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Why do economists cooperate less? An experimental analysis on behavior heterogeneity

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RESUMEN

Los economistas han demostrado que se comportan de una manera más egoísta que sus pares. Esto puede ser porque los economistas son inherentemente más egoístas que los demás, lo que significa que se auto-seleccionan para su carrera, o puede ser que se vuelven más egoístas a medida que cursan su carrera universitaria. La heterogeneidad del comportamiento como motivo del egoísmo se aborda mediante un juego de dictador modificado. Por lo tanto, si los estudiantes de economía tienen una función de utilidad similar entre ellos, pero una que difiere de otros estudiantes, entonces podemos preguntarnos si ésta heterogeneidad en su comportamiento predice un comportamiento menos cooperativo por parte de los economistas en otras situaciones, como en un Dilema de Prisionero. Los resultados sugieren que los economistas se comportan de una manera más egoista que los demás, y que la exposición a los modelos económicos fomenta un comportamiento más egoísta; sin embargo, esto podría diferir cuando se hace una distinción entre una recompensa monetaria y una académica.

Palabras Clave: Economistas, cooperación, juego del dictador, dilema del prisionero, cuestionario de los cinco grandes, auto-selección, pago monetario, pago académico.

ABSTRACT

Economists have shown to behave in a more self-interested way than their peers because it may be that economists are inherently more selfish than others, meaning that they self-select themselves for their major, or it may be that they become more selfish as they go through college. Behavior heterogeneity as a motive for this selfish conduct is addressed by a modified Dictator Game. Therefore, if economics students have a similar utility function among themselves, but one that differs from other students, then we may ask whether this behavior heterogeneity predicts economists' less cooperative behavior in other situations, such as an in a one-shot Prisoner's Dilemma. Results suggest that economists behave in a more self-interested way than other students and that the exposure to self-interested models does in fact encourage a self-interested behavior; however, this might differ when a distinction between a monetary and an academic payoff is made.

Keywords: Economists, cooperation, Dictator Game, Prisoner's Dilemma, Big Five Questionnaire, self-selection, monetary payoff, academic payoff.

TABLA DE CONTENIDOS

ÍNDICE DE TABLAS

ÍNDICE DE FIGURAS

Introduction

Economists have consistently shown lower levels of cooperation and more selfishness than non-economists. Yet, selfish behavior may be driven by various reasons. For example, it may be the case that economists are inherently more selfish than others –which could mean that they self-select themselves for their major–, or that they become more selfish as they learn economics during college. Another motive might be that economists are more competitive and that is why they cooperate less with others; or that economics students have a wider view of situations, as they have a more macro thinking, and do not see utility in micro things, and that is why they do not cooperate when it comes to simple situations. Or simply, it may be the case that economics students share the same personality profile, which differs from non-economists.

In fact, there might be many reasons for economists to cooperate less than non-economists. In this paper we aim to link a person studying economics with selfish behavior focusing on several motives. More precisely, it focuses on two main hypotheses: First, is behavior heterogeneity a motive for this behavior? Second, if economics students have a similar utility function among themselves, but one that differs from other students, then we may ask whether this behavior heterogeneity predicts economists' less cooperative behavior in other situations.

We empirically test the first mechanism by comparing the decisions made by various students in a series of Dictator Games; the second one is tested in a Prisoner's Dilemma. The results show that economists, relative to their peers, tend to have a less cooperative behavior in both games, as they are 26.4% less likely to cooperate in the Prisoner's Dilemma, once they have played several rounds of a Dictator Game for money as a payoff. On the other hand, results report that participants with an economics major

act in a more pro-social manner, relative to their fellows, when they have points as an incentive, suggesting that economists value money more than they do points. The reasons behind this behavior are left for further investigations.

The findings of this study round to the benefit of society considering that cooperation in social dilemmas plays an important role on our daily basis. However, we want to test if a less cooperative behavior is not specific from economists but from business majors and engineers as well. Similarly, we implement personality traits as controls that will help us determine whether economics students in fact self-select themselves into the major. In general, an analysis of personality may provide us with a reliable characterization of standardized elements in the behavior of an individual. Plus, an analysis on self-selection in the economics major justifies the need to implement a a broader view of cooperation and motivation in their courses, as our results suggest that the more economics courses a person takes, the less likely they are to cooperate. Furthermore, we make an additional contribution by contrasting behavior when there are two different incentives (money and points), at the same time addressing this results by the self-selection analysis.

The paper is structured as follows. The next section describes some of the experiments that have tested similar hypotheses outlining the fact that economics students behave more selfishly than others. Then, the following section focuses on the mechanism and the empirical strategy used to analyze the main hypotheses, providing a description of the experimental design. Next, the experimental results are described and discussed. Finally, the conclusion is presented.

Literature Review

There is a broad literature that concludes that economics students behave more selfishly than other students. One of the first papers on this topic is written by Frank et al. (1993), where the authors argue that lower cooperation is caused in part by economics training in the sense that exposure to self-interested models encourages economists to behave in a more self-interested way. Nonetheless, there is another theory that says that it may be the case that economists are more selfish to begin with, and this is the reason why they chose to study economics. Wang et al. (2011) proves, in fact, that education in economics is associated with attitudes towards greed and self-interested behavior. For this reason, it is useful to complement the agent's microeconomic model by introducing a behavioral factor, such as fairness, that is usually ignored by standard models (Kahneman et al., 1986).

Similar hypotheses have been tested by many authors. For example, Marwell and Ames (1981) found that economists tend to free-ride -in a Public Good game- much more than any other group of subjects. However, the study by Marwell and Ames (1981) is conducted with economics graduate students, as compared to this paper where we concentrate in undergraduate students from different majors. As a result, participants (economists) only contributed around 20% of their initial endowment; and they did not even mention fairness in their answers about how they made their decision. In the same way, other articles conclude that economists may be less concerned about fairness, and that they have low expectations about others' fairness behavior, that being the reason to act more selfishly (Gerlach, 2017). Additional literature is presented by Frank et al. (1993), who reports that only 9.3% of their economics sample were pure free-riders; however, contrasting to the 2.9% - 4.2% of other disciplines (such as engineering, social

sciences, natural sciences, and others) who free-ride, economists were the least generous in a charitable giving experiment. On the other hand, Carter and Irons (1991) test the same hypothesis as Marwell's, but with an ultimatum bargaining game. Also, their analysis focuses more on the self-selection vs. learning hypothesis. Their results suggest that economists somehow self-select themselves into the major, as freshmen accept less and keep more in the ultimatum bargaining game.

In experimental economics internal validity is extremely important since we aim to predict human behavior when subjects are given some incentives. In this specific case, we use two incentives: money and points. Therefore, the incentives have to be clearly defined so that the participants are able to calculate the costs and benefits of every choice (Madsen and Stenheim, 2015). As mentioned before, economists are known for their relatively selfish behavior, and experiments with monetary allocations are a clear example of this. For example, Wang et al. (2011) shows that economics majors that have taken more economics courses keep more money in a monetary allocation situation. Additionally, experiments like third-party punishment are used to prove this hypothesis as it shows that economists are less willing to punish the unfair behavior of others – as it implies a cost for them. However, according to Gerlach (2017), economists do not behave in a more self-interested way because of their perception about fairness, but because of social norms.

Another theory suggests that economics students behave more selfishly because they are more skeptic about the fair behavior of other individuals. This theory derives from a more general theory about social norms, where people define some behavioral rules to certain social situations; for instance, there is an underlying assumption where people prefer to behave according to the social norms if other people follow the norms as well (Gerlach, 2017). In this context, economics students may share believes about

what is fair; however, they might not expect other people to behave fairly. Therefore, economists have a greater skepticism that reflects in more selfish behavior. As a consequence, this skepticism would make them behave in a more self-interested way, and therefore, less willing to sanction the norm deviant behavior of others. On the contrary, Strang and Park (2016) stand by the idea that people are willing to punish the lack of cooperation of the rest at the cost of their own costs, without obtaining any benefit in return.

On the other hand, Trust Games are not as common as others to test levels of cooperation; however, they have been used to evaluate a difference between economists and their peers. Haucap and Müller (2014) uses this specific game to show that economists are significantly less trustworthy and less trusting than law students. The authors make an extremely important contribution to the literature as they manifest that this difference is due to differences between women who study economics versus law.

Also, it has been found that economists are different not only from their peers, but from groups from a city population as well (Cappelen et al., 2015). Similarly to the studies mentioned previously, these authors try to evaluate several motives for people to be selfish, like equality, efficiency and reciprocity. As social norms and preferences must be taken into consideration, it is important to understand why people act the way they do and what is their motivation to behave in a specific way. It is also important to understand the importance given to different moral values to determine the behavior of the person in different social dilemmas. For example, the lost-envelope experiment by Frank et al. (1996) surprisingly reported that envelopes that were left in a room occupied by economists were more likely to be returned. Similarly, they found that even-though economists reported giving less to a charity than others, there is only a small difference of less than 10% on contributions compared to the others, suggesting

that training in economics also has some pro-social behavior consequences. However, Fehr and Fischbacher (2002) establish that economic reasoning is typically based on the assumption that all people are extremely motivated by their own interests; but, this rules out any heterogeneity with respect to any other motive of social preferences, in particular, preferences for fairness and reciprocity.

On the other hand, there is a large literature on behavior in the Prisoner's Dilemma. Understanding how individual differences influence games like the Prisoner's Dilemma can be an important step to explain the heterogeneity in behavior for this game. Moreover, cooperation in a Prisoner's Dilemma may be driven by other motives like efficiency, conditional cooperation, fear, and greed, which all seem to be positive and significant. That is why the Prisoner's Dilemma is used, because it is a game of multiple and interrelated reasons, where conditional cooperation is key. Interestingly, and consistent with the main hypothesis of this paper, Butler et al. (2011) established that people categorized as a "selfish dictator" type in such game, cooperated less than half of the times in a Prisoner's Dilemma.

As for the Prisoner's Dilemma, Kagel and McGee (2014) found that science and engineering students behave more selfishly than liberal arts students. Likewise, they incorporated the Big Five Questionnaire as they establish that cooperation in the first round of the game is related to the person's personality traits; mostly agreeableness, as one standard deviation in this factor, increases cooperation by 12,7% (Kagel and McGee, 2014). Such control could be useful for this investigation, as results from Lönnqvist et al. (2011) suggest that the Big Five dimensions are relevant predictors of moral behavior, therefore revealing one's true preferences. Similarly, an experiment on the effect of personality on cooperative behavior by Boone et al. (1999) uses 5 Prisoner's Dilemma games to demonstrate that personality matters. Pothos et al. (2011) explains

in a one-shot Prisoner's Dilemma how much of the human behavior can be explained by a bias for cooperation caused by the person's personality. However, articles like the one written by Engel and Zhurakhovska (2016) argue that there are experiments that confirm that personality tests can be insignificant.

Methodology

3.1 Experimental Design

Participants in the experiment played for two types of payoffs: money and points. First, participants played in 8 rounds of dictator games, and then they played a one-shot Prisoner's Dilemma. Afterwards, another 8 rounds of dictator games were displayed, followed by another one-shot Prisoner's Dilemma. Therefore, there were a total of 18 decisions for participants to make. Subsequently, they were asked to answer some questions regarding gender, age, major, etc.; they were also asked about their reasons for their actions during the experiment; and after those questions, they had to answer a questionnaire with 132 questions about personality.

3.2 Procedure

The experiment was programmed in z-Tree (Fischbacher, 2007). Through the program, we randomly assign participants to play for money or for points; and, the order in which participants played was as follows: we asked participants to answer eight stages of a Dictator Game. The first eight stages were randomly displayed to each participant, and each one was displayed only once. Then, participants had to play a one-shot Prisoner's Dilemma game to find if their preferences on the Dictator Game serve as a

predictor of cooperation in this game. If students were assigned at the beginning of the experiment to play for money in the first section, then in the Prisoner's Dilemma they kept playing for money; while, if they were assigned to play for academic points, they kept playing for points in the Prisoner's Dilemma.

Thereafter, participants began the second section of the experiment, but their payoff changed this time. Participants who were playing for money in the first section, played for academic points this time, and viceversa. They played eight more rounds of the Dictator Game, again randomly displayed to each participant. Next, the same one-shot Prisoner's Dilemma game was displayed, and they kept playing for the same payment method as the last eight tasks. After that, a payoff screen was displayed for each student. Later, students were asked to answer a questionnaire including questions such as age, gender, and a personality test. Each participant earned a monetary and an academic payoff which was structured in the following way: first we designed the program to randomly select one of the eight tasks, then we added the payoff obtained in the Prisoner's Dilemma for that section of the experiment. For the second section we used the same structure. At the end of the experiment the points and money the participants earned were displayed in their screens. Additionally, we payed them one dollar extra as a show-up fee.

There were 11 experimental sessions of 20 to 36 subjects each, resulting in a total of 304 subjects [1]. Each session was conducted as follows: first, all participants had to wait outside the laboratory until they were handled an envelope with a number. As a way of randomizing inside the laboratory, each participant had to sit on the computer with the same number as their envelope. Each envelope contained the informed consent and

[1] All sessions lasted from 70 minutes up to 120 minutes, and subjects earned an average of US$ 5.32 and 1.11 academic points

a payment form that subjects used to write down their earnings. Once they signed the informed consent, I read the instructions aloud, and afterwards the experiment began.

3.2.1 Dictator Games

As mentioned before, the first mechanism analyzed in this paper - behavior heterogeneity as a motive for selfish conduct - is addressed by a Dictator Game. However, we used a modified version of the Dictator Game, as each subject is given an initial endowment (m) which will be allocated given a different price for the payoffs. For instance, the endowment is structured as: $p_s\pi_s + p_o\pi_o = m$, where π_s is the payoff for self and π_o is the payoff of the other person, and p_s is the price for holding any amount of tokens up to m, and p_o is the price of passing tokens to their partners. For example, when $p_s = 1$ and $p_o = 3$ one point lost by the dictator, increases the receiver's payoff by three points (Engel, 2011). While on the contrary in a simple Dictator Game the endowment is only given by $\pi_s + \pi_o = m$ (Andreoni and Miller, 2002).

In total, the game consisted of 16 tasks or stages. Eight of them were designed for getting as a payoff any amount of money up to US$ 12.50, as the maximum they could have won in the Dictator Game was US$ 11.25 (assuming that in budgets 5 and 6, they chose to keep all tokens for them, and that their partner decided to pass all the tokens) plus the maximum they could have won in the Prisoner's Dilemma which was US$ 1.25 (assuming they chose to defect, and that their partner decided to cooperate), while the remaining eight stages were designed for getting any amount of points up to two. Each of the eight tasks was different, meaning that the initial endowment changed in every task as well as the value given to each action (Hold and Pass). Tokens were worth either 1, 2, or 3 points each. The total number of tokens available was either 40, 60, 75, or 100 (Andreoni and Miller, 2002). The allocation choices are shown in Table 1, and each one

of them was randomized in each round. In each task, the participant had to input any amount of the endowment that they were willing to pass to a stranger in the laboratory, and they were encouraged to use a calculator if needed [2].

Table 1: Allocations in the Dictator Games

Budget	**Initial endowment**	**Hold value**	**Pass value**
1	40	3	1
2	40	1	3
3	60	1	1
4	60	2	1
5	60	1	2
6	75	2	1
7	75	1	2
8	100	1	1

Source: Author's elaboration

Considering budget 1 in Table 1, transferring one token raises the other subject's payoff by 1 point, and reduces one's own payoff by 3 points. This implies that the price of the self-payoff (π_s) is 0.33 while the other's payoff (π_o) price is 1 (Andreoni and Miller, 2002). When values are 1 for hold and 1 for pass (as in budgets 3 and 8), the game is a regular Dictator Game.

In the instructions given to the participants, the examples included specific details about their possible earnings in dollars and in academic points [3]. The points earned in the experiment were expressed in E$ (experimental dollars), with an exchange rate of

[2]Following the same example given to the participants in the experiment, the game was played as follows:

Divide 50 tokens: Hold ____ tokens @ 1 point each, and Pass ____ tokens @ 2 points each.

In this case you must divide 50 tokens. You can choose to hold all tokens, hold some tokens and pass others, or you can pass all the tokens. In this example, you will receive 1 point for each token you hold, and another player will receive 2 points for every token you choose to pass. For example, you can choose to hold all 50 tokens and pass 0 tokens, then you will get 50 points and the other player will receive no points. On the other hand, if you hold 0 tokens and pass 50 tokens, you will receive 0 points and the other player will receive 100 points (50 x 2). However, you could choose to hold any number between 0 and 50. For example, you could choose to hold 29 tokens and pass 21 tokens. In this case you would earn 29 points, and the other player would receive 42 points (21 x 2) (Andreoni and Miller, 2002).

[3]The complete set of instructions can be found in Appendix A

20 E$ = 1 US$ for monetary payments, and 100 E$ = 1 academic point for their classes. Also, we told participants that each point they get would be worth 0.05 $US and 0.01 academic points.

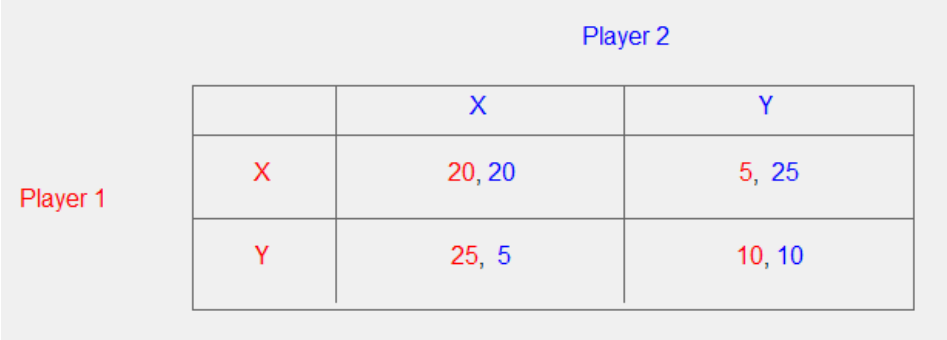
Finally, one week after the experiment [4], we paid the participants according to their performance in the experiment; in order words, we paid them according to the outcome showed at the end of the experiment. The average payment was 5.32 $US. As for the academic points, we sent a list with the points that each person won to the professor who was in charge of adding them to the student's final grade. On average participants received 1.11 academic points.

3.2.2 Prisoner's Dilemma

Given the distinction of the economists' preferences in the Dictator Games from the rest of majors, is it possible to predict their behavior in a Prisoner's Dilemma? After each section of eight rounds of different Dictator Games, students were asked to make a decision in a Prisoner's Dilemma. As the Prisoner's Dilemma is a simultaneous game, the participants did not know each other's decision until the payoff screen was shown at the end of the experiment. The payoff matrix shown in Figure 1, was the same one for each player at the moment of the experiment. Each person could have chosen one of the two possible actions: X or Y, and their payoff of this game depended on the decision that each player took and the decision taken by their partner.

[4] Payment was delayed for a week because of logistic issues as sessions were run one after the other then payments might have delayed the next session. All participants were fully informed about all aspects of the experiment including the delay in the payment so there was no deception implicated.

Figure 1: Prisoner's Dilemma Payoff Matrix



Source: Author's elaboration in zTree

Earnings in this game had the same exchange rate, meaning that the most that a participant could have won in this part of the experiment was 1.25 $US (25 x 0.05$) and 0.25 academic points (25 x 0.01); and the least they could have won was 0.25 $US (5 x 0.05$) and 0.05 academic points (5 x 0.01). At the end, the resulting payoff of this stage was added to the randomly chosen stage in the Dictator Game.

Standard theory predicts that people will always choose to defect in a one-shot Prisoner's Dilemma, as the key feature of such game is that defection is a dominant strategy. However, if both players choose to act in a self-interested way, they will end up with a lower payoff than if they chose to cooperate (Frank et al., 1993). Nonetheless, as always occurs in experiments of the Prisoner's Dilemma, this was not the case as the cooperation rate was higher when playing for money (53.29%) and for points (51.97%). More specifically, economists have a cooperation rate of 27.24% lower than non-economists when playing for money. When playing for points, economists still have a lower cooperation rate but only 14.20% lower. Clearly, this supports the hypothesis that economists behave in a more self-interested way than non-economists.

As the subjects played the game twice, it is expected that the actions would be the same for both cases. Nevertheless, in Table 2 we can see that cooperation rates vary

Table 2: Prisoner's Dilemma Results

	Order	Major	Action	Percentage
Money	Played for money first	Economists	Defect	50.00
			Cooperate	50.00
		Non-Economists	Defect	27.78
			Cooperate	72.22
	Played for money after	Economists	Defect	72.86
			Cooperate	27.14
		Non-Economists	Defect	42.68
			Cooperate	57.32
Points	Played for points first	Economists	Defect	64.52
			Cooperate	35.48
		Non-Economists	Defect	47.78
			Cooperate	52.22
	Played for points after	Economists	Defect	48.57
			Cooperate	51.43
		Non-Economists	Defect	35.37
			Cooperate	64.63

Source: Author's elaboration

according to which payoff they played for first. Half of the economists who played for money first decided to cooperate, whilst when they played for money after, their cooperation rate declined to 27.14%. On the contrary, when economists played for points first, their cooperation rate was lower (35.48%) and rose as they played for points afterwards (51.43%). Therefore, we can see that economists changed their action the second time they played the Prisoner's Dilemma; however, it depends on the payoff they are playing for, as cooperation declines when playing for money, but it rises when playing for points. On the other hand, non-economists cooperation rates behave in the same way than economists, meaning that they cooperation rate declined as they played for money after, but it rose when they played for points after. Nonetheless, it is interesting that for

non-economists, cooperation rates are always higher than economists. Overall, more than half of the non-economics students decided to cooperate in every case.

3.2.3 Questionnaire

We used a psychological test as another control because cooperating behavior may be fostered by personality traits reflecting either favorable inclination to others or willingness to comply with norms and rules (Rustichinib, 2013). Therefore, we want to test the importance of personality in an experiment were subjects provide information about their preferences about cooperation in different situations. The test we use is known as the Big Five Questionnaire, and it measures what many psychologists consider to be the five dimensions of a person's personality (Caprara et al., 2007). We use this model because it proposes five fundamental dimensions for the description and evaluation of personality that are situated at a level of intermediate generality with respect to the models that defend a few extremely general dimensions (such as Eysenck (1978) superfactors, the sixteen factors of Cattell (1956), the thirteen of Martin (1945) and the eight of Comrey and Backer (1970)). Therefore, the Big Five are configured as an adequate and integrating structure for the description of personality in natural language, and in the context of personality questionnaires.

Like any personality test, it is necessary for the person to answer the questions with sincerity and seriousness. Similarly, there are no right or wrong answers. The optimal outcome is to select the answer that most accurately reflects each individual. This test is aimed at the general population older than 16 years old, and it can be applied individually or collectively. The test includes 132 questions with a Likert scale which goes from 1 (Completely false to the individual) to 5 (Completely true to the individual). If more than 10% of responses are blank, the test is invalidated.

As mentioned before, this test proposes five dimensions that are fundamental for the description and evaluation of a person's personality within a general level compared to other tests which can be really broad (Caprara et al., 2007). Additionally, the test uses a day-to-day language as a better descriptor for personality. "In this sense, these Big Five Factors also represent the point of convergence between the implicit theories of personality based on the knowledge/beliefs of ordinary people that permeate the lexicon related to personality and the explicit theories of personality, based on the knowledge accumulated from scientific research" (Caprara et al., 2007, p. 4).

The questionnaire we used in this analysis has as an objective to incorporate and evaluate five dimensions, 10 personality subdimensions (which make reference to different aspects of the dimension that incorporates them), and a distortion scale. These dimensions and the distortion scale are described next.

- Energy (E): describes a confident and enthusiastic vision of multiple aspects of life, mainly interpersonal.
  - Dynamism (Di): it relates to an energetic, dynamic and enthusiastic behavior.
  - Dominance (Do): evaluates the ability to impose its own influence on others.
- Affability (A): measures altruistic concern and emotional support to others.
  - Cooperation (Cp): evaluates the ability to understand the problems and needs of others and cooperate effectively with them.
  - Cordiality (Co): measures aspects related to affability, trust and openness towards others.

- Tenacity (T): determines the capacity of auto-regulation and self-control. Typical of perseverant, scrupulous and responsible behavior.
  - Conscientiousness (Es): measures aspects related to meticulous reliability and love for order.
  - Perseverance (Pe): weights persistence and tenacity with which people carry out tasks and activities, and not to miss what was promised.
- Emotional stability (EE): assesses a broad-spectrum trait, with characteristics such as ability to cope with the negative effects of anxiety, depression, irritability or frustration.
  - Emotion control (Ce): measures aspects concerning the control of the tension states associated with the emotional experience.
  - Pulse control (Ci): measures aspects related to the ability to maintain control of one's behavior even in situations of discomfort, conflict and danger.
- Mental openness (AM): judges especially of an intellectual nature in the face of new ideas, values, feelings and interests.
  - Openness to culture (Ac): measures the aspects that concern the interest to stay informed, interest in reading and interest in acquiring knowledge.
  - Opening to experience (Ae): evaluates the capacity to consider each thing from different perspectives and to the favorable grip towards values, styles, ways of life and different cultures.

Distortion Scale (D): consists of 12 elements and is intended to provide a measure of the tendency to offer a false profile of a subject when responding to the questionnaire.

- It is very useful to detect possible attempts to give a distorted image (good or bad) by the subject.

- A very high score on this scale is considered as an intentional way to provide an artificially positive self-image; on the contrary, a very low score is considered as an intentional tendency to provide an artificially negative self-image (Caprara et al., 2007).

As for the correction of the questionnaire, it was done manually, by using six correction templates. In each of the five main dimensions, two subdimensions have been identified, and refer to different aspects of the dimension itself. In each subdimension (composed of 12 elements), half of the statements have been formulated in a positive way with respect to the construct of the scale, while the other half is formulated in a negative way, in order to control for response biases.

Each subdimension is evaluated using the following equation:

$$Subdimension = 36 + positivepoints + negativepoints \tag{1}$$

Both subdimensions –of each general factor– must be added in order to get the punctuation of the dimension itself. This process must be repeated for all dimensions. Afterwards, for an adequate interpretation of the scores obtained, it is necessary to transform them into more universal scores such as a T-score. This T-score constitutes a typical scale and a constant unit, with an average value of 50 and a standard deviation of 10 points. Thus, "with this differential analysis in T scores, it is intended to know their proximity or distance from the value obtained by the primitive sample" (Caprara et al., 2007). Then, each dimension is categorized according to Table 3, and each subject is

analyzed according to the degree and the adjective. The adjective of each degree is related to the position of the empirical score with the position on a scale of five categories, from a very little grade to a very (much) grade. The adjectives of degree are given below in Table 3.

Table 3: BFQ: T-Scores

Degree	**T Score**	**Adjective**
5	66-99	Very (much)
4	56-65	Quite
3	46-55	Moderately
2	36-45	Little
1	1-35	Very little

Source: Author's elaboration

Descriptive Statistics

4.1 Participants

The study was conducted at Universidad San Francisco de Quito at the beginning of the 2018-2019 Spring semester.[5] The participants were students from different majors and different semesters. They were recruited from specific courses, as teachers had to agree to give students some points. We chose ten classes, five of economics and five of non-economics subjects. 408 students signed up for the experiment, from which 304 students participated. From these, 132 (43.4%) studied economics and 172 (56.6%) studied a non-economics major such as psychology, business, engineering, publicity, among others. The median age was 21 and 159 (52.3%) were female while 145 (47.7%) were male.

[5]To participate in this study all participants had to agree and sign an informed consent. No participant chose to leave the experiment.

We divided the non-economics sample into four categories. Universidad San Francisco de Quito divides their undergraduate majors into schools. First, there is CADE which includes Finance, Business Administration, Marketing, and Economics; however, for the purpose of our analysis, Economics majors are considered as a separate group. Therefore, CADE includes only non-economics majors. As it turns out, this group is conformed by 66.2% of males (see Table 5). Second, COSISOH is the school which includes more humanities-based majors such as Psychology, International Relations, and Contemporary Arts. Third, majors such as Communication, Journalism, Publicity, Architecture, Nutrition, Dentistry, Veterinary, and others were grouped as "Others" because the sample for each major was very small. As opposed to the first group, both of these groups are conformed mostly by women, with 74% and 71% respectively. We kept Engineering as a separate group -even though we have a small sample- because they have different characteristics compared to the other two groups, as 58.8% of them are male. In terms of age, all groups are conformed by people around 20-21 years old, except from the engineers, which appear to be a little bit younger as they have an average age of 18.59.

4.2 Descriptive Statistics

Table 4 presents descriptive statistics of all the dependent and independent variables used in our econometric models, both when using points and when using money as payoffs. Additionally, Table 4 presents these statistics for the whole sample and for the two main groups: economics and non-economics students; and, it reports p-values from the Mann-Whitney test. The first two variables are dummy variables which are equal to 1 if the students decided to cooperate, and 0 otherwise. In general, economics students

Table 4: Descriptive Statistics: General Groups

	Whole sample		Economists		Non-economists		Mann–Whitney
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	p-value
Prisoner's Dilemma							
Cooperation (money)	0.53	0.50	0.38	0.49	0.65	0.48	0.000
Cooperation (points)	0.52	0.50	0.44	0.50	0.58	0.49	0.014
Dictator Games							
Offer (money)	17.18	13.12	14.35	14.25	19.36	11.77	0.000
Offer (points)	16.96	11.99	13.76	12.18	19.41	11.28	0.000
Demographics							
Female	0.52	0.50	0.52	0.50	0.53	0.50	0.810
Age	20.90	2.29	21.18	2.06	20.68	2.43	0.002
Economics exposition							
ECON courses	5.15	5.55	9.68	5.77	1.68	1.07	0.000
Personality							
Energy	2.98	1.13	3.02	1.14	2.95	1.12	0.637
Affability	2.18	1.08	2.15	1.13	2.21	1.04	0.511
Tenacity	3.13	0.97	3.25	1.00	3.05	0.95	0.071
Emotional Stability	2.08	0.96	2.08	0.98	2.08	0.95	0.888
Mental Openness	2.79	0.98	2.87	1.04	2.73	0.92	0.208
Observations	304		132		172		

Source: Author's elaboration

have lower average rates of cooperation than non-economics students in both games (the Dictator Games and the Prisoner's Dilemma). Interestingly, looking at Table 5 we can see that engineering students have a higher average of offers (made in the Dictator Games) than economists; however, they are not statistically significant, meaning that both groups offered similar quantities. Among economics students the Table 4 reports that on average subjects decided to cooperate more when playing for points (avg.=0.44, SD=0.50) than for money (avg.=0.38, SD=0.49 respectively). However, non-economics students present an average of 0.58 (SD=0.49) in cooperation for points versus an average of 0.65 (SD=0.48) in cooperation for money.

Table 5: Descriptive Statistics: Non-economics subgroups

	CADE non-econ		M–W	COSISOH		M–W	Others		M–W	Engineering		M–W
Variable	Mean	Std. Dev.	p-value	Mean	Std. Dev.	p-value	Mean	Std. Dev.	p-value	Mean	Std. Dev.	p-value
Prisoner's Dilemma												
Cooperation (money)	0.61	0.49	0.002	0.68	0.47	0.000	0.74	0.44	0.00	0.59	0.51	0.099
Cooperation (points)	0.49	0.50	0.516	0.74	0.44	0.000	0.61	0.50	0.082	0.47	0.51	0.808
Dictator Games												
Offer (money)	18.61	11.26	0.005	21.40	13.04	0.000	18.92	10.38	0.037	17.38	12.61	0.211
Offer (points)	19.25	11.39	0.000	20.74	11.48	0.000	18.49	10.32	0.043	17.86	12.46	0.156
Demographics												
Female	0.34	0.48	0.014	0.74	0.44	0.006	0.71	0.46	0.051	0.41	0.51	0.424
Age	20.49	2.37	0.001	21.54	2.48	0.761	20.90	2.27	0.384	18.59	1.37	0.000
Economics exposition												
ECON courses	2.16	1.23	0.000	1.54	0.84	0.000	1.13	0.67	0.000	1.00	0.35	0.000
Personality												
Energy	3.23	1.10	0.236	2.86	1.23	0.466	2.65	0.98	0.111	2.59	0.87	0.157
Affability	2.32	1.02	0.198	2.20	1.05	0.688	2.03	1.05	0.649	2.06	1.09	0.764
Tenacity	3.09	0.88	0.288	3.12	0.98	0.376	2.68	0.98	0.005	3.29	0.99	0.978
Emotional Stability	2.28	1.01	0.132	1.88	0.90	0.250	1.87	0.72	0.424	2.18	1.07	0.767
Mental Openness	2.50	0.93	0.011	3.00	0.97	0.412	2.94	0.77	0.716	2.53	0.80	0.121
Observations	74			50			31			17		

Note: Mann-Whitney test refers to economists compared to each non-economist group.
Source: Author's elaboration

Just as stated in the main hypothesis of this paper, offers made in the Dictator Game show a similar pattern to the actions in the Prisoner's Dilemma: in the same way that in the Prisoner's dilemma economists have lower cooperation rates than non-economists, in the Dictator Games, economists offer on average less than non-economists. However, we can see some differences regarding the behavior within groups comparing money and points. For example, economists offer an average of 14.35 tokens (SD=14.58) when playing for money, compared to 13.76 (SD=15218) when playing for points. On the contrary, non-economics present a similar average for monetary offers (avg.=19.36, SD=11.77) as academic ones (avg.= 19.41, SD=11.28).

A deeper analysis can be conducted by splitting non-economics students into subgroups, as reported in Table 5. CADE non-economists and Engineers appear to have a similar behavior as economists when playing for points, as shown by insignificant p-values for the Mann-Whitney test for cooperation. On average, they offer around 19.25 (SD=11.39) and 17.86 (SD=12.46) tokens when playing for points, compared to an average of 18.61 (SD=11.26) and 17.38 (SD=12.61) tokens offered when playing for money, respectively.

The number of economic courses taken is an independent variable used to isolate the self-selection vs. education effects. The average for economists is 9.68 economics courses (SD=5.77), compared to the subgroups that have taken an average of 2.16 (SD=1.23), 1.54 (SD=0.83), 1.13 (SD=0.67) and 1 (SD=0.35) economics courses, respectively.

Personality variables do not have a clear pattern. For example, the variable measuring tenacity is the only one that shows a significant coefficient of 0.071 for the test of economists versus non-economistes in Table 4. Nonetheless, when we split the sample into smaller groups (see Table 5), we can see that CADE majors show a significant

coefficient which means that this groups is statistically similar to economists when it comes to mental openness, meaning that both groups have similar thoughts about openness to culture and experiences. On the other hand, there is no personality trait that is statistically similar from the students in COSISOH compared to economists. However, when analyzing the Mann-Whitney coefficients for ”Others” versus economists, we find that there is a clear similarity between this two groups when it comes to tenacity, that being the reason for the significant coefficient when comparing general groups in Table 4. Therefore, we can see that this particular dimension is significant for ”Others”, suggesting that both groups (economists and ”Others”) are pretty similar regarding conscientiousness and perseverance. Also, results from the Mann-Whitney test show that the majority of the coefficients for personality are insignificant; therefore, we can conclude that personality traits give us an exogenous explanation that there is in fact a problem of self-selection.

Results

5.1 Monetary Payoffs

In Table 6 we display the coefficients and standard errors for the probit model when playing for money. In all the models presented in the table, the dependent variable is 1 if subjects cooperated in the Prisoner’s Dilemma, and 0 if they defected (when playing for money). Column (1) only reflects a basic regression where "Offer" stands for an average of the offers made by the participants in the Dictator Games. In column (2) we add a dummy variable called Economist which takes the value of 1 if the participant is an economics student, and 0 otherwise. This dummy Economist is significant, but it

Table 6: Probit: cooperation in the Prisoner's Dilemma for general groups (Payoff: Money)

Dependant variable: Cooperation in the Prisoner's Dilemma when playing for money								
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8) ME**
Offer (money)	0.027***	0.024***	0.022***	0.020***	0.020***	0.021***	0.023***	0.009***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.002)
Economist		-0.608***	-0.317	-0.293	-0.292	-0.261	-0.217	-0.086
		(0.153)	(0.215)	(0.218)	(0.221)	(0.221)	(0.224)	(0.089)
ECON courses			-0.039*	-0.042**	-0.043*	-0.048**	-0.055**	-0.022**
			(0.021)	(0.021)	(0.022)	(0.022)	(0.023)	(0.009)
Order				0.480***	0.487***	0.459***	0.457***	0.180***
				(0.152)	(0.153)	(0.156)	(0.158)	(0.061)
Female					0.063	-0.040	-0.049	-0.020
					(0.154)	(0.166)	(0.173)	(0.069)
Age					0.005	0.019	0.037	0.015
					(0.035)	(0.037)	(0.038)	(0.015)
Energy						-0.082	-0.066	-0.026
						(0.081)	(0.082)	(0.033)
Affability						0.192**	0.221**	0.088**
						(0.086)	(0.088)	(0.035)
Tenacity						0.059	0.060	0.024
						(0.087)	(0.089)	(0.035)
Emotional Stability						-0.060	-0.086	-0.034
						(0.084)	(0.087)	(0.035)
Mental Openness						-0.117	-0.131	-0.052
						(0.092)	(0.095)	(0.038)
Session dummies							YES	YES
Constant	-0.380***	-0.057	0.049	-0.168	-0.311	-0.430	-0.946	-0.946
	(0.123)	(0.149)	(0.158)	(0.172)	(0.733)	(0.872)	(0.912)	(0.912)
Observations	304	304	304	304	304	304	304	304

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Author's elaboration

loses its significance as soon as the number of economics courses taken by the subject (ECON courses) is added in column (3).

In column (4) we include a dummy variable called "Order" which is equal to 1 for the subjects who played for money in the first part of the experiment (meaning they played for points afterwards), and 0 if they played for points first. Then, in column (5) we add some basic demographic variables -gender and age- obtained from the questionnaire at the end of the experiment. Adding these controls to the variables was not

relevant for the analysis of this paper. Next, in column (6) we include the Big Five personality traits (energy, affability, tenacity, emotional stability, and mental openness). Finally, dummies for sessions were included (not reported) in column (7).[6]

Marginal effects from the probit model are reported in column (8), which can be interpreted as each variable's percentage effect on cooperation in the Prisoner's Dilemma. First, we can see that the effect of the variable "Offer (money)" is significant and positive, meaning that each additional token that subjects gave in the eight rounds of the Dictator Game (when playing for money) is related to a 0.92% increase in the likelihood of cooperation later in the Prisoner's Dilemma, supporting our first hypothesis that behavior in the Dictator Game serves as a predictor of cooperation in a Prisoner's Dilemma. As mentioned before, the dummy Economist shows a negative but insignificant marginal effect. As for the variable ECON courses, the negative and significant result suggests that economists do not self-select themselves for the major because of their selfishness; rather they become more selfish throughout their career. The marginal effect shows that each additional economics course is associated with a probability of cooperation in a Prisoner's Dilemma of 2.2% less.

The marginal effect for the variable "Order" is positive and significant at 1%, and it suggests that participants who first played for money have a probability of cooperating in the Prisoner's Dilemma (when playing for money) of 18% more than the ones who played for points first. Interestingly, the dummy for female is not robust but the marginal effect is negative. This shows that women do not cooperate more than men, as opposed to what is often found in the literature.

[6]When including dummies for the time and day that sessions were carried out, the results showed that in half of the sessions people cooperated less than the two sessions ran Tuesday and Thursday at 2:30 PM (the omitted category).

Table 7: Probit: cooperation in the Prisoner's Dilemma for subgroups (Payoff: Money)

Dependant variable: Cooperation in the Prisoner's Dilemma when playing for money								
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8) ME**
Offer (money)	0.027***	0.024***	0.022***	0.020***	0.020***	0.022***	0.023***	0.009***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.002)
CADE non-econ		-0.397	-0.355	-0.430	-0.433	-0.569*	-0.621**	-0.243**
		(0.282)	(0.282)	(0.285)	(0.294)	(0.307)	(0.312)	(0.117)
COSISOH		-0.255	-0.234	-0.227	-0.224	-0.281	-0.320	-0.127
		(0.304)	(0.304)	(0.309)	(0.310)	(0.313)	(0.314)	(0.123)
Engineering		-0.416	-0.421	-0.440	-0.450	-0.577	-0.727*	-0.276*
		(0.392)	(0.390)	(0.397)	(0.415)	(0.423)	(0.442)	(0.149)
Economics		-0.900***	-0.596*	-0.608*	-0.613*	-0.669**	-0.675**	-0.264**
		(0.265)	(0.310)	(0.314)	(0.318)	(0.320)	(0.317)	(0.12)
ECON courses			-0.038*	-0.040*	-0.040*	-0.045**	-0.053**	-0.021**
			(0.021)	(0.021)	(0.022)	(0.022)	(0.022)	(0.009)
Order				0.502***	0.502***	0.474***	0.476***	0.188***
				(0.155)	(0.155)	(0.158)	(0.160)	(0.062)
Female					0.000	-0.117	-0.134	-0.053
					(0.163)	(0.175)	(0.183)	(0.072)
Age					-0.005	0.007	0.024	0.009
					(0.036)	(0.037)	(0.039)	(0.015)
Energy						-0.069	-0.057	-0.023
						(0.082)	(0.083)	(0.033)
Affability						0.204**	0.233***	0.093***
						(0.088)	(0.090)	(0.036)
Tenacity						0.080	0.081	0.032
						(0.089)	(0.090)	(0.036)
Emotional Stability						-0.044	-0.074	-0.030
						(0.085)	(0.088)	(0.035)
Mental Openness						-0.160*	-0.175*	-0.070*
						(0.096)	(0.101)	0.040
Session dummies							YES	YES
Constant	-0.380***	0.234	0.314	0.121	0.218	0.165	-0.187	
	(0.123)	(0.267)	(0.270)	(0.277)	(0.824)	(0.942)	(0.970)	
Observations	304	304	304	304	304	304	304	304
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Source: Author's elaboration

Finally, among these five dimensions of the Big Five questionnaire, only affability has a significant marginal effect on cooperation. This makes intuitive sense, as this dimension measures altruism. Each additional point increase in affability is associated with an 8.8% increase in the likelihood of cooperation in the Prisoner's Dilemma.

Table 7 has the same column structure as Table 6, but instead of a dummy variable for economists in column (2), in Table 7 we divided the sample into 5 categorical dummies for the subgroups (CADE non-econ, COSISOH, Others, Engineering, and

Economics), and we used ”Others” as the omitted group. Analyzing the marginal effects for all the groups, we can see that all of them are negative, and only COSISOH is not significant. Interestingly, economists have a probability of cooperating 26.42% lower than the subjects who study Communication and other majors. Looking at engineers and CADE majors, we find that they have a negative cooperation rate as well -as suggested by the literature- and the closest to the economists. The probability of cooperation for Engineering is 27.64% less, although only marginally significant. Thus, our results show that economists are not the only ones who behave in a more self-interested way, but there are other majors (CADE and engineering) that are less likely to cooperate in relation to "Others". Additionally, even though the sample for Engineering was not as large, they were kept as another group because studies such as Kagel and McGee (2014) have shown that students from engineering and science have a lower probability of cooperation than liberal arts students. Likewise, there is substantial evidence that business students (CADE non-econ) are less altruistic and less cooperative than their peers, as they tend to move towards a free-riding behavior in Public Good Games (Cadsby and Maynes, 1998).

Therefore, we can confirm that self-selection is a possibility because the marginal effect for economics is significant compared to the "Others" group. This means that there are in fact some differences between these groups. Thus, we can conclude that self-selection depends on who we compare with. For example, comparing psychologists with economists, Muñoz-Izquierdo et al. (2014) show that when altruistic instincts affect an action, anti-social behavior decreases for psychologists. Nonetheless, these differences do not necessarily apply for all groups of non-economists; rather we find that groups such as CADE and engineering have something in common with economists (as the three groups have significant marginal effects) that makes them different from

the others, i.e. it is not that there is no self-selection, but it depends on the comparison group.

Despite of the existence of self-selection, the marginal effect of the number of economic courses (ECON courses) shows that each additional economics course is associated with a probability of cooperation in a Prisoner's Dilemma of 2.1% less. Although the marginal effect of studying economics is around 12 times larger than the marginal effect of economics courses, it is important to recall that the marginal effect of the courses is cumulative, so for each additional economics course. As economists take on average 5.15 economics courses, this adds up to an effect of around 8% less cooperation relative to "Others", who on average take 1.13 courses. Similarly, Wang et al. (2011) show that as more economics courses an economist has taken, the more money is kept in a Dictator Game. On the contrary, Frank et al. (1993) found that defection rates decline towards graduation, meaning that economics underclassmen defect more than upperclassmen, which is inconsistent with the theory that the exposure to economics courses tend to lower cooperation rates for economists. However, when they decided to test for specific economic courses vs. a non-economic course, results showed that students in the economic courses who appeared to be less cynical at the beginning of the semester, ended up showing a higher level of cynicism at the end of the semester; once again, confirming the theory that the exposure to self-interested models inhibits cooperation.

Furthermore, marginal effects from the rest of the variables appear to be really similar to the ones reported in Table 6, with the only exception of a personality trait called mental openness. Once again, among these five dimensions, affability and mental openness have significant marginal effects on cooperation. For each additional point increase in the mental openness score, the less likely the subject is to cooperate, meaning that

Table 8: Probit: cooperation in the Prisoner's Dilemma for general groups (Payoff: Points)

Dependant Variable: Cooperation in the Prisoner's Dilemma when playing for points								
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Offer (points)	0.029***	0.027***	0.024***	0.023***	0.023***	0.022***	0.021***	0.008***
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.003)
Economist		-0.222	0.081	0.062	0.124	0.129	0.151	0.060
		(0.151)	(0.217)	(0.218)	(0.222)	(0.223)	(0.228)	(0.091)
ECON courses			-0.041*	-0.041**	-0.055**	-0.055**	-0.059**	-0.024**
			(0.021)	(0.021)	(0.022)	(0.022)	(0.023)	(0.009)
Order				-0.319**	-0.320**	-0.325**	-0.333**	-0.132**
				(0.150)	(0.151)	(0.153)	(0.153)	(0.060)
Female					0.179	0.140	0.125	0.050
					(0.152)	(0.161)	(0.162)	(0.064)
Age					0.084**	0.087**	0.094**	0.038**
					(0.039)	(0.038)	(0.038)	(0.015)
Energy						-0.078	-0.076	-0.030
						(0.079)	(0.080)	(0.032)
Affability						0.129	0.139*	0.055*
						(0.079)	(0.079)	(0.032)
Tenacity						-0.078	-0.078	-0.031
						(0.085)	(0.085)	(0.034)
Emotional Stability						0.013	-0.003	-0.001
						(0.083)	(0.084)	(0.033)
Mental Openness						0.029	0.026	0.010
						(0.089)	(0.089)	(0.036)
Session dummies							YES	YES
Constant	-0.436***	-0.306*	-0.192	0.001	-1.796**	-1.743*	-1.704*	-1.704*
	(0.128)	(0.157)	(0.167)	(0.188)	(0.816)	(0.897)	(0.906)	(0.906)
Observations	304	304	304	304	304	304	304	304
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Source: Author's elaboration

people who consider things from different perspectives have a 7% lower probability of cooperation. Dummies for sessions were included as well (not reported).

5.2 Academic Payoffs

In Table 8, we report marginal effects when playing for points. The dependent variable is still 1 for cooperation and 0 for defection, but this time subjects are playing for academic points. In column (1) we use the same basic regression from the previous

table, only now the variable "Offer" stands for an average of the offer made by participants in the Dictator Games when playing for points. Taking this into consideration, the column structure of this table is the exact same one as in Table 6. Therefore, we can analyze only the marginal effects reported in column (8). Subjects who gave more in the eight rounds of the Dictator Game decided to cooperate more in the Prisoner's Dilemma (with an additional probability of 0.8% for each additional token given), once again supporting our hypothesis about behavioral prediction. However, when we compare with Table 6 we can see that people are less willing to cooperate when playing for points than for money.

Surprisingly, the dummy Economist shows a positive (yet insignificant) marginal effect, reporting that economics students are 6% more likely to cooperate when playing for points. Nonetheless, the variable ECON courses has a negative and significant result, suggesting that economists are less willing to cooperate as they move along their career. The marginal effect shows that each additional economics course is associated with a 2.4% lower probability of cooperation in a Prisoner's Dilemma. Thus, we can infer that the more economic courses that a participant has taken, the less likely they are to cooperate in the Prisoner's Dilemma.

The dummy variable "Order" in this case turns out to have a negative and significant marginal effect on cooperation. When subjects were randomly assigned to play for money first, they were 13.2% less likely to cooperate when they had to play for points in the second part of the experiment. One of the reasons might be that students have a higher appreciation for academic points than they have for money; or, as they learned the structure of the game throughout the experiment, in its second part they reasoned that they should cooperate less.

Regarding gender, compared to Table 6, the coefficient's sign is now positive, although still insignificant. Age is also positive but significant, meaning that participants who are older have a 3.8% higher cooperation rate when playing for points.[7] Similarly, Frank et al. (1993) shows that older students tend to have higher concerns for the social matters, as compared to the ones who tend to free-ride in a experiment. Likewise, Engel (2011) suggests that the older that people gets, the more generous the split of the pie is.

Next, looking at the five dimensions from the Big Five Questionnaire mentioned before, the results show that affability is the only dimension that has a significant marginal effect on cooperation, meaning that people who are able to understand the problems and needs of others are 5.5% more likely to cooperate in the Prisoner's Dilemma. This results seems somewhat larger when playing for money than for points. Lastly, we add the category dummies for the groups of sessions (not reported) according to date and time.[8]

Table 9 has the same column structure as Table 7 (with the same non-economics subgroup division), but instead of having money as the payoff, we have an academic incentive. Analyzing the marginal effects for all the groups, we can see that there are major differences for the groups. First of all, CADE non-econ and engineering marginal effects on cooperation are now insignificant. On the other hand, psychologists and the other participants that conform the group COSISOH have now a positive -although insignificant- cooperation rate compared to the "Others". In the same way, economics have an insignificant, but more surprisingly, positive marginal effect on co-

[7]The distribution of sample according to age presents three outliers. However, when excluding them from the sample, the results in general do not differ. Age, however becomes insignificant in that case. Nonetheless, we decided to keep the outliers as they are part of the distribution of the sample.

[8]An overview of the respective groups formed by sessions is provided in Appendix B

Table 9: Probit: cooperation in the Prisoner's Dilemma for subgroups (Payoff: Points)

Dependant Variable: Cooperation in the Prisoner's Dilemma when playing for points								
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8) ME**
Offer (points)	0.029***	0.027***	0.024***	0.023***	0.023***	0.022***	0.021***	0.009***
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.003)
CADE non-econ		-0.341	-0.299	-0.259	-0.191	-0.175	-0.236	-0.094
		(0.284)	(0.284)	(0.285)	(0.289)	(0.305)	(0.313)	(0.124)
COSISOH		0.334	0.352	0.349	0.305	0.344	0.308	0.121
		(0.307)	(0.307)	(0.308)	(0.307)	(0.312)	(0.313)	(0.120)
Engineering		-0.351	-0.355	-0.363	-0.201	-0.160	-0.236	-0.094
		(0.405)	(0.402)	(0.406)	(0.420)	(0.421)	(0.422)	(0.166)
Economics		-0.322	-0.010	-0.009	0.078	0.112	0.088	0.035
		(0.266)	(0.314)	(0.315)	(0.318)	(0.324)	(0.327)	(0.130)
ECON courses			-0.039*	-0.040*	-0.051**	-0.051**	-0.055**	-0.022**
			(0.021)	(0.021)	(0.022)	(0.022)	(0.023)	(0.009)
Order				-0.291*	-0.300**	-0.307**	-0.313**	-0.124**
				(0.151)	(0.152)	(0.154)	(0.154)	(0.061)
Female					0.092	0.064	0.041	0.016
					(0.157)	(0.167)	(0.168)	(0.067)
Age					0.064	0.069*	0.074*	0.030*
					(0.040)	(0.040)	(0.039)	(0.015)
Energy						-0.068	-0.066	-0.026
						(0.080)	(0.081)	(0.032)
Affability						0.135*	0.146*	0.058*
						(0.080)	(0.080)	(0.032)
Tenacity						-0.077	-0.076	-0.030
						(0.085)	(0.086)	(0.034)
Emotional Stability						0.026	0.009	0.004
						(0.084)	(0.084)	(0.033)
Mental Openness						-0.005	-0.012	-0.005
						(0.091)	(0.091)	(0.036)
Session dummies							YES	YES
Constant	-0.436***	-0.205	-0.118	0.044	-1.333	-1.319	-1.185	-1.704*
	(0.128)	(0.267)	(0.270)	(0.283)	(0.902)	(0.979)	(0.987)	(0.906)
Observations	304	304	304	304	304	304	304	304

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Author's elaboration

operation when compared to the omitted category. Thus, we can conclude that there are no significant differences between mayors when cooperating for an academic payoff.

Next, we were not able to find any significant differences for the marginal effect of the number of ECON courses, compared to Table 7. The more economic courses that a participant has taken, the less likely they are to cooperate in the Prisoner's Dilemma.

Thus, for each additional economic course taken, subjects are 2.2% less likely to cooperate when playing for points. Also, referring to Table 8, and according to what we mentioned in the previous paragraph, it seems that there is no self-selection because there is not a big difference between economists and the rest of the participants, and because the effect of ECON courses is still robust in both cases.

The dummy "Order" in this case turns out to have a negative and significant marginal effect on cooperation. Subjects who were randomly assigned to play for money first, report to have a negative effect on their cooperation rate when they had to play for points in the second part of the experiment; they are 12.4% less likely to cooperate. Once again, one of the reasons may be that students have a higher appreciation for an academic incentive than for a monetary one. When we take a look at the marginal effects of the demographic variables (gender and age), the dummy for female is now positive but still insignificant. Equally, age is also positive but significant this time (compared to Table 7).

Next, when we look at the 5 personality traits from the Big Five Questionnaire, the results show that affability is the only dimension that has a significant marginal effect on cooperation, meaning that people with more trust and openness to others are 5.8% more likely to cooperate in the Prisoner's Dilemma when playing for points. Finally, we add dummies for the groups of sessions according to date and time which are not reported.[9]

[9]The results for these non-reported dummies varied from Table 7 to Table 9, as none of the categories are significant anymore, meaning that neither the time nor the day had a different effect on cooperation when academic points were the reward.

Conclusion

The purpose of this work is to determine the difference in cooperation between economics students and their peers, recruited from different majors at Universidad San Francisco de Quito, in Ecuador. The results were obtained by using an experimental design which includes a total of 16 rounds of Dictator Games and two one-shot Prisoner's Dilemmas. Additionally, participants were rewarded with money and points. The results suggest that on average, economists cooperate less than non-economists. However, this difference is not that large when participants played for points, so that when we compare economists versus the subgroups of non-economists, there are no differences in cooperation. On the other hand, when participants had a monetary incentive, there are other groups that also show lower levels of cooperation in relation to the omitted category, which shows that, if there is a selection effect, this is stronger in economists, but it is not unique to economists. Therefore, self-selection is not enough to explain the difference in cooperate behavior.

Another fundamental part of the explanation is the exposure to economics courses, as those results suggest that economists do not (only) self-select themselves for the major because of their selfishness, rather they become more selfish as they take more economics courses. Thus, we can conclude that the lowest level of cooperation is given by a combination of self-selection and education; since there is in fact self-selection but depending on the comparison point. In particular, we found no difference between economists, CADE majors, and engineers, suggesting that students from those specific majors also tend to play in a more selfish way than students from other majors. At the same time, the other side of the story can be explained by the fact that cooperation

decreases when we at into the number of economics courses a subject has taken, as explained before.

To analyze self-selection more deeply, we took personality dimensions into consideration. Affability contributes to a greater level of cooperation both in money and points. However, there are no significant differences in personality between economists and non-economists, apart from the the relevant exceptions.

Summarizing the results, economic theory is contradicted by the evidence, as most people tend to contribute voluntarily, despite the fact that the experiment was designed specifically to test self-interested behavior. Obviously, we must analyze results carefully and with some apprehension, because even though the instructions may seem to have been completely understood, subjects can sometimes be confused or act in a naive way, even after the 18 rounds of the experiment. However, the findings of this research are in line with many results found in other replications of these types of games about cooperation. Additionally, we manage to gather new information regarding the possible motives for human behavior (mostly economics undergraduate students).

These days, the world has become very dependent on social cooperation; however, cooperation can be highly fragile. People in general think that there is a benefit to society if more people cooperate in social dilemmas, which surely maximizes social well-being. Nonetheless, the exposure to self-interested models does in fact encourage a self-interested behavior; as results suggested, education in economics may have serious consequences on students attitudes towards selfishness and cooperation. So, it seems that if economists want to reach a social optimum, they should implement a broader view of cooperation and motivation in their courses.

Bibliography

Andreoni, J. and Miller, J. (2002). Giving according to garp: An experimental test of the consistency of preferences for altruism. *Econometrica*, 70(2):737–753.

Boone, C., De Brabander, B., and Van Witteloostuijn, A. (1999). The impact of personality on behavior in five prisoner's dilemma games. *Journal of Economic Psychology*, 20(3):343–377.

Butler, D. J., Burbank, V. K., and Chisholm, J. S. (2011). The frames behind the games: Player's perceptions of prisoners dilemma, chicken, dictator, and ultimatum games. *The Journal of Socio-Economics*, 40(2):103–114.

Cadsby, C. B. and Maynes, E. (1998). Choosing between a socially efficient and free-riding equilibrium: Nurses versus economics and business students. *Journal of Economic Behavior & Organization*, 37(2):183–192.

Cappelen, A. W., Nygaard, K., Sørensen, E. Ø., and Tungodden, B. (2015). Social preferences in the lab: A comparison of students and a representative population. *The Scandinavian Journal of Economics*, 117(4):1306–1326.

Caprara, G. V., Barbaranelli, C., Borgogni, L., and Moreno, J. B. (2007). *Cuestionario Big Five: BFQ: manual*. TEA.

Carter, J. R. and Irons, M. D. (1991). Are economists different, and if so, why? *Journal of Economic Perspectives*, 5(2):171–177.

Cattell, R. B. (1956). Validation and intensification of the sixteen personality factor questionnaire. *Journal of Clinical Psychology*, 12(3):205–214.

Comrey, A. L. and Backer, T. E. (1970). Construct validation of the comrey personality scales. *Multivariate Behavioral Research*, 5(4):469–477.

Engel, C. (2011). Dictator games: A meta study. *Experimental Economics*, 14(4):583–610.

Engel, C. and Zhurakhovska, L. (2016). When is the risk of cooperation worth taking? the prisoner's dilemma as a game of multiple motives. *Applied Economics Letters*, 23(16):1157–1161.

Eysenck, H. J. (1978). Superfactors p, e and n in a comprehensive factor space. *Multivariate Behavioral Research*, 13(4):475–481.

Fehr, E. and Fischbacher, U. (2002). Why social preferences matter–the impact of non-selfish motives on competition, cooperation and incentives. *The economic journal*, 112(478):C1–C33.

Fischbacher, U. (2007). z-tree: Zurich toolbox for ready-made economic experiments. *Experimental economics*, 10(2):171–178.

Frank, R. H., Gilovich, T., and Regan, D. T. (1993). Does studying economics inhibit cooperation? *Journal of economic perspectives*, 7(2):159–171.

Frank, R. H., Gilovich, T. D., and Regan, D. T. (1996). Do economists make bad citizens? *Journal of Economic Perspectives*, 10(1):187–192.

Gerlach, P. (2017). The games economists play: Why economics students behave more selfishly than other students. *PloS one*, 12(9):e0183814.

Haucap, J. and Müller, A. (2014). Why are economists so different? nature, nurture and gender effects in a simple trust game. *Nature, Nurture and Gender Effects in a Simple Trust Game (March 1, 2014)*.

Kagel, J. and McGee, P. (2014). Personality and cooperation in finitely repeated prisoner's dilemma games. *Economics Letters*, 124(2):274–277.

Kahneman, D., Knetsch, J. L., and Thaler, R. H. (1986). Fairness and the assumptions of economics. *Journal of business*, pages S285–S300.

Lönnqvist, J.-E., Verkasalo, M., and Walkowitz, G. (2011). It pays to pay–big five personality influences on co-operative behaviour in an incentivized and hypothetical prisoner's dilemma game. *Personality and Individual Differences*, 50(2):300–304.

Madsen, D. Ø. and Stenheim, T. (2015). Experimental methods in economics and psychology: A comparison. *Procedia-Social and Behavioral Sciences*, 187:113–117.

Martin, H. G. (1945). The construction of the guilford-martin inventory of factors gamin. *Journal of applied psychology*, 29(4):298.

Marwell, G. and Ames, R. E. (1981). Economists free ride, does anyone else?: Experiments on the provision of public goods, iv. *Journal of public economics*, 15(3):295–310.

Muñoz-Izquierdo, N., Gil-Gómez de Liaño, B., Rin-Sánchez, F. D., and Pascual-Ezama, D. (2014). Economists: cheaters with altruistic instincts.

Pothos, E. M., Perry, G., Corr, P. J., Matthew, M. R., and Busemeyer, J. R. (2011). Understanding cooperation in the prisoner's dilemma game. *Personality and Individual Differences*, 51(3):210–215.

Rustichinib, E. P. A. (2013). Cooperation and personality.

Strang, S. and Park, S. Q. (2016). Human cooperation and its underlying mechanisms. In *Social Behavior from Rodents to Humans*, pages 223–239. Springer.

Wang, L., Malhotra, D., and Murnighan, J. K. (2011). Economics education and greed. *Academy of Management Learning & Education*, 10(4):643–660.

Appendix

8.1 Appendix A: Instructions

Welcome to this experiment!

General instructions

Your participation in this experiment is voluntary and you are free to leave at any time. However, if for any reason you have to withdraw, you will not be able to return to the experiment and you will not receive any payment.

Please turn off your cell phone. Lift the divisions that are on your right and in front of you, and please do not talk to other participants. If during the experiment you have a question, please raise your hand to receive help.

This is an experiment about decision making. You will be remunerated for your participation in the experiment, and the amount of money you will receive depends on the decisions that you and the other participant make. In this experiment you will be randomly assigned to a partner. In each round you will be assigned a different partner. Finally, you will receive a payment depending on the decision you make, and the decision made by one of the people with whom you were matched.

If you make good decisions then you can earn a considerable amount of money. The whole experiment should be completed within an hour and a half.

You will participate in eight (8) rounds.

Your payment will be expressed in E $ (experimental dollars). You will receive your payment in US $ with an exchange rate of 20 E $ = 1 US $.

Through the experiment you will never be asked to reveal your identity, so your name will not appear in any record. Therefore, neither the experimenters nor the other partic-

ipants will be able to know the decisions you make. To keep your decisions private, you are asked not to share your decisions with any other participant.

On the front of your desk, you will find a sheet with a number. Each participant has a different number. At the end of the experiment you must present the envelope with this number to receive your payment later.

Experimental procedure: Game of the Dictator

Please read the instructions carefully and make sure you understand them in their entirety.

You must make a series of decisions between yourself and another participant in the laboratory. You and the other participant will be paired randomly, and their identities will NOT be revealed.

You will be assigned a certain number of tokens, and as you divide the tokens, you and the other participant will earn points. Each point that the players win is equivalent to a value of 0.05 US $. For example, if you earn 58 points in the experiment, you will receive $ 2.90 at the end of the experiment.

Each decision you make will have the following format:

Example: Divide 50 tokens: Keep ____ tokens @ 1 point each, and Pass ____ tokens @ 2 points each.

In this decision you must divide 50 tokens. You can keep all the tokens, you can keep some and pass others, or you can pass all the tokens. In this example, you will receive 1 point for each token that you decide to stay, and the other player will receive 2 points for each token you decide to pass. For example, if you decide to keep 50 tokens and pass 0, then you will receive 50 points, or $ 2.50 (50 x $ 0.05), and the other player does not receive points and does not receive money. On the other hand, if you decide to keep 0 tokens and pass 50, then you receive $ 0, and the other player receives 100 points (50

x 2) or $ 5 (100 x $ 0.05). However, you can choose to stay with any number of tokens between 0 and 50. For example, you can decide to keep 29 tokens and pass 21 tokens. In this case you would earn 29 points, or $ 1.45 (29 x $ 0.05), while the other person would receive 42 points (21 x 2), or $ 2.10 (42 x $ 0.05).

You will be asked to make 8 decisions as the example mentioned above. We will calculate your payment in the following way:

One of the 8 rounds played is selected randomly, and from this round you will obtain the points that are in the "Keep" part of your decision, and the other participant will obtain the amount inputted in “Pass". These points have a value of 0.05 US $ each.

Next, the decision of the other participant will be taken into account. You will get the points assigned in the "Pass" part of the other individual, while the other participant will earn the "Keep" part of their decision.

Experimental procedure: Prisoner ’s Dilemma

Now in this experiment, you will be either Player 1 or Player 2. You will have a random and anonymous match with a player of the other type (so that half of the class plays as Player 1 and the other half plays Player 2).

You will not know the decision of the other player until after you make your decision, and the other player will not know your decision until after you have taken it. In other words, both make their decisions simultaneously without knowing the decision that the other person is taking.

Likewise, you will never know the identity of the person with whom you are paired and this person will never know your identity.

Each person in the class can choose one of the two possible actions: X or Y. The amount of money they earn in this experiment depends on the decision they make and the decision made by the person with whom they are matched.

8.2 Appendix B

Table 10: Session Overview

Session	Day	Time	Students	Group
1	Monday	2:30 PM	24	Group 1
2	Monday	4:00 PM	20	Group 2
3	Monday	5:30 PM	28	Group 5
4	Tuesday	11:30 AM	36	Group 3
5	Tuesday	2:30 PM	32	Group 4
6	Tuesday	4:00 PM	20	Group 6
7	Wednesday	2:30 PM	32	Group 1
8	Wednesday	4:00 PM	20	Group 2
9	Thursday	11:30 AM	36	Group 3
10	Thursday	2:30 PM	36	Group 4
11	Friday	2:30 PM	20	Group 7