(1) (1992) 57-70.
- [21] D. Kleinmuntz and D.A. Schkade, Information Displays and Decision Processes. *Psychological Science* 4(4) (2006), 221-227.
- [22] J.A. List, Preference Reversals of a Different Kind: The “More is Less” Phenomenon. *American Economic Review* 92 (5) (2002) 1636-1643.
- [23] J.B. Loomis, M. Lockwood and T. DeLacy, Some Empirical Evidence on Embedding Effects in Contingent Valuation of Forest Protection. *Journal of Environmental Economics and Management* 24 (1993) 45-55.
- [24] J.L. Lusk and T.C. Schroeder, Are Choice Experiments Incentive Compatible? A Test with Quality Differentiated Beef Steaks. *American Journal of Agricultural Economics* 86(2) (2004) 467-482.
- [25] J.L. Lusk, T. Feldkamp, and T.C. Schroeder, Experimental Auction Procedure: Impact on Valuation of Quality Differentiated Goods. *American Journal of Agricultural Economics* 86(2) (2004) 389-405.
- [26] J.L. Lusk and J.F. Shogren, Experimental auctions: methods and applications in economic and marketing research, Cambridge University Press, UK, 2007.
- [27] J. Pate and J.B. Loomis. The effect of distance on willingness to pay values: a case study of wetlands and salmon in California. *Ecological Economics* 20 (1997) 199-207.

- [28] E.E. Rutström, Home-Grown Values and Incentive Compatible Auction-Design. *International Journal of Game Theory* 27(3) (1998) 427-441.
- [29] J.F. Shogren, M. Margolis, C. Koo, and A. List, A random Nth-price Auction. *Journal of Economic Behavior and Organization* 46 (2001) 409-421.
- [30] J.C. Whitehead, T. C. Haab, and J.C. Huang, Measuring Recreation Benefits of Quality Improvements with Revealed and Stated Behavior Data. *Environmental and Resource Economics* 22 (2000) 339-354.

**Figure 1. Average Consumer WTP for Animal Welfare Cured Ham by Round with the Endowment Auction Approach**



**Table 1. Descriptive Statistics and Test Results for each Round using the Endowment Auction Approach**

	<b>WTP for Comprehensive Animal Welfare (A)</b>	<b>WTP for Good Housing Condition (B)</b>	<b>Ho: A=B</b>	
	<b>Mean</b>	<b>Mean</b>	<b>T-test</b>	<b>P-value</b>
Round 1	0.427 (0.254)	0.563 (0.674)	-1.088	0.859
Round 2	0.412 (0.224)	0.441 (0.384)	-0.384	0.649
Round 3	0.426 (0.200)	0.463 (0.437)	-0.441	0.669
Round 4	0.399 (0.200)	0.477 (0.443)	-0.919	0.819
Round 5	0.389 (0.208)	0.489 (0.450)	-1.163	0.875

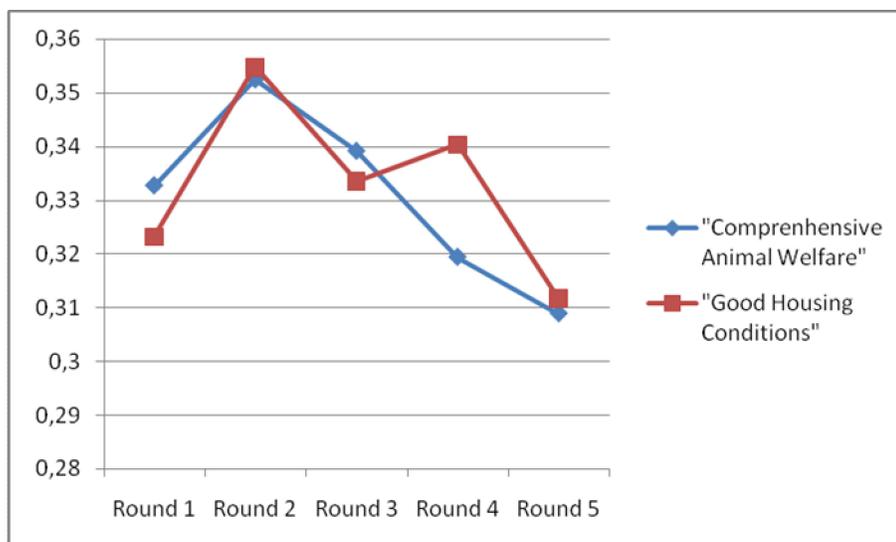
**Table 2. Experimental and Socio-demographic Characteristics used in Regression**

<b>Variable</b>	<b>ENDOWMENT AUCTION</b>	<b>Mean</b>	<b>Std. Dev.</b>
COMPREHENSIVE	=1 if comprehensive label was evaluated; 0 otherwise.	0.311	0.463
FEMALE	=1 if participant is a female; 0 otherwise.	0.623	0.485
AGE	=Participant's age.	53.640	16.141
HOUSEHOLD-SIZE	=Number of people living in participant's household.	2.793	1.185
UNIVERSITY	=1 if participant had university studies; 0 otherwise.	0.216	0.412
HIGH-INCOME	=1 if participants income above €2500/month; 0 otherwise.	0.188	0.391
EAT-HAM	=1 if participant eats ham regularly.	0.094	0.292
<b>Variable</b>	<b>MULTI-PRODUCT AUCTION</b>	<b>Mean</b>	<b>Std. Dev.</b>
COMPREHENSIVE	=1 if comprehensive label was evaluated; 0 otherwise.	0.3854	0.4872
FEMALE	=1 if participant is a female; 0 otherwise.	0.8229	0.3821
AGE	=Participant's age.	52.227	14.836
HOUSEHOLD-SIZE	=Number of people living in participant's household.	2.873	1.294
UNIVERSITY	=1 if participant had university studies; 0 otherwise.	0.323	0.468
HIGH-INCOME	=1 if participants income above €2500/month; 0 otherwise.	0.239	0.427
EAT-HAM	=1 if participant eats ham regularly.	0.145	0.353

**Table 3. Tobit Model with Random Effects for the Endowment Auction**

WTP	Coef.	Std. Err.	Z	P> z
COMPREHENSIVE	-.1641	.0400	-4.10	0.000
FEMALE	-.0463	.0408	-1.13	0.258
AGE	.0098	.0018	5.34	0.000
HOUSEHOLD-SIZE	-.0080	.0179	-0.45	0.655
UNIVERSITY	.1785	.0669	2.67	0.008
HIGHINCOME	.2277	.0505	4.51	0.000
EAT-HAM	.2547	.0633	4.02	0.000
Constant	-.0611	.1334	-0.46	0.647
Log-lik.	-116.513			
N	335			

**Figure 2. Average Implicit Consumer WTP for the Comprehensive Animal Welfare and Good Housing Conditions by round with the Multi-Product Auction Approach**



**Table 4. Descriptive Statistics and Test Results for each Round in the Multi-Product Auction Approach**

	<b>Comprehensive</b>	<b>Good</b>		
	<b>Animal</b>	<b>Housing</b>	<b>Ho: A=B</b>	
	<b>Welfare</b>	<b>WTP</b>	<b>Condition</b>	
	<b>(A)</b>	<b>WTP (B)</b>		
	<b>Mean</b>	<b>Mean</b>	<b>T-test</b>	<b>P-value</b>
Round 1	0.323 (0.271)	0.323 (0.403)	0.115	0.859
Round 2	0.352 (0.265)	0.354 (0.399)	-0.384	0.649
Round 3	0.339 (0.272)	0.333 (0.304)	-0.441	0.669
Round 4	0.319 (0.236)	0.340 (0.305)	-0.919	0.819
Round 5	0.308 (0.229)	0.312 (0.283)	-1.163	0.875

**Table 5. Tobit Model with Random Effects Results for Multi-Product Auction**

WTP	Coef.	Std. Err.	Z	P> z
COMPRENHENSIVE	-.0159	.0317	-0.50	0.615
FEMALE	.0214	.0411	0.52	0.603
AGE	.0059	.0011	5.45	0.000
HOUSEHOLD-SIZE	-.0320	.0131	-2.44	0.015
UNIVERSITY	.0684	.0382	1.79	0.073
HIGH-INCOME	.0044	.0378	0.12	0.907
EAT-HAM	-.1411	.0434	-3.25	0.001
Constant	.1255	.0970	1.29	0.196
Log-likelihood	-145.112			
N	480			

## Appendix

Information with respect to the “Comprehensive Animal Welfare” Label and the “Good Animal Housing” Label.

Table A1. Information resented to the participants (Translated from Spanish)

<p>We have two types of 100-gram cured ham packages available: cured ham produced using improved animal housing labeled as “Good animal housing” and cured ham produced under good human animal housing and good animal-human interaction and transport conditions labeled as “Animal Welfare”. The information associated with the requirements to obtain each of the animal welfare labels is as follows:</p>	
<p>“Good animal housing” label</p>	<ul style="list-style-type: none"> <li>• The number of pigs reared in a pen is lower than in the current production system</li> <li>• The pigs are reared in pens that can be opened, so they have the possibility to stay inside and outside the pen and walk and have contact with each other</li> <li>• They have bedding of straw</li> <li>• They have a sufficiently high number of troughs</li> </ul>
<p>“Comprehensive Animal Welfare Label” label</p>	<ul style="list-style-type: none"> <li>• The number of pigs reared in a pen is lower than in the current production system</li> <li>• The pigs are reared in pens that can be opened, so they have the possibility to stay inside and outside the pen and walk and have contact with each other</li> <li>• They have bedding of straw</li> <li>• They have a sufficiently high number of troughs</li> <li>• Pigs can see and are in contact with the stockman</li> <li>• Stockmen should pass a training course where they are instructed on how they must treat animals</li> <li>• Transport should be only done to the slaughterhouse, avoiding unnecessary transport between farms</li> <li>• Transport time should not be longer than 6 hours, avoiding the hottest hours of the day</li> </ul>

<p>“Regular Welfare” label</p> <p>no Animal</p>	<ul style="list-style-type: none"> <li>• In order to increase productivity, the amount of animals per m<sup>2</sup> is the highest as possible, so that overcrowding is rather common. The animals become aggressive having so little space for themselves. Therefore, their teeth and tails have to be cut.</li> <li>• The pigs are reared in pens that are closed until they achieve the sufficient weight to be sent to the slaughter house.</li> <li>• The floors of the pens are usually made of hard cement.</li> <li>• The farms are fully mechanized, so that the animals do not have any direct contact with the stockmen.</li> <li>• Transportation can be between farms or from the farm to the slaughter house. Transport time should not be longer than 8 hours, avoiding the hottest hours of the day.</li> </ul>
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