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FROM THE FIELD TO THE LAB. AN EXPERIMENT ON THE REPRESENTATIVENESS OF STANDARD LABORATORY SUBJECTS

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From the Field to the Lab
An Experiment on the Representativeness of Standard Laboratory Subjects

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Abstract[*]
We replicate in the lab an artefactual field experiment originally run with a representative sample of the population. Our results show that, despite the many differences between university students and representative subjects from the whole population, the two samples closely follow a common behavioral pattern in a set of binary dictator games. The only exception seems to be represented by a significant difference in those situations where self-interest plays a prominent role. This gap is mainly related to the academic background of the participants: our sample of undergraduate economics students, in fact, differs in its degree of self-interested choices both from the representative group of the population and from its sub-sample of students from heterogeneous disciplines.

Keywords: Methodology, External Validity, Experiments, Prosocial Behavior.
Jel Classification: C91, D03.

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1. Introduction

The generalizability of lab results has always been a problematic issue in the methodological debate surrounding experimental economics. One of the source of concern refers to the almost exclusive recourse to college students as participants in most of the experiments. Students, in fact, are readily available in universities campuses[1], have low opportunity costs and possess many other peculiarities[2] which make them the most convenient experimental sample.

We know that samples made of students certainly differ from the general population for demographics, education and cognitive skills and tend to be more homogeneous. More specifically it has been shown that undergraduates, for example, show 'unfinished' personalities (Carlson, 1971), less-crystallized attitudes and less-formulated senses of self, more unstable peer group relationships, stronger tendencies to comply with authority and stronger cognitive skills than older adults (Sears, 1986), and give slightly more homogeneous answers than non-students (Peterson, 2001). Moreover, they are usually interested in research, quite willing to collaborate with the experimenter, in pursuit of social approval (Rosenthal and Rosnow, 1969), concerned about what their choices tell about them, they are also prone to the experimenter's demand effect (Orne, 1969, Zizzo, 2010). However, it is still debated whether such differences impact on behavior in a way that compromises the external validity of lab observations.

In the recent years, many aspects related to the representativeness of this convenient pool has been explored (see Fréchette, 2015 for a complete survey). One of the first investigations was carried out by Gordon et al. (1986). They compared thirty-two studies in which groups of students and non- students have participated in identical experiments and found strong divergences between the two samples in twelve studies. Cooper et al. (1999) experimentally analyzed the 'standard' sample of students addressing several open questions about the development of the 'ratchet effect' in centrally planned economies. They find that students exhibit significantly higher initial levels of strategic play than older and more experienced participants. The suspicion that professionals' behaviour may differ from non-professionals is confirmed also in Haigh's and List's (2005) work, in which professional traders show greater myopic loss aversion than undergraduate students. Differences between the two types of groups have also been found by Fehr and List (2004); students are less trusting, less trustworthy and tend to use the punishment threat more often than CEOs, the other groups of participants considered in the study. In a social framing study, Carpenter et al. (2005) compared three different samples: students at Middlebury College, non-traditional students at Kansas City Community College, and employees at a distribution center in the same city; they find that, in the Dictator Game, students make significantly less generous offers than workers, even controlling for demographic differences. Similar results are found by Carpenter et al. (2008) in a charitable giving game. Bellemare and Kröger (2007) considered an investment game to explore the differences between a representative sample

[1] According to the list proposed by the Laboratoire Montpelliérain d´Economie Théorique et Appliquée, only 2 out of 173 experimental labs considered are located outside universities campus and, only one is totally independent by academic research activities.

[2] Among the others, the tendency to have a steep learning curve (Friedman and Cassar, 2004) and to be intelligent and educated (Gätcher, 2010).

of Dutch population and a students' pool in the laboratory. Their results indicate that trust, trustworthiness and other forms of other-regarding behaviour are generally underrepresented in the lab, when compared with the population as a whole. These results are in line with those obtained by Belòt et al. (2015) who, using a wide set of standard experimental games (Dictator Game, Trust Game, Public Good Game, Beauty Contest and Second-price Auction), find that students are more likely to behave as homo-economicus than non-students in games involving a conflict between self-interested and other-regarding preferences, while there is no significant difference between samples, in the games such as the Beauty-contest and the Second-price Auction. Falk et al. (2013) compared the behaviour of students with that of a sample from the general population using a variant of the trust game and found that, while the trustors display a similar behavior, the degree of reciprocity shown by the trustees is lower for students than for non-students. Finally, in one of the most recent studies on that topic, Cappelen et al. (2015) addressed the question to what extent lab experiments on student populations are useful to identify the motivational forces present in society at large by comparing the behaviour of a nationally representative population with different student populations in the lab. Their results show that students may not be informative of the role of social preferences in the broader population: representative participants differ fundamentally from students especially because their sensitivity to self-interested motivations.

As in Cappelen et al. (2015), the aim of our investigation is to verify to what extent experimental results obtained with undergraduates may be representative of the motivational drives of the general population. To investigate this point we exploit the experimental design devised by Pelligra and Stanca (2013) (PS henceforth) and the data they gathered in an artefactual field experiment with a representative sample. We replicate their original experiment with a sample of 240 undergraduates.

Our contribution enriches the present state of the literature in two main respects: first, we follow exactly the reference protocol and experimental design to make the comparison between two different samples as punctual as possible; second, we use an innovative methodology to disentangle behavioral components' from the choices implemented in the binary dictator games: in the first part of the analysis we compare results obtained with the two different samples in a set of binary-choice dictator games within four treatments and for two reward dimensions, whilst in the second one, we make an analysis of differences between samples for a single behavioral component.

Our main results show that there is an extremely similar pattern of behaviour between students and representative subjects of population. Some differences emerge only with respect to the sensitivity to self-interested motivations. Undergraduates appear more sensitive to the loss of a possible payoff and show higher degree of self-interest that significantly differs from the level shown by representative subjects but also from a sub-sample of students belonging to the same representative population.

The remainder of the paper is organized as follows. Section 2 describes the experimental design, procedures and testable hypotheses. Section 3 presents the statistical analysis and the results. Section 4 concludes.

2. The experiment

2.1. Design

In order to make a comparison between people's behaviour in the field and in the lab we replicate exactly the same design implemented by PS with a representative sample of the population, considering now a sample of 240 undergraduates; the typical subjects used for a classical experiment. The experimental design consists of four binary-choice dictator games each with two reward dimensions, small rewards dimension (T1-T4) and large rewards dimension (T1L-T4L). Overall, each participant is asked to make eight decisions, one with small and another one with large reward for each treatment. One of the two allocations is considered as a benchmark and has always identical payoff for the two players (400, 400). The alternative allocations instead vary along the four treatments.

Table 1 summarizes all treatments by considering the options available in each game and the prediction consistent with different structure of preferences: efficiency, equality, self-interest and competition.

Each of the 8 binary dictator game has a benchmark distributive option (400, 400), and an alternative one. If the dictator chooses "A" in T1 the recipient's payoff will be of 300 instead of 400; a choice consistent with competitive or positional preferences, but at odds with both efficiency and equality concerns. If the player is self-interested, then, she should be indifferent between the two alternatives. If the dictator chooses "A" in T4, the recipient will get 500 instead of 400; this choice is consistent with both efficiency and self-interested motivations, but not with equality and positionality. The same is true for the T1L-T4L treatments; the only difference refers to the gains available to the recipients which are equal to 100 point in the baseline treatments and to 400 points in the large rewards (L) treatments.

Table 1. Treatments T1-T4 (small reward), T1L-T4L (large reward) and Predictions

Treatments	Options		Predictions			
	A	B	Efficiency	Equality	Self-Interest	Competition
T1	400, 300	400, 400	–	–	=	+
T2	400, 500	400, 400	+	–	=	–
T3	350, 500	400, 400	+	–	–	–
T4	450, 500	400, 400	+	–	+	–
T1L	400, 0	400, 400	–	–	=	+
T2L	400, 800	400, 400	+	–	=	-
T3L	350, 800	400, 400	+	–	–	–
T4L	450, 800	400, 400	+	–	+	–

Notes: Column 2 reports allocations that can be chosen as an alternative to the benchmark (400, 400) for small and large reward size respectively; columns from 3 to 6 report the sign of the corresponding choice.

2.2. Procedures

We conducted five experimental sessions in January 2011 at the University of Cagliari[3]. We enrolled a total of 240 students, all from the first year of the BA in Economics and Business. At the beginning of each session the instructions were read aloud as well as the details of the payment system; questions were answered privately. Each participant then was presented the 8 games in random order; once each choice task was completed they were presented a post-experimental questionnaire. The experiment was run using paper and pencil and through a double-blind anonymity procedure (subject vs. subject and subjects vs. experimenters). We used the same incentive system of the PS's design. One of the participants, during the first session, was randomly selected to be the recipient. All the other participants played as dictators. Once all sessions were completed, one of the dictators was selected and matched with the recipients; then one of the eight games was picked at random and payed according to the dictator choice. Each point is worth one euro. Both the dictator and the recipients gained € 400.

2.3. Testable Hypotheses

We are interested in testing two main hypotheses: the first one refers to the differences in the distribution of choices across games between students and the representative sample. The second is related to how the different motives that we can infer from the combination of the different games affect both our two types of participants. More specifically:

Hypothesis 1: Samples comparison.

The first hypothesis concerns the proportions of subjects who decide to give in each game and for both reward dimensions.

Our hypothesis is that the population proportion of undergraduates who choose to give is equal to the population proportion of representative subjects who make the same decision.

Hypothesis 2: Samples comparison by single motivational components.

For the second hypothesis, we exploit PS's design by focusing on motives behind participants' choices. After disentangling different reasons to give or not to give (efficiency, equality, self-interest and competition), we observe whether those motivational components affect representative subjects' and undergraduates' choices differently.

Our null hypothesis is that students and representative subjects are affected by each motivational component in the same way.

3. Results

First, in Table 2 we summarize the characteristics of the participants. We enrolled a total of 240 undergraduate students (141 female and 99 male), while the sample of representative subjects is composed by 611 participants (323 female and 288 male)[4]. In addition to a series of questions on socio-demographic characteristics, both samples answered to a series of questions on sociodemographic characteristics, beliefs, and pro-social activities such as

[3] The instructions are provided in the Appendix.

[4] The experiment was conducted in December 2009 in Sardinia, an autonomous region of Italy, and involved a representative sample of subjects, stratified by gender and place of residence.

donations to charities and volunteerisms. Moreover, we asked a self-reported measure of trust, satisfaction for own life and satisfaction about own financial situation.

Table 2. The two samples

Characteristics	**Undergraduates** (n = 240)	**Representative subjects** (n = 611)
Female, # (%)	141 (59%)	323 (53%)
Family Dimension, mean (min-max)	4.2 (1-10)	3.4 (1-8)
Voluntarism, # (%)	61 (25%)	141 (23%)
No Trust, # (%)	198 (83%)	413 (68%)
Donations, # (%)	100 (42%)	433 (71%)
Life satisfaction, mean (min-max)	7.3 (1-10)	7.6 (1-10)
Financial satisfaction, mean (min-max)	6.4 (1-10)	6.3 (1-10)

3.1. Parametric analysis

Figures 1.1-1.4 plot participants' behaviour by subject's types: Undergraduates and Representative subjects. From a first visual inspection of the graphs, it is quite evident that the two samples show the same behavioral pattern in all treatments and for both reward dimensions, as far as the direction of choices it concerned.

In T1 and T1L, where giving is costless and increases efficiency and equality, 78% of undergraduates decide to give in T1, and this fraction rises to 86% in T1L. In the representative sample of population, the proportion of givers is 83% and increases by 6 points percentage in T1L (see Figure 1). By comparing independent observations, we do not find any statistically significant difference between samples ($p=0.111$ and $p=0.247$, respectively, Pearson chi-squared test).

Result 1: *When giving is not costly and increases efficiency and equality, we do not find any statistically significant difference between two proportions of givers in the two samples.*

In T2 and T2L, where giving is still costless and there exists a trade-off between efficiency and equality, the fraction of undergraduate givers is equal to 49% and decreases to 43%, respectively. In the representative sample of population, the proportion of givers

decreases from 47% in T2 to 43% in T2L (see Figure 2). Once again, we do not find any statistically significant difference between the proportion of givers in these two samples both for T2 and T2L (p=0.703 and p=0.870, respectively, Pearson chi-squared test).

Result 2: *When giving is not costly and increases efficiency and inequality, we do not find any statistically significant difference between the two samples.*

In T3 and T3L, where the decision of giving is costly and increases efficiency and inequality disadvantageous, the proportion of students who decide to give in T3 is 11% and increases to 17.5 % in T3L. Instead, as we can see from Figure 3, 29% of representative subjects opts for giving in T3 and 28% in T3L. Even though, students' and representative subjects' decisions go to the same direction, the fraction of students who choose to give is statistically lower than the proportion of representative agents who make the same decision. The statistical comparison between the proportions of givers of two different samples points out a significant difference both in T3 and T3L (p<0.000 and p=0.002, respectively, Pearson chi-squared test).

Result 3: *When giving is costly, increases efficiency and inequality and decreases self-interest, we do find statistically significant difference between the two samples.*

In T4 and T4L, giving is rewarding for the dictator, increases efficiency and inequality, students' and representative subjects' choices go in the same direction, but the proportion of college students and representative agents who decide to give are statistically different in T4 (p<0.000, Pearson chi-squared test) but *not* in T4L (p=0.154, Pearson chi-squared test). The proportion of students who decide to give in T4 is 68% and decreases to 56 % in T4L, while, the 55% of representative subjects opts for giving in T4 and 50% in T4L (Figure 4).

Result 4: *When giving is rewarding, increases efficiency and inequality, we find statistically significant difference between the two samples in T4 but not in T4L.*

These numbers show negligible differences between two samples for the first two treatments in both reward dimensions and reject any significant behavioral difference.
We find significant differences only in the last two treatments between the samples and for treatment 3 for both reward dimensions. Our sample of undergraduates appears more sensitive to the possibility to lose an available payoff with respect to the representative sample of population.

Figures 1a-b. Subjects' Choices - Treatments T1-T1L (by sample)

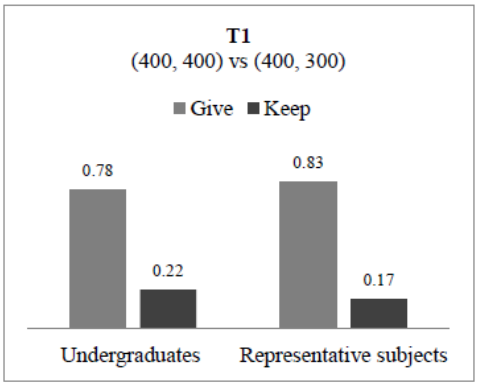

Figure 1a. Treatment T1

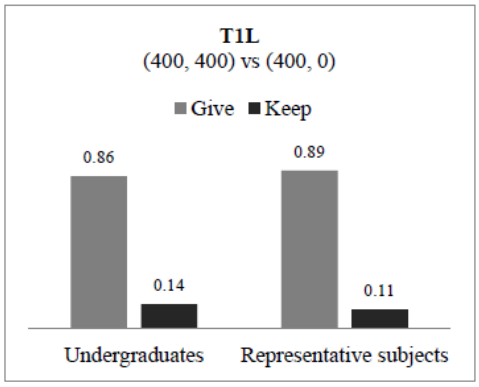

Figure 1b. Treatment T1L

Figures 2a-b. Subjects' Choices - Treatments T2-T2L (by sample)

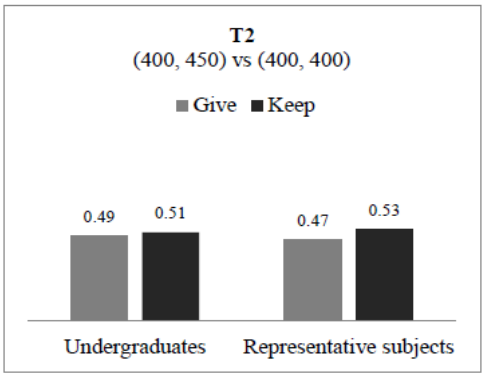

Figure 2a. Treatment T2

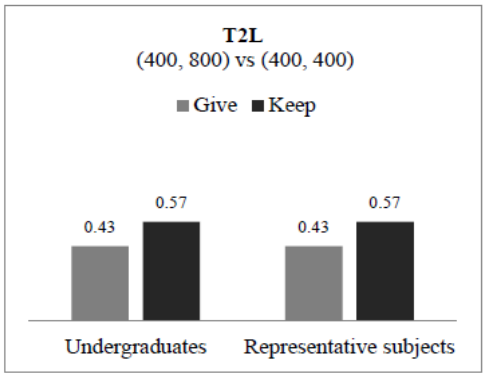

Figure 2b. Treatment T2L

Figures 3a-b. Subjects' Choices - Treatments T3-T3L (by sample)

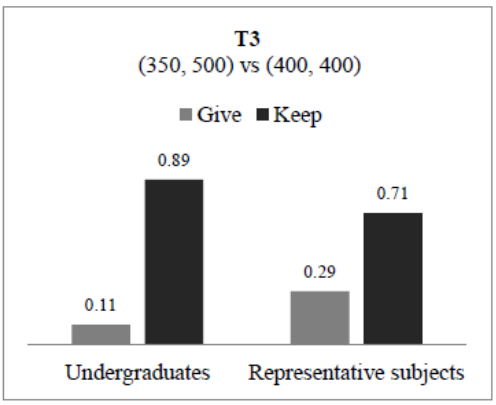

Figure 3a. Treatment T3

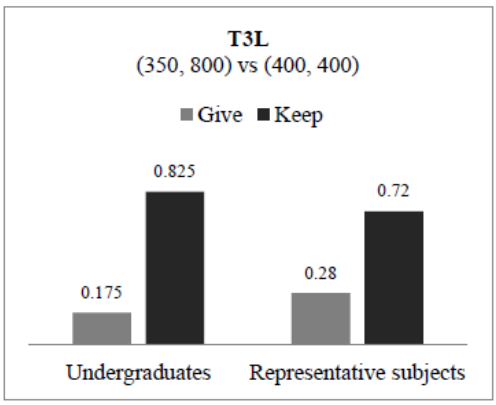

Figure 3b. Treatment T3L

Figures 4a-b. Subjects' Choices - Treatments T4-T4L (by sample)

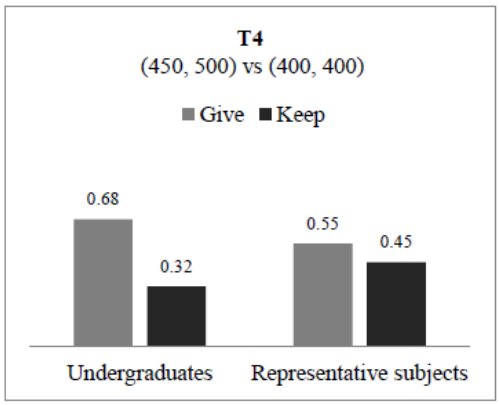

Figure 4a. Treatment T4

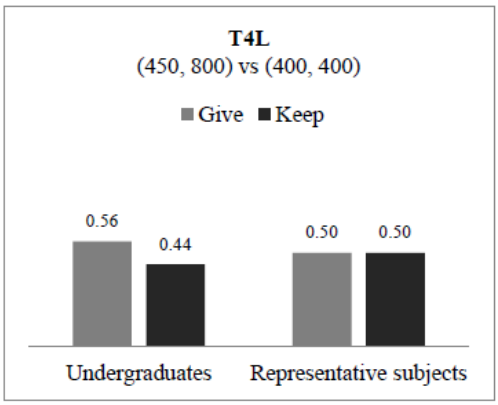

Figure 4b. Treatment T4L

3.2. Non-parametric analysis

We now check whether the different components of behaviour, singularly, affect representative subjects' and undergraduates' choices in a similar way. We have disentangled different motives by exploiting the subjects' decisions in the binary-choice dictator games: a weight that can be -1, 0 or +1 is assigned to each component along treatments in relation to the predicted effect behind the choice of the alternative allocation, as shown in Table 1.

For instance, for the choice of the alternative allocation in the treatment T1-T1L, in which the predicted effects are positive for competition, negative for equality and efficiency and null for self-interest (absent in this treatment), we assign the weight +1, -1, -1 and 0,

respectively for each component, and similarly for the other treatments (see Table 3 for each treatment horizontally).
After that, we define the total level for each behavioral component, counting for each sample the number of points scored in all treatments (see Table 3 for each behavioral component vertically).

Tables 4 and 5 presents the means obtained for each components and level of rewards both for the students' and the representative sample. The total levels of efficiency, equality and competition scored by the two pools of subjects result statistically indistinguishable from each other at any conventional level and in both reward dimensions.

Table 3. Components weights

Treatments	Alternative Allocations	Components Weights			
		Efficiency	Equality	Self-Interest	Competition
T1 - T1L	400, 300 - 400, 0	-1	-1	0	1
T2 - T2L	400, 500 - 400, 800	1	-1	0	-1
T3 - T3L	350, 500 - 350, 800	1	-1	-1	-1
T4 - T4L	450, 500 - 450, 800	1	-1	1	-1
		Total level of Efficiency	Total level of Equality	Total level of Self-Interest	Total Level of Competition

Notes: In the 2nd column we report the alternative allocations for all four treatments and for both reward size (small and large); from 3rd to 6th columns are reported weights for each component within treatments. Self-interest weight in T1– T1L and T2 – T2L is equal to zero because in these treatments it does not play any role.

We find a statistically significant difference only for the self-interest motive for both reward dimensions ($p=0.000$ in both dimensions; Two-sided Wilcoxon-Mann-Whitney test). The self-interest component, on average, is statistically higher in undergraduates than in representative agents: 1.142 vs 0.517 (small reward dimension) and 0.767 vs. 0.451 (large reward dimension).

Results 5*: Among the behavioral components, only the total level of self-interest is statistically different between undergraduates and representative agents for both reward dimensions* (see Tables 4-5).

Table 4. Components Comparison: Small reward dimension

Behavioral Components	Samples	Mean	Std. Dev	MWU - Z	p-value
Total Efficiency Level	Undergraduates	*0.125*	*2.307*	*0.584*	*0.559*
	Representative Subjects	*0.275*	*2.35*		
Total Equality Level	Undergraduates	*0.992*	*1.892*	*0.363*	*0.717*
	Representative Subjects	*1.031*	*2.449*		
Total Competition Level	Undergraduates	*-0.125*	*2.307*	*-0.584*	*0.559*
	Representative Subjects	*-0.275*	*2.305*		
Total Self-Interest Level	Undergraduates	*1.142*	*1.073*	*-7.572*	*0*
	Representative Subjects	*0.517*	*1.078*		

Notes: Columns (5) and (6) are the results of a Wilcoxon-Mann-Whitney Nonparametric test.

Table 5. Components Comparison: Large reward dimension

Behavioral Components	Samples	Mean	Std. Dev	MWU - Z	p-value
Total Efficiency Level	Undergraduates	*0.05*	*2.515*	*0.74*	*0.459*
	Representative Subjects	*0.193*	*2.423*		
Total Equality Level	Undergraduates	*1.383*	*2.146*	*0.126*	*0.899*
	Representative Subjects	*1.355*	*2.437*		
Total Competition Level	Undergraduates	*-0.05*	*2.515*	*-0.74*	*0.459*
	Representative Subjects	*-0.0193*	*2.423*		
Total Self-Interest Level	Undergraduates	*0.767*	*1.057*	*-4.047*	*0*
	Representative Subjects	*0.451*	*1.008*		

Notes: Columns (5) and (6) are the results of a Wilcoxon-Mann-Whitney Nonparametric test.

In order to check whether the difference in the behavioral component of self-interest between samples is related to specific demographic characteristics of subjects, such as age or schooling level, we compare the sample of undergraduates with the sub-sample of students belonging to the representative subject pool. The result of a Wilcoxon-Mann-Whitney Nonparametric test shows a statistically significant difference in the small reward dimension between these two samples of students ($p=0.017$).

However, we do not find any significant difference between students of the representative sample and the rest of the same sample ($p=0.809$ for the small reward).

Non-parametric analysis suggests that being a student per se does not seem to be the reason of the difference we found; the high level of self-interest component appears as an

intrinsic characteristic of our sample of undergraduates, who are all students from the school of economics and business of the University of Cagliari. Even though we do not have details about the majors of students belonging to the representative sample, we may speculate about this result, that appears to be in line with the findings by Cappelen et al. (2015) for which students in economics and students in other disciplines mainly differ in their level of self-interest; non-economics students appear less selfish than students in economics and thus make choices that are more in line with what we observe in the representative group.

3.3. Regression analysis

So as to check the robustness of the result delivered by the non-parametric analysis in section 4.2, we report further GLM regression analyses (Table 6 for small and Table 7 for large reward dimensions) that allow us to assess if and how the estimates of behavioral components may be affected by the use of student samples by controlling for a richer set of individual-specific factors that might influence the behavioral outcomes observed.

In models (1) (2) (3) (4) we focus on the behavioral components in which the level of efficiency, the level of equality, the level of competition and the level of self-interest represent the response variables, respectively.

3.3.1. Small Reward Dimension

The GLM estimates for the Undergraduates sample dummy variable reject any statistically significant differential effect generated by the group identity – with respect to the representative subjects group – concerning each behavioral component with the only exception of the level of self-interest (see Table 6).

Model (1) shows that the level of efficiency is affected significantly by the dummies 'No Trust' and 'Gender'. The level of efficiency is lower in the subjects who have no trust in other people, while men seem to be more concerned about efficiency than women. In Model (2), we see that women seem to be more egalitarian than men. The level of competition (Model 3), is influenced by 'No Trust' and 'Gender' dummies; it is higher in the subjects who have no trust others, while women seem to be more competitive compared to men. In Model (4), the level of self-interest is not influenced by individual characteristics and values.

This regression analysis confirms the result delivered by the non-parametric analysis: self-interest is the only behavioral component in which the undergraduates sample appears to be different from the representative sample.

3.3.2. Large Reward Dimension

In the large reward dimensions, the GLM estimates confirm that the Undergraduates sample dummy variable is statistically significant only with respect to the level of self-interest (see Table 7). Model (1), again shows that the level of efficiency is affected significantly by the dummies 'No Trust', 'Donations' and 'Gender'. In Model (2), we see that women seem to be more egalitarian than men. The level of competition, investigated in Model (3), is influenced by the 'No Trust' and 'Gender' dummies; it is higher in subjects who have no trust, while women seem to be more competitive compared to men. In Model (4), the level of self-interest is not influenced by individual characteristics and values. As in the Small Reward Dimension analysis the results delivered by the non-parametric analysis are confirmed by regression analysis: the two samples differ only for the behavioral component of self-interest.

Table 6. Behavioral outcomes. GLM regressions. Small Reward Dimension

	(1)	(2)	(3)	(4)
OUTCOMES:	**Total level of efficiency**	**Total level of equality**	**Total level of competition**	**Total level of self-interest**
Undergraduates sample (Dummy)	**0.112**	**-0.202**	**-0.112**	**0.649*****
	(0.197)	**(0.194)**	**(0.197)**	**(0.092)**
Family Dimension	-0.064	0.09	0.064	0.042
	(0.067)	(0.066)	(0.067)	(0.031)
Voluntarism	0.111	-0.233	-0.111	-0.04
	(0.189)	(0.186)	(0.189)	(0.088)
No Trust	-0.484*	0.001	0.484*	-0.101
	(0.189)	(0.186)	(0.189)	(0.088)
Donations	0.302	-0.263	-0.302	0.095
	(0.182)	(0.179)	(0.182)	(0.085)
Gender (Male=1)	0.566***	-0.618***	-0.566***	0.098
	(0.165)	(0.162)	(0.165)	(0.077)
Life satisfaction	0.053	-0.026	-0.053	-0.001
	(0.059)	(0.058)	(0.059)	(0.028)
Financial satisfaction	0.011	-0.045	-0.011	-0.002
	(0.046)	(0.045)	(0.046)	(0.021)
Intercept	-0.172	1.731***	0.172	0.349
	(0.529)	(0.52)	(0.529)	(0.246)
Observations	851	851	851	851
Null deviance	4443.5 on 809 d.f.	4273.8 on 809 d.f.	4443.5 on 809 d.f.	1006.07 on 809 d.f.
Residual deviance	4293.1 on 801 d.f.	4151.4 on 801 d.f.	4293.1 on 801 d.f.	931.76 on 801 d.f.
Number of Fisher Scoring iterations	2	2	2	2

Notes: ***, **, * for significant level at the 0.001, 0.01 and 0.05 level, respectively. Standard errors are reported in parenthesis.

Table 7. Behavioral outcomes. GLM regressions. Large Reward Dimension

	(1)	(2)	(3)	(4)
OUTCOMES:	**Total level of efficiency**	**Total level of equality**	**Total level of competition**	**Total level of self-interest**
Undergraduates sample (Dummy)	**0.213**	**-0.213**	**-0.213**	**0.377*** **
	(0.204)	**(0.196)**	**(0.204)**	**(0.088)**
Family Dimension	-0.118	0.028	0.118	-0.019
	(0.069)	(0.067)	(0.069)	(0.029)
Voluntarism	0.142	-0.097	-0.142	-0.029
	(0.196)	(0.189)	(0.196)	(0.084)
No Trust	-0.575**	0.337	0.575**	-0.041
	(0.196)	(0.188)	(0.196)	(0.084)
Donations	0.441*	-0.436*	-0.441*	0.107
	(0.188)	(0.181)	(0.188)	(0.081)
Gender (Male=1)	0.717***	-0.672***	-0.717***	0.021
	(0.171)	(0.164)	(0.171)	(0.073)
Life satisfaction	0.093	-0.049	-0.093	-0.017
	(0.061)	(0.059)	(0.061)	(0.026)
Financial satisfaction	0.013	-0.023	-0.013	-0.006
	(0.048)	(0.046)	(0.048)	(0.021)
Intercept	-0.468	2.193***	0.468	0.629**
	(0.548)	(0.527)	(0.548)	(0.235)
Observations	851	851	851	851
Null deviance	4861.0 on 809 d.f.	4434.2 on 809 d.f.	4861.0 on 809 d.f	871.16 on 809 d.f
Residual deviance	4600.5 on 801 d.f.	4265.1 on 801 d.f.	4600.5 on 801 d.f	849.77 on 801 d.f
Number of Fisher Scoring iterations	2	2	2	2

Notes: ***, **, * for significant level at the 0.001, 0.01 and 0.05 level, respectively. Standard errors are reported in parenthesis.

4. Conclusions

We perform a rigorous comparison between the behaviour observed in and economic experiment by a convenience sample of undergraduate participants and one made by a

representative sample of population in order to investigate the generalizability of social preferences results, and, more generally, to answer methodological questions about the representativeness of the samples usually considered in economics laboratory experiments.

Our results confirm that undergraduates show a pattern of behaviour very similar to that of the representative sample of the population, at least in our design the considers a series of a binary-choice dictator games.

In the first part of our analysis, the simple comparison of samples choices in each treatment shows a very similar directional pattern for all treatments. The treatments (T1-T1L), (T2-T2L) and (T4L) show, on average, negligible differences and a non-parametric analysis leads to rejection of any significant behavioral difference between the two samples. However, we find that in treatments T3-T3L and T4, the proportion of undergraduates who choose the alternative allocations is statistically different with respect to that observed in the representative sample; when giving is costly the proportion of undergraduates who choose to give is statistically lower than the proportion of representative subjects who make the same choice, and when not giving is costly, the proportion of undergraduates who choose to give is higher than the proportion of representative subjects who make same choice. We note a higher sensitivity of undergraduates to the possibility to lose a part of their own payoff.

Finally, when we check for the incidence of single behavioral components in the two samples, we find a difference only in the level of self-interest. Undergraduates show a statistically higher level of self-interest with respect to both the representative subjects sample and a sub-sample of students belonging to the same group, confirming a possible academic background effect due to the study of economics.

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Appendix: Experimental Instructions

By answering this section of the questionnaire, you can win a substantial prize in euro. You have to answer a series of 8 questions. If your name will be extracted among those who participate in this survey, one of the 8 answers you provide will be randomly selected to determine the corresponding prize. Note that you will be matched to another randomly selected participant, who will also win a prize that will depend on your choices.

Example:
Which one would you choose between the following two options?
(A) you win 200 euros and the other subject wins 200 euros
(B) you win 300 euros and the other subject wins 250 euros
By choosing A, you would win 200 euro and the other subject would win 200 euro.
By choosing B, you would win 300 euro and the other subject would win 250 euro.

Let us now turn to the actual questions, that might determine your actual win.
[The order of the 8 choices was randomized]

1. Your choice:
(a) you win 400 euros and the other subject wins 400 euros
(b) you win 400 euros and the other subject wins 300 euros

2. Your choice:
(a) you win 400 euros and the other subject wins 400 euros
(b) you win 400 euros and the other subject wins 500 euros

3. Your choice:
(a) you win 400 euros and the other subject wins 400 euros
(b) you win 350 euros and the other subject wins 500 euros

4. Your choice:
(a) you win 400 euros and the other subject wins 400 euros
(b) you win 450 euros and the other subject wins 500 euros

5. Your choice:
(a) you win 400 euros and the other subject wins 400 euros
(b) you win 400 euros and the other subject wins 0 euros

6. Your choice:
(a) you win 400 euros and the other subject wins 400 euros
(b) you win 400 euros and the other subject wins 800 euros

7. Your choice:
(a) you win 400 euros and the other subject wins 400 euros
(b) you win 350 euros and the other subject wins 800 euros

8. Your choice:
(a) you win 400 euros and the other subject wins 400 euros
(b) you win 450 euros and the other subject wins 800 euros.

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