Warm glow in charitable auctions: Are the WEIRDos driving the results?

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Abstract

Running conventional laboratory experiments (i.e., with a standard student subject pool) is common practice in economic experiments especially when methodological issues are explored. However, generalization of the results from such experiments to the entire population is subject to severe critique. In this study we investigate warm glow in charitable auctions in a conventional lab experiment and an artefactual field experiment (i.e., lab experiment using subjects from the general population). The auction is constructed in a way to isolate warm glow by donating the sum of revenues by highest bidders to an environmental charity of subjects' choice. Contributions motivated by pure altruism were eliminated by keeping constant the total amount the charity would receive. Results for the two subject pools are at complete odds. There is ample evidence of warm glow in the student subject pool but none in the consumer subject pool. Our findings suggest that conclusions from conventional lab experiments may not be immediately transferable to the general population.

Keywords: warm glow, charitable auctions, lab experiment, WEIRDos
JEL codes: C92, D44, J19, Q52

1. Introduction

The satisfaction that comes from contribution has long been identified as a motivation behind donations for public goods provision. The term 'warm glow' was first coined by Andreoni (1989) to distinguish among the pure egoist deriving utility (warm glow) from donating, like from any other private good, and the pure altruist being concerned only with the level of provision of a public good irrespectively of the method that this is financed. Since then, there has been ample evidence of satisfaction generated

by the act of giving in real and hypothetical valuation studies. Nunes and Schokkaert (2003) have used a list of attitudinal statements to identify potential warm glow incentives in a contingent valuation study. Their empirical results confirm the presence of warm glow in elicited willingness-to-pay (WTP) values. In a recent experiment, Crumpler and Grossman (2008) compare giving in a dictator game where participants' contributions were crowded out by reduced giving by the proctor so that the charity of choice would always receive a preset amount. Contributions were thus motivated only by warm glow and authors report a significant percentage (between 51.3% and 77%) of respondents making positive contributions. Neural evidence further supports the existence of warm glow motives. Harbaugh et al. (2007) report certain neural activity taking place in areas known to respond to rewards when a payment to a public good is made. Consistent with the warm glow argument, this brain activation further increases when people make voluntary donations compared to mandatory tax payments. This is an indication that warm glow provides the giver a reward that is higher than the benefit the giver receives from paying an equivalent amount of taxes.

On the other hand, Isaac et al. (2010) did not find any evidence of warm glow when revenues from an auction were donated to actual charities. Their results were robust even when a specialized subject pool consisting of students affiliated with a local church which already supported the charity was used in the experiment. However, in their application warm glow was not isolated from pure altruism.

Meanwhile, a common criticism of laboratory experiments is that participants are usually students from western developed countries and thus results may not be representative of the entire population and consequently generalizable to consumer behaviour. Concern on the use of students as research surrogates for consumers or adults in general, is rather old (McNemar, 1946; Enis et al., 1972). Reasons are attributed to the fact that students exhibit psychological, social and demographical differences from other segments of the population but also to the fact that students are not yet complete personalities. Other arguments favour the use of students as experimental subjects when the nature of the research is universal. As stated by Lusk and Shogren (2007, p46): 'A theory is a generalization that should hold for everyone, *including students*'. Following this line of reasoning using student samples when the aim of the study is to test a theory is of little concern. After six decades of research the debate is still active. Henrich et al. (2010) call the usual subject pool of experiments as WEIRDos, being an abbreviation of the Western, Educated, Industrialized, Rich and Democratic societies they live in and

argue that generalization of the findings relied upon these subjects can be misleading since they are outliers of the rest of humanity. Authors review a broad literature providing evidence of significant variability across human population and argue that universality cannot be claimed not even for fundamental behavioural processes. The arguments developed triggered the release of a special issue in the Behavioral and Brain Sciences journal (vol. 33, Issue 2-3, 2010) accommodating commentaries to the article and replies by the authors. The majority of the commentaries are supportive to the main thesis developed in the target article with authors agreeing on the need for research on culturally diverse, non-weird populations to permit generalization of the findings.

In measuring social preferences, Levitt and List (2007) argue that human behaviour may be influenced by a number of factors (moral considerations, scrutiny of ones actions by the others, context, self-selection and stakes of the game) that may differ between the lab and the outside world but also between different subject pools in laboratory experiments.

Applying a second-order meta-analysis of studies examining the external validity of experiments that use student pools, Peterson (2001) concludes that ‘‘…researchers should be cautious when using college student subjects and be cognizant of the implications of doing so if the purpose of the investigation is to produce universal principles’’. More recent research has also shown that students exhibit different trust attitudes and thus contribute less in public good experiments (Gachter et al., 2004), exhibit less loss aversion when compared to professional traders (Haigh and List, 2005) and are more selfish compared to workers manifested with extremely decreasing offers between Ultimatum and Dictator games (Carpenter et al., 2004). In experimental auctions, studies attempting an external validity test of the results from student pools are rather few. Depositario et al. (2009) have found no significant differences in the bidding behaviour between students and the general population in an auction eliciting WTP for a novel food. A similar result is reported by Lusk (2005) in a meta-analysis of genetically modified food valuation studies. Authors, however, argue that their results should be treated with caution since the literature examining the validity of extrapolating the results from auctions with students to the broader population is rather limited.

Motivated by the fact that the existing literature that investigates the existence of warm glow incentives in charitable auctions draws conclusions from experiments with student subject pools and given the ongoing debate on the legitimacy of generalizing results from students to the broader population, we offer a validity test of the results when

a representative sample is employed. We conducted one set of sessions with a standard student pool in what constitutes a *conventional lab experiment* (in Harrison and List's (2004) terminology) and a second set of sessions with a representative sample of consumers (*artefactual field experiment*). Our experimental procedures were designed to isolate warm glow by donating revenues from auction winners to the charity of the majority's choice by crowding out proctor's contribution. This procedure is in essence a combination of the procedures employed by Isaac et al. (2010) and Crumpler and Grossman (2008). Comparing with standard auction (control) treatments we find that the warm glow theory is verified only for the student sample suggesting that arguments of generalizability of the conclusions from lab experiments with student pools merit greater attention.

2. Experimental design

The laboratory experiment was conducted in an experimental economics lab in the Agricultural University of Athens using the z-Tree software (Fischbacher, 2007). For the consumer sessions, a random sample of the population of the city of Athens was drawn. Recruitment was undertaken by a professional research company and the requirement was that subjects did most or at least some of the grocery shopping for their household. This was necessary since the experiment was part of a larger project on food choice under environmental health risk. For the student sessions, subjects were recruited from the undergraduate student population of the university. None of the authors was their professor.

A fourth-price auction was used to determine subjects' buying price for the products in auction. The specifics of the nature of the experiment were not mentioned during the recruitment but we did provide information regarding the provision of stochastic fees. Stochastic fees have been shown to be able to generate samples that are less risk averse than would otherwise have been observed (Harrison et al. 2009)

Our design involved two treatments, namely a standard auction treatment and a charitable auction treatment. Four sessions[1] (two sessions per treatment) were conducted

[1] In session 2 and session 4 of the consumer sessions, subjects were given additional information on the higher health risk to which children are exposed, given their longer time span, when consuming contaminated agricultural products. The aim of these two sessions was to further examine whether consumers respond differently when provided with this extra information. Results of this analysis will be reported elsewhere. Although it is out of the scope of this paper, a dummy variable indicating whether additional information was provided to respondents is included in the econometric analysis to control for potential information effects (see table 3).

with a total of 61 consumers and two sessions (one session per treatment) with a total of 36 students. The average duration of a session was a little more than an hour and experiments were conducted in June 2010. Each session included a training phase and an auction phase. For the treatment that aimed to isolate warm glow, a charity selection phase preceded the auction. Subjects were given prior instructions on the overall layout of the session and were also reminded the procedures at the beginning of each phase.

Table 1 shows the experimental design. We only used one proctor or monitor (i.e., one of the authors) for all sessions. Table 2 displays the socioeconomic characteristics of the subjects.

Table 1. Experimental design and number of subjects

	Students	*Consumers*
Charitable auction Treatment	18	29 (15+14)
Non charity (standard auction) Treatment	18	32 (16+16)

2.1 The training phase

After arriving at the lab, subjects were randomly assigned to a computer. A computer-training phase was conducted for subjects in the consumer sessions that did not have previous experience with computers. An interactive PowerPoint application was used that allowed subjects to familiarize with the mouse and keyboard. The training with the auction phase followed.

To control for possible monetary endowment effects, subjects were told that further to their participation fee, a random amount of money was going to be assigned to each one of them. For consumers this amount ranged between €0.5 and €5 and for students between €0.5 and €3. Participation fees were fixed to 20€ for consumers and 15€ for students. Different fees intended to approximate what is a standard compensation fee for these subjects' pools. Everyone then received a random draw determining their individual-specific extra fee. We emphasized to the subjects that the endowment they received was private information and that they should not communicate this information to other subjects in the lab. All transactions were completed at the end of the experiment.

Subjects initially watched a short PowerPoint presentation to familiarize them with the auction and procedures. The presentation included a short explanation of the fourth-

price auction, along with a numerical example demonstrating why it is in subjects' best interest not to deviate from bidding their true value for the good under evaluation. Subjects then took a short computerized test regarding the procedure. The monitor explained the correct answers afterwards.

Subjects then bid in three practice *hypothetical* auction rounds for a bag of potato chips. The monitor emphasized that these rounds were hypothetical and that one binding round would be randomly chosen at the end of these rounds. A screen displayed subjects' hypothetical earnings after these rounds.

After getting fully familiarized with the auction mechanism and procedures, subjects bid in three *real* auction rounds for a chocolate bar. The monitor emphasized that these rounds were now real and that the highest bidders would actually pay for the products. Again, one round was randomly chosen as binding at the end of these rounds. A screen displayed subjects' earnings after these rounds. Between rounds the only available information was whether the subject was one of the highest bidders or not.

2.2 The charity organization selection phase

This phase was only applied in the charitable auction treatment (see Table 1). Subjects were asked to select their favorite organization from a list of six non-government organizations (NGOs) with the understanding that the NGO selected by most subjects in the session will be donated an amount of €30 by the proctor. Subjects were told that deposit verification will be sent to everyone's mail address. The donation amount was specified to 30€ since usually this is what most NGOs request for annual membership. All charities were environmental NGOs and a short description from each NGOs website was provided to subjects (all experimental instructions, supplemental material and information provided to subjects are available at https://sites.google.com/site/warmglowweirdos/). The selected charity was revealed only after the auction phase was through.

2.3 The auction phase

In the auction phase subjects were endowed with one kilo of potatoes from a very specific location of the country. The region was *never* revealed to subjects and was called with the generic name "region A". Potatoes were packed in paper bags and were labeled "Potatoes from region A".

A leaflet was then distributed to subjects that described the environmental profile of region A (see Appendix). In brief, the leaflet mentioned that the initial potatoes

endowment from region A is of unknown quality due to extensive pollution of the groundwater but the risks for human health could not be assessed since the epidemiological study in the area of origin was not completed. The description accurately described region A and in fact epidemiologists and agronomists that study the environmental health effects of this specific region were advised about the content of the leaflet (see Appendix).

Subjects were then asked to bid to exchange a kilo of potatoes from region A with a kilo of potatoes from region B. A second leaflet was subsequently distributed to subjects (prior to the actual auction) with a description of the environmental profile of region B (see Appendix). In brief, the leaflet described region B as being in a good ecological status (in the terminology of the European Water Framework Directive) and explained that this characterization implies that, among others, agricultural products are safe for human health. We made sure that potatoes from the two regions are of the same variety to avoid differences in appearance characteristics. Potatoes were packed in a similar paper bag and were labeled "Potatoes from region B". Both potatoes are available at the market for sale but the origin was not revealed to subjects to avoid regional affiliation effects. The label was the only visible difference between the two products.

To elicit subjects' WTP, a 4th price Vickrey auction was employed. Considering the size of the session groups and the likelihood of disengaging some of the participants due to small number of winners, the 4th price auction was regarded as a compromise between a 2nd price auction and a nth random price auction for engaging off-margin bidders[2]. Subjects participated in five consecutive rounds and were told that at the end one round would be randomly chosen as binding. Between rounds subjects again could only observe if they were one of the highest bidders of the previous round or not.

2.4 Isolating warm glow incentives

In the charitable auction treatment, subjects were additionally informed that the revenues from the highest bidders would be donated to the charity selected by the

[2] Shogren, Margolis, Koo, and List (2001) found that the 2nd price auction worked better for on-margin bidders while the random nth price auction worked better for off-margin bidders. Harrison (2006) and Harrison, Harstad and Rutstrom (2004) emphasize the importance of having simultaneous bid submission rather than having real-time bid submission or real-time sequential bid submission such as in an English auction. Another popular mechanism is the Becker-Degroot Marschak (BDM) mechanism, even though it is not an auction per se. Lusk and Rousu (2006) have found that on average the 2nd price auction and the nth price auction are more accurate than the BDM. In addition, Shogren, Cho et al. (2001) found that the Willigness To Pay /Willigness To Accept gap remains present in a BDM mechanism while it disappears in active market environments like the 2nd and nth price auctions.

session's majority on their behalf and a deposit receipt would be mailed to the address of the highest bidders.

To disentangle motives behind donations in the charity treatment we followed Crumpler and Grossman (2008). We crowded out participants donation by reduced giving by the proctor so as to keep the charity contribution constant at €30. Subjects were told that the charity would receive neither more nor less than €30 and that the monitor would add to the contributions by the highest bidders that much, so that the total amount would always sum to €30. Only respondents with warm glow incentives, purchasing moral satisfaction from the act of giving itself, had thus incentive to contribute higher in the charitable auction sessions. Since the amount the charity would be receiving was preset (fixed), pure altruists, deriving utility from increases in provision of public goods, had no incentive to raise their contribution when a charitable session was employed.

Formally, drawing, and modifying, from the original work of Andreoni (1989), the utility function of a pure altruist is $U_{pure\,altruist} = u(x_{pure\,altruist}, Y)$, with $x_{pure\,altruist}$ denoting individuals consumption of the private good x and Y being the total supply of the public good as follows: $Y = G_{others} + g_{purealtruist}$, where G_{others} is the contributions of all other individuals to the public good and $g_{purealtruist}$ is pure altruist's own contribution to the public good. A pure altruist would thus donate to a charity in order to raise the total contributions and subsequently the level of provision of the public good. On the other hand, an individual holding pure warm glow incentives cares only for her contribution irrespectively of the level of the public good provision: $U_{egoist} = u(x_{egoist}, g_{egoist})$.

If the total contribution to public good Y is fixed, and thus the amount of the public good to be provided is not sensitive to individual's contribution, a pure altruist will contribute nothing. Therefore, in this context, pure altruists should not alter their bidding behaviour in the charitable treatment. If, however, average bids are higher when a charity treatment is employed, this is evidence of warm glow i.e., people derive utility from their contribution irrespective of the level of provision of the public good. Thus, the main advantage of this design is its ability to isolate warm glow incentives from pure altruism[3].

[3] We acknowledge that under this design, as Crumpler and Grossman (2008) admit, warm glow incentives may be cooled-off by subjects' unwillingness to reduce the financial pressure to the proctor. That is, subjects may think that the proctor expects them to free-ride and thus play along. On the other hand, it is also likely that an experimenter bias is present. Respondents may assume that the experimenter expects them to bid more and thus behave accordingly in the charitable auction session to please the experimenter. On the absence of any prior knowledge as to which, if any, of these motives prevails, it may as well be that on

To check respondents understanding of the donation mechanism we asked three test questions, two before the auction took place and one at the demographic collection phase. The exact questions were:

"Suppose the highest bidders pay in TOTAL 6€ to exchange their endowed product:

1. How much money will the HIGHEST BIDDERS donate to the selected NGO?
2. How much money will be donated in TOTAL (that is, by US and the HIGHEST BIDDERS)?"

"Suppose the highest bidders pay in TOTAL 8€ to exchange their endowed product:

3. How much money in TOTAL (that is, by US and the HIGHEST BIDDERS) would the NGO receive?"

Subjects that failed to answer two or more questions were dropped from the subsequent analysis which resulted in dismissing observations from 2 individuals**.**

2.5 The post-auction phase

The socio-economic background of the subjects was elicited in the final phase. Experimental instructions are available at https://sites.google.com/site/warmglowweirdos/.

3. Research Hypothesis and Data Analysis

To scrutinize our data for warm glow we need to examine whether submitted bids in the charitable auction treatment (where revenues by highest bidders are donated to the charity) are higher than bids in the standard auction procedure (where revenues are collected by the experimenter to provide the good). Higher WTP estimates in the charitable auction treatment would be an evidence of warm glow motives. We are further interested in investigating whether similar results are obtained between subject pools. Students are commonly used in economic laboratory experiments. Especially when it comes to methodological studies, it is very common for experimenters to employ WEIRDos as their guinea-pigs and rarely question the generalizability of the observed behavior into the general population. Our study, therefore offers a test of external validity of the experimental results when student pools are employed contributing to the ongoing debate on whether results from students can be extrapolated to the entire adult population.

3.1 Descriptive analysis

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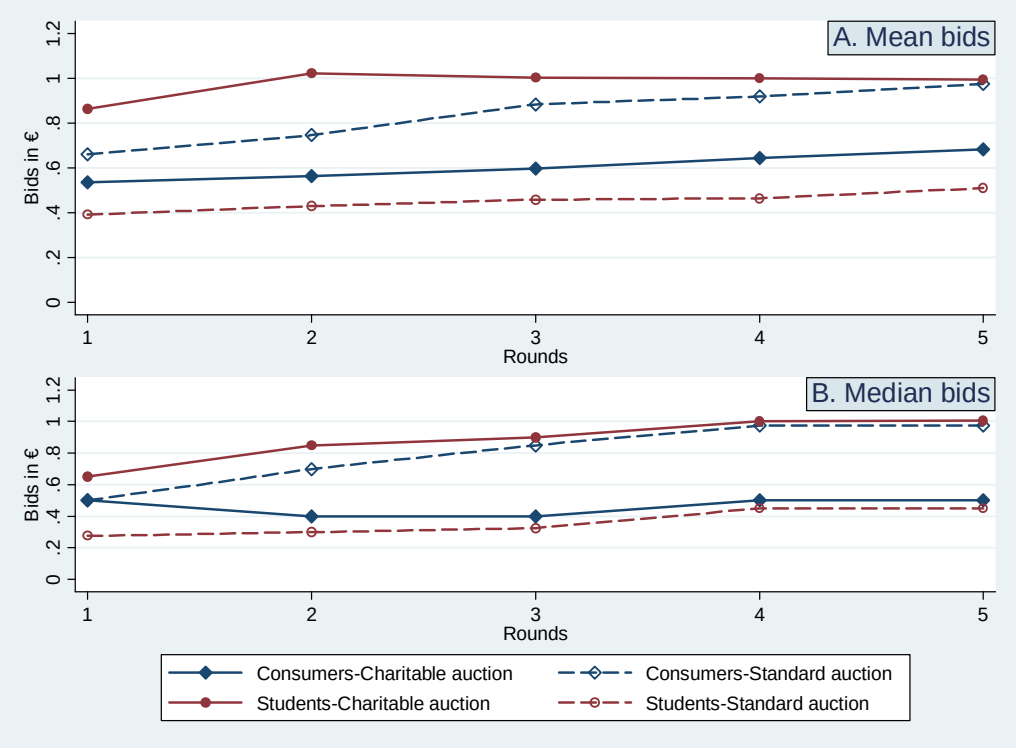
average these effects cancel-out. In any case we have no reason to expect these effects to influence differently the two samples considered.

Simple statistics can help illuminate our research questions. Figure 1 shows mean and median bids across rounds by subject pool and treatments. Solid lines refer to the auctions that purported in isolating warm glow (i.e., the charitable auctions) and dashed lines refer to the standard auction treatment. Raw data draw a completely different picture for the bidding behaviour of each subject pool. The student pool reconfirms what is widely reported in the literature: warm glow is evident and subjects derive utility just from the act of giving. Even though subjects were aware that their contribution was crowded out by reduced giving by the proctor they tend to bid on average twice as much as the control group in every round.

The consumer subject pool is, however, at complete odds. The warm glow turns "cold" with consumers bidding on average less than the control group, a difference which becomes as large as €0.3 in round 5.

Figure 1. Mean and median bids across rounds



3.2 Econometric analysis

To account for the panel nature of our data, we estimated a random effects regression model for each subject pool as well as for the pooled sample. Variables in the

regression function for each subject pool are displayed in Table 3 and explained in Table 2. We assume bidding behavior to be affected by the treatment variables, respondents' socio-demographic characteristics, perceived health risk associated with the consumption of potatoes from areas A and B respectively and potato consumption habits.

Table 2. Variable description

Variable	**Variable description**	**Students**		**Consumers**	
		Mean	**SD**	**Mean**	**SD**
Bid	Bid to exchange product	0.626	0.628	0.604	0.589
Charity	Dummy, 1=Subject participated in the charitable auction	0.500	0.507	0.458	0.502
*Students**	Dummy, 1=Subject is student	Mean: 0.379		SD: 0.488	
HRisk	Dummy, 1=Subject received additional health risk information regarding children	-	-	0.492	0.504
TotFee	Total money endowment	16.917	0.806	22.805	1.531
t_i	Dummy, 1=Round *i* where *i*=1 to 5	0.2	0.4	0.2	0.4
Age	Subject's age	20.972	1.665	41.508	9.839
Gender	Dummy, 1=male	0.389	0.494	0.305	0.464
Income	Dummy, 1=Subject's household economic position is above average	0.361	0.487	0.475	0.504
Kids	Dummy, 1=Subject has underage kids	-	-	0.339	0.477
Educ	Dummy, 1= subject is 4th year student or higher	0.306	0.467	-	-
	Dummy, 1=Subject has a university diploma **	-	-	0.610	0.492
*DangA****	Dummy, 1=Subject perceives consumption of agricultural products from region A as being dangerous for her health	0.611	0.494	0.864	0.345
*NotDangB****	Dummy, 1=Subject perceives consumption of agricultural products from region B not being dangerous for her health	0.805	0.401	0.830	0.378
$ConsPot_1$****	Dummy, 1=Subject consumes potatoes 1-2 times/month or less	0.083	0.280	0.153	0.363
$ConsPot_2$	Dummy, 1=Subject consumes potatoes 1 time/week	0.222	0.421	0.186	0.393
$ConsPot_3$	Dummy, 1=Subject consumes potatoes 2-3 times/week	0.527	0.506	0.441	0.501

ConsPot$_4$	Dummy, 1=Subject consumes potatoes 4-5 times/week or more often	0.166	0.378	0.220	0.418

* Only applicable to the pooled model.
** This is the definition used in the pooled model as well.
*** These were measured on 7-point Likert scales and were dummy coded for the analysis
**** Excluded from estimations to avoid perfect multi-collinearity

Table 3 displays regression coefficients. Note that the coefficients and standard errors of the interacted variables (*Student*, *Charity*) in the pooled model take into consideration the coefficient of the interaction term, following similar procedures to Drichoutis and Nayga (2010). For the *Student* variable this would be:

$$\frac{\partial Bid}{\partial Student} = b_2 + b_3 Charity \quad (1)$$

Expression (1) can then be evaluated as:

$$\left.\frac{\partial Bid}{\partial Student}\right|_{Charity=1} = b_2 + b_3 \quad \text{and} \quad \left.\frac{\partial Bid}{\partial Student}\right|_{Charity=0} = b_2 \quad (2)$$

Similarly for the *Charity* variable we have:

$$\left.\frac{\partial Bid}{\partial Charity}\right|_{Student=1} = b_1 + b_3 \quad \text{and} \quad \left.\frac{\partial Bid}{\partial Charity}\right|_{Student=0} = b_1 \quad (3)$$

Table 3. Results from random effects regression models

		Pooled sample		Consumer subject pool		Student subject pool	
		Coef.	Std.Error	Coef.	Std.Error	Coef.	Std.Error
Constant		2.329**	1.087	1.769	1.267	4.677**	1.854
Charity (non-interacted)		-	-	-0.251	0.155	0.441***	0.138
Charity (interaction)	*Student=1*	0.443**	0.172	-	-	-	-
	Student=0	-0.297**	0.139				
Student	*Charity=1*	-0.157	0.357	-	-	-	-
	Charity=0	-0.897**	0.372				
Hrisk		-0.148	0.137	-0.208	0.148	-	-
TotFee		-0.098**	0.042	-0.073	0.050	-0.207**	0.098
T$_2$		0.074***	0.027	0.058*	0.033	0.098**	0.046
T$_3$		0.131***	0.027	0.149***	0.033	0.103**	0.046
T$_4$		0.157***	0.027	0.189***	0.033	0.104**	0.046
T$_5$		0.194***	0.027	0.236***	0.033	0.125***	0.046
Age		0.003	0.007	0.005	0.008	-0.083	0.060
Gender		-0.159	0.113	-0.094	0.171	-0.243*	0.146

Income$_2$	0.182*	0.107	0.235	0.146	0.033	0.146
Educ$_2$	-0.037	0.142	0.007	0.155	0.216	0.209
Kids	-	-	-0.068	0.168	-	-
DangA	0.238*	0.137	0.079	0.236	0.404***	0.137
NotDangB	0.388***	0.143	0.436**	0.209	0.429**	0.174
ConsPot$_2$	0.386**	0.195	0.392	0.275	0.512*	0.277
ConsPot$_3$	-0.024	0.176	-0.170	0.241	0.356	0.243
ConsPot$_4$	0.126	0.192	-0.004	0.251	0.656**	0.303
R-squared	0.288		0.278		0.550	

Note: ***, **, * = Significance at 1%, 5%, 10% level.

Regression coefficients confirm the main findings of the unconditional analysis. Students bid on average €0.44 more in the charitable auction compared to the standard auction which is a clear evidence of warm glow. On the other hand, consumers in the charitable auction sessions bid on average €0.25 less than consumers in the standard auctions, reinforcing the picture of Figure 1. Note that the coefficient is marginally not significant (p-value=0.106).

The pooled model reconfirms inferences drawn from the two subsamples. Students that participated in the charitable auctions bid on average €0.44 more than students that participated in the standard auction sessions. Simply stated, it corresponds to the difference between the red solid and red dashed lines in Figure 1. On the other hand, consumers that participated in the charitable auctions bid on average €0.29 less than consumers that participated in the standard auctions. This corresponds to the difference between the blue solid and blue dashed lines of Figure 1.

Other differences that are evident in Table 3 show that subjects increased bids across rounds by as much as 23 cents in round 5. Student subjects did increase their bids as well but by a lower amount of money than consumers. Gender differences are also evident. Male subjects bid up to €0.24 less than female subjects which is a common finding in WTP studies and particular in auctions. The difference is not significant for the consumer subject pool and the pooled model. Income has an economic and statistical significant effect as well. Subjects from households with a self-evaluated economic position above average, bid higher by as much as €0.18 in the pooled model.

As expected subjects that perceived consumption of agricultural products from region A to pose a high health risk bid more to exchange their endowed products with potatoes from region B. This is particularly profound for the student sample which bids on average 0.4€ more to exchange potatoes A with potatoes B. Similarly, subjects that perceived

region B posing no health risk bid 0.38€ to 0.43€ more. Consumption habits of potatoes also have an effect on bidding behavior with subjects consuming potatoes more frequently bidding more for the exchange with potatoes from region B. Other effects in Table 3 don't look substantial in terms of economic significance.

4. Discussion

Student pools are widely used as experimental subjects in laboratory applications. After six decades of research in experimental economics, the question on their representativeness and consequently on the extent to which results derived from them generalize to the entire adult population is still open, triggering hot debates. This study offers an external validity test of the presence of warm glow motives when a charitable auction is administered to students. We find that student subjects drawn from a university population and consumer subjects drawn from the general population behaved in a completely opposite direction. The student pool verified the presence of warm glow motives behind charitable giving. Student subjects were bidding more in an auction that contributed the sum of revenues by highest bidders to a charity, than a control group that was bidding in a standard auction. This was so even though subjects knew that their contribution was crowded out by reduced giving by the proctor. Oddly, the consumer subject pool was bidding less than the control group.

This study therefore shows that inferences drawn from a student population are not automatically transferable to the general population even when a methodological issue is explored. Economists, however, use subjects drawn from the student population to study a myriad of economic inquiries e.g. the WTP-WTA gap (Plott and Zeiler, 2005; Isoni et al., 2010), self-selection bias (Eckel and Grossman, 2000; Cleave et al., 2010), information effects (Healy 2009), hypothetical bias (Carlsson and Martinsson, 2001; Spencer et al., 1998), the initial endowment effects (Corrigan and Rousu, 2006) and warm glow itself (Crumpler and Grossman, 2010; Isaac et al., 2010). Whether different subject pools can lead every economic experiment to different inferences is not a generalization we want or can make. We further recognize that consumers from western and developed societies, like those participated in our experiments, can be as weird as students and therefore claims of universality of our results are not intended. Results under this study, however, do urge, in agreement with the concerns raised by Henrich et al. (2010), for validation of the results drawn from WEIRDos using representative and diverse samples before firm conclusions are drawn. Finally, although it is unlikely that the observed differences in the two samples

are procedure-specific, since a standard auction procedure was employed following established protocols from the literature, there is definitely scope for further research before generalization can be claimed.

5. Role of the funding source

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7. Appendix

A. Environmental Health Risk information

Environmental profile of region A

Region A is characterized by intensive industrial activity, with many of the industries not fulfilling the safety standards, and intensive agricultural activity. Underground water analysis has revealed the presence of heavy metals, such as chromium and nickel, which **may** have contaminated plants through irrigation. The severity of these substances for human health depends on the **degree** and the **duration** of the **exposure**. However, an epidemiological study assessing accurately the risks for human health from the consumption of agricultural products from region A, **has not been performed yet**. In

addition, with respect to potatoes heavy metals tend to accumulate in the skin of potatoes and not in the interion that is commonly consumed.

Environmental profile of region B

Region B is classified as in **good ecological** status, according to the European Water Framework Directive. The good ecological status guarantees that pollution loads are **minor** such that there is no risk for human health and aquatic life. The agricultural sector follows **good agricultural and environmental practices** and there is no industrial activity in the area. Measurements in potatoes from the area revealed that the accumulation in heavy metals is far below the international safety levels.

B. Environmental Organizations

1. ARCTUROS

ARCTUROS is an Environmental, Non Governmental, non profit organization that was founded in 1992 for the protection and management of wildlife and natural environment. To achieve its goals the organization is undertaking field activities, conducting scientific research, awareness campaigns, environmental training, promoting volunteerism for the protection of wildlife and the empowerment of biodiversity and sustainability in Greece and abroad.

2. MOM

MOM, the Hellenic Society for the Study and Protection of the Monk Seal is a non-profit non-governmental organisation (NGO) that is supported by more than 6,500 members in Greece and internationally. Its activities target the conservation of the critically endangered marine mammal, the Mediterranean Monk Seal Monachus monachus and its marine and coastal habitats.

3. PELAGOS

The Pelagos Cetacean Research Institute is a scientific, non-profit and non-governmental organization that works for the development of cetacean research aiming at the conservation of dolphins, whales, seals and their natural habitat in both Greece and the Mediterranean Sea.

4. Plant-a-Tree.gr

Plant-a-Tree.gr is a young company that provides tree planting and envisages the raising of environmental awareness of Greeks, being people, unions, or industries, towards initiatives that will ‘green’ their city.

5. WWF

WWF Greece is part of the international WWF family, which consists of 50 National Organizations and works for the protection of the environment in more than 100 countries. WWF’s mission is to conserve the rich biodiversity of Greece, to prevent and eventually to reverse environmental degradation, seeking the harmonious coexistence of humans with nature.

6. MEDITERRANEAN SOS Network

MEDITERRANEAN SOS Network is an environmental and social Non-Governmental Organisation (NGO) of non-profit character. The Network is active since 1990 for the protection of the natural and cultural wealth of the Mediterranean, paying particular attention to the protection of coasts and the sea and their sustainable management, the protection of bio-diversity, sustainable management of energy, water resources and waste, protection of global climate and last but not least diminishing the nuclear threat.