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# Are economists really different? Experimental Evidence from Brazil

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### Abstract

Over the last decades, several authors emphasized the individualistic approach followed by economists and their students. In particular, there is the possibility that undergraduates who major in economics would be more likely to free ride or defect from coalitions in collective action situations. The main goal of this paper is to test the hypothesis that economics students tend to provide inferior amounts of voluntary donations to public goods provisions in a controlled environment. In doing so, we report the results of laboratory experiments performed in a business school, involving students majoring in accounting, business administration and economics. The results obtained suggest that, contrarily to most experimental studies, subjects who major in economics tend to cooperate more and free ride less than non-majors. We also find a result where senior economics students cooperate more than freshmen, indicating that exposure to economic concepts does not hinder cooperation.



**Keywords:** experiments; free-riding behavior; public goods.



### Resumo

Ao longo das últimas décadas, diversos autores ressaltaram o caráter individualista da abordagem seguida por professores e alunos de economia. Em particular, levanta-se a possibilidade de que alunos de graduação que se formam em economia tendem a exibir comportamento carona em maior frequência ou não cooperar em situações de ação coletiva. O principal objetivo deste artigo é testar a hipótese de que alunos de economia tenderiam a contribuir com menores valores de contribuições voluntarias em experimentos envolvendo bens públicos. Para tanto, reportamos os resultados de experimentos de laboratório realizados em uma escola de negócios, envolvendo alunos dos cursos de administração, contabilidade e economia. Os resultados obtidos sugerem que, contrariamente à maioria dos estudos experimentais existentes, alunos de economia tendem a cooperar mais e pegar menos carona que outros alunos. Adicionalmente, encontramos um resultado onde alunos veteranos de economia cooperam mais que alunos calouros, o que indica que a exposição a conceitos econômicos não tende a reduzir a cooperação em experimentos.



**Palavras-Chave:** experimentos; comportamento carona; bens públicos.

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## 1. Introduction

Pure public goods have two distinct characteristics: they are non-rival and non-exclusive. Examples of such goods are national defense, knowledge and the environment, just to cite a few. These goods are important mainly for the social benefits they generate. Since markets may not display enough incentives for the private provision of public goods, government intervention is frequently needed (Stiglitz, 2000, ch.6).

One important question related to public goods is the following: how much money are people willing to pay for their provision? Two other questions are: (i) will people take part in collective actions involving public goods if they notice that the provision will take place regardless of individual contributions?; (ii) will individual actions lead to social inefficient results?

Over the last decades, several authors emphasized the individualistic approach followed by economists and their students. In particular, there is the possibility that undergraduates who major in economics would be more likely to free ride or defect from coalitions in collective action situations.

At first, this hypothesis could be consistent with the proposition that studying economics may alter students' vision of cooperation. This line of reasoning provides an unique opportunity for testing hypotheses relating subjects' area of study to their decisions during experiments involving public goods provision, controlling for other characteristics (sex, age, political orientation, etc.).

The main goal of this paper is to test the hypothesis that students who major in economics tend to provide an inferior amount of voluntary provisions to public goods in a controlled environment, such as a laboratory experiment. In doing so, we hope to contribute to a growing body of research related to the use of experimental methods as a means to uncover new results in Applied Social Sciences (Smith 1991).

Our main results can be summarized as follows: (i) subjects who major in economics tend to cooperate more and free ride less than non-majors; (ii) senior economics students cooperate more often than freshmen, indicating that exposure to economic concepts does not hinder cooperation. Contrarily to previous studies, we cannot find evidence pointing to more individualistic behavior by economics students. In our view, these results are important for providing additional evidence related to the long-term impacts of academic training in economics.

The paper is divided as follows: the second section describes some of the literature related to laboratory experiments testing economics students' behavior, while the third section describes the experiment performed and data construction. The fourth section presents our main findings. The fifth section concludes.

## 2. Related Literature

Marwell and Ames (1981) correspond to one of the first attempts to test economists' behavior in collective-action experiments. The authors report the results of twelve experiments related to testing two versions ('weak' and 'strong') of the free rider hypothesis. Table 1 contains a summary of their findings:

**Table 1**
**Marwell and Ames' (1981)**
**Summary Results for Public Goods Experiments**

| Public Goods Experiment | Mean % of Resources Invested |
|---|---|
| 1. Basic Experiment | 42 |
| 2. Skewed Resources and/or Interest | 53 |
| 3. Provision Point | 51 |
| 4. Small Groups w/ Provision Point | 60 |
| 5. Experienced Subjects | 47 |
| 6. High Stakes (Experienced Interviewers) | 35 |
| 7. High Stakes (All Interviews) | 28 |
| 8. Feedback (No Changing Initial Investment) | 46 |
| 9. Feedback (Initial Investment Change) | 50 |
| 10. Feedback (Initial Investment Change – College Students) | 49 |
| 11. Manipulated Feedback (Low) | 43 |
| 12. Manipulated Feedback (Medium) | 50 |
| 13. Manipulated Feedback (High) | 44 |
| 14. Non-Divisibility (Control) | 43 |
| 15. Non-Divisibility (Treatment) | 84 |
| 16. Economics Graduate Students | 20 |
| Mean | 46.56 |
| Median | 46.50 |

**Source: Marwell and Ames (1981, Table 2, p.307).**

The table's second column reports the percentage of resources invested by subjects in different versions of public goods games. According to these results, resources invested are in the 40%-50% range (mean and median contributions of 46.56% and 46.50%, respectively), refuting the 'strong version' of the free rider hypothesis (where subjects should not contribute at all to the provision of public goods).

The results in the last rows of the table are somewhat surprising: they correspond either to very large (84%) or very low (20%) contributions. While the first number refers to a special version of the public goods game, where the good is non-divisible, the second refers to an experiment involving graduate students in economics.

In the latter case, contributions to the provision of public goods are half the magnitude of the contributions from other experiments. Marwell and Ames (1981) conclude that economists, when represented by graduate students, tend to free ride considerably more than other subjects, with reported differences in contributions being statistically significant at the 0.05 level (F-test results). According to the authors, there are two possible explanations for their results: first, students worried about economic incentives might self-select in economics; second, as time goes by, economics students may adapt their behavior to the theories they study.

Carter and Irons (1991) explore the robustness of Marwell and Ames' (1981) original study by implementing a simple ultimatum bargaining game experiment to test whether economics students behave in accordance with the predictions of rational choice models. They find that economics students, when playing the role of 'responders' in ultimatum games, tend to accept less money offers, while they keep more when playing the role of 'proposers'.

The authors also present some econometric evidence trying to disentangle 'selection' and 'learning' effects among the experiment's subjects. In this case, results are mixed: while self-selection seems to play a role in the choices reported, the same is not true for learning economic topics. Overall, they conclude that, although evidence is not conclusive, "(…) *economists are different*" (Carter and Irons 1991, p.177).

Frank, Gilovich and Regan (1993) investigate if exposure to self-interest models commonly used in economics tend to affect students. In doing so, the authors present extensive evidence related to situations where economics students may display opportunistic behavior when compared to students from other areas. For instance, in one occasion, the authors mailed questionnaires to over a 1,000 professors of 23 disciplines asking for charity contributions. Based on the responses received, the authors uncover a result where the proportion of free riders (those who reported giving no money to any charity) was significantly higher among economics professors (9.3%) when compared to other disciplines, whose percentage was between 3% and 4%.

In other occasion, the authors conducted 267 experiments related to the prisoners' dilemma's game involving both economics majors and nonmajors. When comparing defection rates among the two groups, they report a 60.4% defection rate for economics majors, which was considerably higher than the value reported for nonmajors (38.8%). Interestingly, they also notice that the overall defection rate declines significantly as students progress through school. Additionally, they report the results of an honesty survey related to freshman students in a microeconomics and astronomy courses. The results from this survey show that the proportion of 'less honest' responses raised after students passed one semester of introductory economics courses. The authors conclude that: (i) there are large differences in the extent to which economists and non-economists behave self-interestedly; (ii) however, there can be occasions where economists behave in traditionally communitarian ways; and (iii) there exists some evidence suggesting that differences in cooperativeness are caused in part by economics' training.

Yezer, Goldfarb and Poppen (1996) question the validity of Frank, Gilovich and Regan's (1993) study. According to the former authors, it is not obvious that exposure to economics would be expected to encourage less cooperative behavior. In particular, they emphasize the importance of drawing inferences based on subjects' behavior in actual (as opposed to hypothetical) situations. They present an interesting experiment, where envelopes containing currency are dropped in classrooms before classes in economics or other subjects are scheduled to meet (the 'lost-letter experiment'). In this case, the return rate on lost letters is used as a measure of cooperation.

The results of this experiment show a considerable difference in cooperation between economics in noneconomics majors. Contrarily to the evidence presented by Frank,

Gilovich and Regan (1993) and other authors, Yezer, Goldfarb and Poppen's (1996) results indicate that economics students are far more cooperative than students from other disciplines.

A very promising example of the use of experimental methods in the Brazilian context is Bianchi (1998). Inspired by Carter and Irons (1991), the author presents results of an experiment related to an ultimatum game, where each subject was asked to divide R$ 10 (US$ 9.70 in 1998) between him(her)self and another anonymous subject. The author reports a similar result to Carter and Irons (1993): subjects who are economics majors tend to accept less money offers when playing the role of 'responders' in ultimatum games, while keeping more money when playing the role of 'proposers'. She emphasizes that, in the Brazilian context, fairness considerations may play a significant role in determining the negotiations' outcomes. In terms of econometric evidence, contrarily to Carter and Irons' (1991) original conclusions, self-selection does not seem to play a relevant role in the reported results. In addition, the reported regression results do not support the hypothesis of a learning effect, either.

One common point between our paper and Bianchi's (1998) is that we both deal with Brazilian students in our experiments. Also, we divide our sample between economics and noneconomics majors, in order to study distinct behaviors in the laboratory. In terms of differences, these are the following: (i) instead of using an ultimatum game, we base our analysis on a linear public goods game *à la* Andreoni (1988); (ii) we develop a multi-period experiment, which allows us to analyse the evolution of cooperation over time. To sum up, we see our analysis as complementary to Bianchi's (1998), as a means to contribute to an incipient literature related to the use of experimental methods in economics in Brazil.

## 3. Data and Experimental Method

The analysis performed in this paper is based on two stages. In the first stage, we conducted several classroom experiments related to the provision of public goods in a dynamic setting. The experiments reported took place in a Brazilian business school during the first semester of 2014. They involved students of three undergraduate courses: accounting, business administration and economics.

Specifically, we ran a five-round experiment where subjects filled a form deciding how to divide R$ 100 (R$ 1.00 = US$ .44 in August, 2014) between a private and a public good (for simplicity, the private and public goods were named *A* and *B*, respectively). For each R$ 1.00 invested in the private good, subjects would receive R$ 1.00 individually. On the other hand, for each R$ 1.00 invested in the public good, the group's members would receive R$ 0.50 (more details about this game's optimal strategies are described below).

When designing our experiment, we followed mainly the guidelines contained in Andreoni (1988). We divided subjects in random groups of five members. Half of these groups had a fixed composition during distinct rounds (labeled 'partners') while the other half had their composition randomly changed in every round of the game (labeled 'strangers').

In every class where we performed the experiment, subjects were randomly selected to compose each group ('partners' and 'strangers'). Those who were selected as 'partners' would remain in the classroom while the others ('strangers') were taken to a separate place where they could participate in the experiment. In the latter case, subjects were randomly assigned to a new group after the end of every round.

Once the experiment started, subjects were given instructions and time to ask questions. They were also told that the experiment would last five rounds. Experimenters suggested subjects not to communicate with each other during the rounds of the experiment, although no strict prohibitions were imposed. After each round, subjects were informed about how much money they had individually and as a group (that is, the outcomes of other groups were not known)[1].

## 4. Linear Public Goods Games

Linear public goods games have been extensively used in experiments over the last decades (e.g., Marwell and Ames 1981; Andreoni 1988). In such games, individuals are given a budget (*m*), which can be invested either in a private (*x*) or public good (*g*), with $x + g = m$.

Individual payoffs ($P_i$) are determined by the following formula:

$$P_i = x_i + \alpha\sum^{n}_{j=1} g_j \quad (1),$$

where *n* is the number of group members. The parameter $\alpha$ is chosen such that $0 < \alpha < 1$.

Given the payoffs of the linear public goods game described, investing R$ 1.00 in the public good has a private return of R$ 1.00, while it has a social return of R$ 2.50. Therefore, it is Pareto efficient for subjects to invest all of their money in the public good. However, since the private return from the private good exceeds the private return from the public good, the Nash equilibrium of this game is to invest zero in the public good (to free ride). In fact, it can be shown that investing zero in the public good is a dominant strategy for each player in this game[2].

In the present setting, it is expected that subjects who are economics majors would tend to contribute with smaller amounts to public goods than other subjects. Since the immediate payoff of playing a linear public goods game is higher than the social payoff, economics majors would probably tend to free ride more often.

## 4. Results

In this section, we present the main results related to our experiment. Table 2 contains descriptive statistics of the main variables employed in the analysis below:

[1] The original dataset used in this paper is available from the authors upon request.

[2] Since $0 < \alpha < 1$, free riding ($g = 0$) corresponds to a single-shot dominant strategy, while fully providing the public good ($g = m$) for all *i* is the symmetric Pareto efficient outcome (given that $n\alpha > 1$) (Andreoni and Croson 2008, p.777).

**Table 2**
**Descriptive Statistics**
**Linear Public Goods Game Experiment**

| | Sex | Age | Econ.Major | Senior |
|---|---|---|---|---|
| Mean | 0.53 | 21.55 | 0.22 | 0.14 |
| Median | 1.00 | 20.00 | 0.00 | 0.00 |
| Maximum | 1.00 | 47.00 | 1.00 | 1.00 |
| Minimum | 0.00 | 17.00 | 0.00 | 0.00 |
| Std. Dev. | 0.50 | 5.13 | 0.41 | 0.35 |
| Observations | 100 | 102 | 102 | 102 |

Source: authors' calculations.
Notes:
**a.** 'Sex' corresponds to a dummy variable that assumes the value of 1 for male subjects and 0 for female subjects.
**b.** Age corresponds to each subject's age at the experiment date.
**c.** 'Econ.Major' corresponds to a dummy variable that assumes the value of 1 for subjects majoring in Economics and 0 otherwise.
**d.** 'Senior' corresponds to a dummy variable that assumes the value of 1 for subjects who have completed more than 50% of the economics major and 0 otherwise.

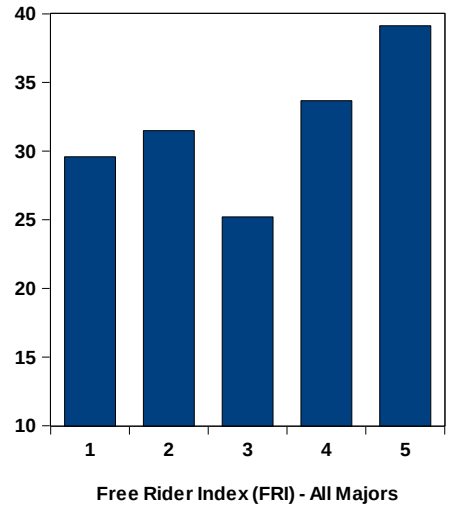
As suggested by the results in the table, our sample is composed by undergraduate students from a business school. About 53% of the subjects are male students, with the mean age being around 22 years old. At the time of the experiment, only 22% of the subjects were majoring in economics, while the remainder was majoring in business administration or accounting. In terms of senior students, about 14% of the students have passed half the major, while the remainder of the other students have not ('freshmen').

In order to test opportunistic behavior, we constructed a simple index, named 'Free Rider Index' (FRI) (Leuthold 1993). This index is based on the following formula:

$$FRI = (\text{Amount Invested in A}) / R\$\ 100 \qquad (2)$$

We employ the FRI as a means to capture free riding behavior in classroom experiments involving public goods provision. Graph 1 displays results related to the FRI during all rounds of the experiment:

**Graph 1**
**Free Rider Index (FRI) – All Majors**
**Linear Public Goods Game Experiment**

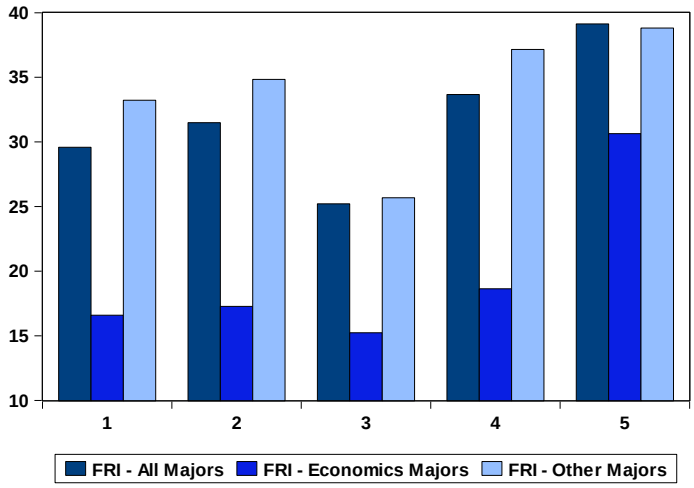



**Source: authors' calculations.**

The graph shows two remarkable patterns: (i) the FRI increased between the first and final round of the game (average values range from 30% to 40%); (ii) although the FRI presented a lower value in the third round, it raised again in the fourth round, reaching its peak by the end of the game. Interestingly, this last pattern is in accordance with most predictions from game-theoretic models with a finite number of repetitions (Gibbons 1992, chap.4).

Graph 2 plots the FRI index and its components, divided by major. In this case, we divided our sample in 'Econ. Majors', representing subjects who major in economics, and 'Other Majors', representing subjects majoring in other fields (such as accounting and business administration).

**Graph 2**
**Free Rider Index (FRI) – Different Majors**
**(Economics and Others) - Linear Public Goods Game Experiment**




**Source: authors' calculations.**

A remarkable pattern in the graph is that the results for economics majors are significantly lower than for other majors, contrarily to what was previously expected. This is confirmed when we consider the FRI values for each round of the experiment, as reported in Table 3:

**Table 3**
**Free Rider Index (FRI) – Different Majors**
**(Economics and Others) - Linear Public Goods Game Experiment**

| | Round 1 | Round 2 | Round 3 | Round 4 | Round 5 |
|---|---|---|---|---|---|
| Economics Major | 16.59 | 17.27 | 15.23 | 18.64 | 30.64 |
| Other Majors | 33.23 | 34.84 | 25.68 | 37.16 | 38.81 |
| Difference | -16.64 | -17.57 | -10.45 | -18.52 | -8.18 |

**Source: authors' calculations.**

These results confirm that subjects who are economics majors tend to free ride significantly less often than those who are not. The reported differences between the two groups are in the 17-18% range. It is interesting to notice that such differences drop to half these values (-8.18%) once the experiment reaches its final round.

Interested in testing the same predictions as Carter and Irons (1991) and Bianchi (1998), we present econometric results related to the experimental data collected in Table 4. Basically, this table contains the results of specifications of the following form:

$$FRI_i = \alpha + \beta_1 * \text{'Econ.Major'} + \beta_2 * \text{Controls} + \varepsilon_i \quad (3),$$

where '$FRI_i$' stands for the FRI calculated for each subject in our sample, while 'Econ.Major' corresponds to a dummy variable that assumes the value of 1 for subjects

who were majoring in economics during the experiment and 0 for subjects who were not. Basically, we regress FRI on several controls, while attempting to capture some causal relation among these variables. All regressions were run through Ordinary Least Squares (OLS)[3].

**Table 4**
**Regression Results**
**FRI and Subjects' Characteristics, 5-Round Experiment**

| Dep. Variable | FRI (Rounds' Average) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Econ. Major | -15.49** | -7.65 | -5.64 | -9.82 |
| | (6.29) | (7.04) | (7.90) | (7.06) |
| Senior | | -19.38** | | -17.54** |
| | | (8.42) | | (8.49) |
| Senior and Econ. Major | | | - 25.16** | |
| | | | (10.83) | |
| Age | | | -0.91* | -2.92 |
| | | | (0.50) | (3.10) |
| $(Age)^2$ | | | | 0.04 |
| | | | | (0.06) |
| Constant | 35.16*** | 36.13*** | 55.19*** | 81.53** |
| | (2.92) | (2.89) | (11.22) | (40.14) |
| $R^2$ | 0.057 | 0.105 | 0.140 | 0.140 |
| $R^2$ Adj. | 0.048 | 0.086 | 0.114 | 0.104 |
| Observations | 102 | 102 | 102 | 102 |

Source: authors' calculations.
Notes:
**a.** The dependent variable in each specification is the Free Rider Index (FRI) (average across all rounds of the experiment).
**b.** 'Econ.Major' corresponds to a dummy variable that assumes the value of 1 for subjects majoring in Economics and 0 otherwise. 'Sex' corresponds to a dummy variable that assumes the value of 1 for male subjects and 0 for female subjects.
**c.** 'Age' corresponds to each subject's age at the experiment date, while '$(Age)^2$' represents 'Age' squared.
**d.** The variable 'Senior' corresponds to a dummy variable that assumes the value of 1 for subjects who completed more than 50% of the major at the experiment's date and 0, otherwise.

Several interesting patterns emerge from the econometric results above. Contrarily to most available evidence (e.g., Marwell and Ames 1981), subjects majoring in economics seemed to free ride less often than others in this context. This is a

[3] A word of caution is needed here. While Carter and Irons (1991) and Bianchi (1998) perform an ultimatum game experiment, we deal with a linear public goods game. This difference in procedure might complicate comparisons involving each experiment's results. We see our results as complementary evidence to Carter and Irons' (1991) and Bianchi's (1998).

particularly surprising result, since previous studies usually found the opposite pattern, where economics majors would free ride more often than not[4].

We also noticed that, even though the 'Econ.Major' variable has a negative sing, it lacks statistical significance in most specifications. A similar result was previously reported by Bianchi (1998), when dealing with an ultimatum game experiment. Interestingly, when we consider an interaction between the last variable and the 'Senior' variable, we obtain a negative coefficient, which is statistically significant at the 5% level.

Additionally, subjects' age did not seem to exert a significant effect on free riding. If anything, the sign of the estimated coefficients suggests that older subjects tended to free ride less often than younger ones, albeit its lack of statistical significance. Overall, we see these results as suggestive, rather than representing definitive evidence related to opportunistic behavior[5].

## 6. Conclusions

In this paper, we tried to answer the following question: do economists present a remarkably different behavior in laboratory experiments involving the provision of public goods? Given that economics courses tend to focus, on average, on individual and rational decisions, one could expect that subjects majoring in economics would tend to cooperate less often than non-majors.

Our results are somewhat surprising: when deciding on how much to contribute for a public good provision, economics majors tend to provide higher amounts than non-majors, on average. We also noticed that students in senior economics classes tend to cooperate more often than the ones in freshman classes. These results are in stark contrast with other contributions previously reported in the literature (Carter and Irons 1991; Frank, Gilovich and Regan 1993). Specifically, with the exception of Yezer, Goldfarb and Poppen (1996), all other studies cited in this paper present results where economics students are seen as more 'selfish' than students from other areas.

When analyzing these results, we present four possible reasons for the results reported. First, it is well known that one of the major difficulties related to experimental research is the difficulty in extrapolating results (external validity). This implies that the results reported here might not be valid to other settings. While this is a potential drawback of our work, we would suggest that this conclusion would be tested through the use of field experiments (List 2011).

Second, there is the possibility that, contrarily to what most authors previously emphasized, economics majors tend to play experimental games in a strategic way. Because of that, economics majors may contribute not because they more altruistic than

[4] See, for instance, Marwell and Ames (1981) and Carter and Irons (1991). On the other hand, Yezer, Goldfarb and Poppen (1996) provide results supporting the claim that subjects who major in economics actually tend to cooperate more often in collective-action experiments.

[5] When performing robustness tests, we noticed that, regardless of the econometric specification considered the 'Senior' variable remained statistically significant. In this setting, we tend to see such result as suggesting that senior economics majors tend to free ride less often than other subjects.

others, but because they are willing to receive higher payoffs in future rounds of the game. While this is an exploratory hypothesis, it would be interesting to test for the occurrence of strategic behaviors in public goods games, as originally proposed by Andreoni (1988). While this is not our goal in this paper, we suggest that future research address this kind of question.

Third, the fact that communication was not strictly forbidden during the experiment may have affected our results. Specifically, the experiments' subjects had the opportunity to talk to each other and possibly follow strategies during the experiment. Additionally, since subjects were classmates, we believe that the existence of social ties may have affected results. Because of this possibility, it would be interesting to repeat the same experiment in a setting where subjects did not have any previous relationships and where communication would be forbidden[6].

Finally, we may have found an unusually cooperative group of economics majors for our experiment. While this result was clearly not intentional, it is a possibility, given the relatively modest size of our sample. One future route of research would be to run the same experiment described here, but with larger groups of college students and see if the results still hold.

To sum up, the results reported in this paper are important for providing additional evidence related to the behavior of economists and their students. These results are interesting for the possibilities they open in terms of discussions related to the economics curriculum, a long-standing debate over the last decades (Klamer and Colander 1990; Colander 2007). We hope to see more experimental results related to economists' behavioral responses in collective-action settings in the near future as a means to provide a better understanding of their actions in real-life situations.

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