UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ

Colegio de Administración y Economía

Altruistic Preferences Among Economists and Non-Economists: An Experimental Study Based on the "Dictator Game"

Proyecto de Investigación

Paola Alejandra Castillo de la Cadena

Economía

Trabajo de titulación presentado como requisito

para la obtención del título de Economista

Quito, 23 de mayo de 2019

UNIVERSIDAD SAN FRANCISCO DE QUITO
COLEGIO DE ADMINISTRACIÓN Y ECONOMÍA

HOJA DE CALIFICACIÓN DE TRABAJO DE TITULACIÓN

Altruistic Preferences Among Economists and Non-Economists: An Experimental Study Based on the "Dictator Game"

Paola Alejandra Castillo de la Cadena

Calificación: .....

Nombre del profesor, Título académico: Diego Grijalva, Ph.D.

Firma del profesor: .....

Quito, 23 de mayo de 2019

Derechos de Autor

Por medio del presente documento certifico que he leído todas las Políticas y Manuales de la Universidad San Francisco de Quito (USFQ), incluyendo la Política de Propiedad Intelectual USFQ, y estoy de acuerdo con su contenido, por lo que los derechos de propiedad intelectual del presente trabajo quedan sujetos a lo dispuesto en esas Políticas.

Asimismo, autorizo a la USFQ para que realice la digitalización y publicación de este trabajo en el repositorio virtual, de conformidad a lo dispuesto en el Art. 144 de la Ley Orgánica de Educación Superior.

Firma del estudiante: .....

Nombres y Apellidos: Paola Alejandra Castillo de la Cadena

Código: 00129906

Cédula de Identidad : 1752131472

Lugar y fecha: Quito, 23 de mayo de 2019

AGRADECIMIENTOS

Quiero mostrar mi agradecimiento a todas las personas que de una u otra forma estuvieron conmigo durante esta etapa.

A la persona más importante de mi vida, mi mamá. Se que disfrutas cada uno de mis logros como si fueran tuyos, ¡lo logramos! Gracias por darme todo tu amor y acompañarme en este camino para ser la persona que soy.

A todos mis amigos que me han enseñado a vivir, en especial Gustavo Gálarraga, gracias por ser mi mejor amigo; siempre vamos a recordar todo lo que vivimos. Finalmente, quiero mostrar mis agradecimientos a mi tutor Diego Grijalva que, con su tiempo y mentoría, ayudarón a que esto sea posible.

RESUMEN

El presente trabajo experimental tiene como objetivo comparar las preferencias altruistas de los estudiantes de economía de la Universidad San Francisco de Quito versus los estudiantes de otras carreras de la misma universidad. Las preferencias son medidas con información obtenida mediante un experimento basado en el juego del dictador, con paga en dólares americanos y en puntos sobre la nota final de una clase que estén tomando. Dentro de la literatura el experimento aporta con dos ideas nuevas. Primero, la diferenciación de las preferencias altruistas mencionadas por Andreoni y Miller (2002) divididas entre economistas y no economistas, que a su vez están divididos en cuatro carreras. Segundo, analizamos si las preferencias altruistas de los economistas y no economistas dependen del pago que reciben, ya sea en dólares americanos o en puntos para una de sus clases. Concluímos que el comportamiento de los economistas es significativamente diferente que la de los no economistas independiente del tipo de pago. Los economistas tienden a dar menos y quedarse con más considerándolos más egoistas que los estudiantes de otras carreras. Esto ocurre pese a que los economistas muestran una mayor preocupación por la equidad que la eficiencia.

Palabras Clave: Economía experimental, preferencias, egoismo, altruismo, juego del dictador, economistas, pago monetario, pago académico.

ABSTRACT

The objective of this experimental work is to compare the altruistic preferences of economics students at Universidad San Francisco de Quito with non-economics students. Preferences are measured using an experiment based on the dictator game with payments in US dollars and points on the final grade of a class. The experiment contributes to the existing literature in two new ways. The preferences analyzed by Andreoni and Miller (2002) are separated by economists and non-economists, which in turn are further divided into four subcategories. Second, we analyze whether the altruistic preferences of economists and non-economists depend on the payment that they receive, either in US dollars or in academic points. We conclude that the behavior of economists is different from non-economists, independently of the type of payments. Economists tend to give less and keep more, so that we can consider them more selfish than students from other majors. This occurs despite the fact that economist show a higher concern for equality over efficiency.

Keywords: experimental economics, preferences, selfishness, altruism, dictator game, economists, monetary payment, academic payment

TABLE OF CONTENTS

List of Tables

List of Figures

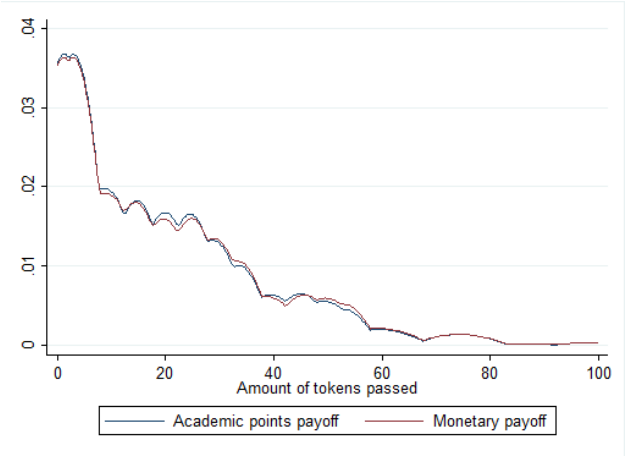
Introduction

Altruistic preferences are the willingness to care about others while selfish preferences are actions oriented only towards self-interest. For economists, these preferences are interesting because economics emphasizes that people tend to maximize their benefit according to their preferences. If we think about maximization as selfish behavior, altruistic and selfish preferences make us selfish. Simply put, the set of preferences that we have is irrelevant; we will act always according to selfishness.

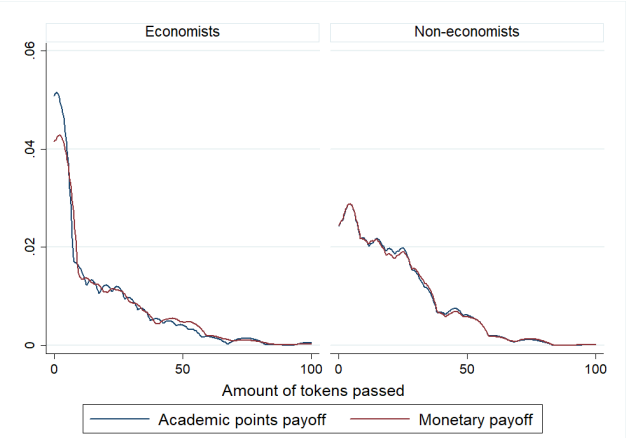
There are many experimental studies analyzing the differences between behaviors of economists and non-economists. The main results show that there are indeed significant differences between these groups, mainly that economists make decisions more selfishly according selfishness preferences. We derive preferences of economists and non-economists students by using the Dictator game. More precisely, we ask whether economists have different preferences, and whether they change depending on the payments received as an incentive to participate in the experiment. Also, we contribute to the literature by presenting two different comparisons. The main one is between economists and non-economics students and the second is to compare between economists and four non-economist subgroups which are students of business (CADE), students of social sciences and humanities (COCISOH), POLI are engineers and others are students of different careers.

A first look at the differences between the groups described previously is presented in Figure 1. Panel (a) that shows the density of tokens given by all participants, according to the incentive they would win (money and academic points).At first glance there is no noticeable difference in the behavior of the sample by either of the incentives. In Panel (b) we split economists and non-economists. To the left side are the economists,

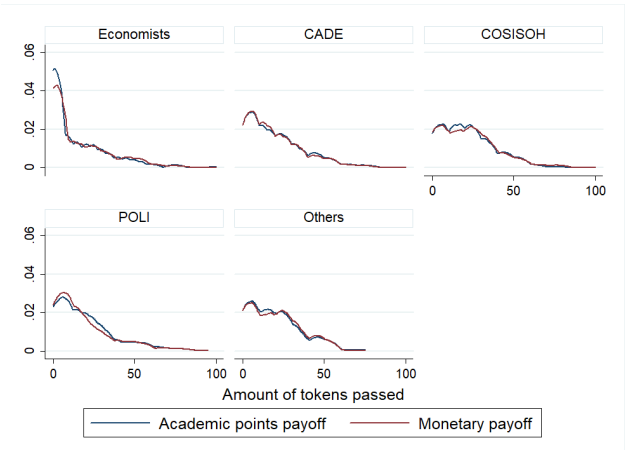
Figure 1: Kernel densities monetary and academic points payoff



(a) Full sample



(b) Economists and Non-economists



(c) Economists and Non-economists majors

Source: Authors's elaboration.

where a large share of the group gave less; meanwhile the majority of non-economists gave more. Finally, Panel (c) shows the density of the subgroups (Economists, CADE, COCISOH, POLI and Others). It is evident that the graphic of the economists is different from the other ones.

Along this paper we provide solid evidence that economists show a different behavior compared to non-economists. This behavior occurs if the incentive is money or points. We analyzed these differences looking at aggregate behavior through the use of beanplots, as well as looking at dissagregated behavior by budgets and tasks. Finally, we present the analysis of the parameters α, ρ and σ that are the parameters of a CES function.

Literature review

2.1 Self-interest

The principles described below were first proposed by Adam Smith who is considered the father of economic science. His book "The Wealth of Nations" (Smith, 1976), explained that a country economy is successful when people act in their own self-interest. Self-interest is a behavior that implies that people act in a way that provides personal benefit. People who act under self-interest consider their options and make decisions about what they believe will be the best use of their resources and time. There are three important factors to consider: first, the concept of self-interest and its relationship with the economy. Second, why resources and time must be managed in such a way that maximizes well-being. And finally, the appearance of the concept of homo economicus in the economy.

Nelson (2001) proposed two types of self-interest. First, legitimate self-interest recognizes that people can be interested in their own future, wishes, ambitions, feelings and well-being; people produce and exchange in conjunction with others in order to build wealth. Second, illegitimate self-interest is defined as a form of deceit, coercion and violence for the individual's own benefit; people enrich themselves at the expense of those around them. This type of self-interest is commonly condemned and illegal. Although illegitimate self-interest is bad for society, the economic models are based under the assumption of legitimate self-interested behavior. For this reason, Persky (1995); Caruso (2012) and Ingram (1888) have built an image of homo economicus with legitimate self-interest.

In addition, to understand the importance of management of resources and time, it's necessary to understand scarcity. The most important objective of economics is to study how to manage scarce resources. Resources are scarce because of non infinite resources that are subject to productivity and capital returns. Thus, people must make decisions to maximize their personal benefit (about preferences, beliefs and knowledge) under the premise of scarcity. Furthermore, one principle of economics states that the cost of something is what you give up to get it, which is known as opportunity cost (Mankiw, 2011). The ideas of scarcity and opportunity cost explain the decisions people should make to maximize their own personal benefit.

Economists adopted the term "homo economicus" as the image of the rational human being who makes decisions that maximize his/her utility. The concept of rationality is often used by economists, although its meaning can be questionable. Hammond (2019) notes that rationality could be used in a relatively trivial way. However, Simon (1957, 1955) proposes a better description of rationality. Firstly, he introduces rationality as behavior. Following this logic, a choice is a selection among numerous possible al-

ternative behaviors. Every behavior involves a selection of this kind, be it conscious or not. Hence, we could conclude that rationality is a criterion used in the decision that is theoretically grounded on the presupposition that people have rational intentions. Therefore, homo economicus makes decisions that only affect his/her own interests. In the same manner self-interest could be conceptualized in experimental studies as selfishness. Thus, economists value rationality as a criterion of selection and it is in this sense, and by this route, that rationality is taken as a main explanation for the results of this paper.

On the contrary, Adam Smith proposed that people do not make decisions as homo economicus (Smith, 1759). As Barro (1974) mentions, the utility of the parents incorporates the utility of their children. In this line, Adam Smith proposed that people make their choices guided by feelings that act to redirect their self-interest towards what is best for all, i.e. the maximization of social interest.

2.2 Economists' behavior

In this paper we incorporate the concepts of self-interest and rationality to analyze economists' and non-economics students' behavior, focusing on the issue of selfishness. Our motivation is that economists have studied the self-interest model of individual human behavior. Several studies show that economists are different from others with respecto to their degree of selfishness. Marwell and Ames (1981); Carter and Irons (1991); Frank et al. (1993); Lundquist et al. (2009) report that economists are more selfish in experimental games. Along the same line, Wang et al. (2011) conclude two important elements, which are relevant for our study. First, economists keep more money for themselves, and second, economic education generates attitudes toward greed that

makes it morally acceptable. To support the second assumption, the studies by Stigler (1959); Frey et al. (1993); Frey and Meier (2002); Scott and Rothman (1975); Haucap and Just (2010) are based on the idea that studying economics adjusts behavior of people towards homo economicus.

Originally, the focus of the literature was on economists' selfishness. However, there are now several experiments on differences between economists and non-economists. For instance, Marwell and Ames (1981) measure the probability of being a free-rider and find that graduate students of economics are more likely than others to free-ride in experiments of public good games. In these games, students allocate their initial endowment to a "public" or a "private" account. Money is deposited in a private account that returns a dollar for a dollar at the end of experiment. Money deposited in the public account is pooled, and thus the amount is multiplied by some factor greater than one, and then split equally among all participants even if they do not invested in this account. For specific values of the returns, the social strategy (i.e. he strategy that maximizes the sum of the payoffs) is to put all the money in the public account, but the individually optimal strategy is to put the entire endowment in the private account. Economists put significantly less than other students; they put 20 percent of their endowment in the public account unlike the other students who put 49 percent.

Carter and Irons (1991) compare behavior of economists and non-economics students by means of a simple ultimatum game. In their experiment, they control for selection and learning hypotheses. There were two players, one of them was the proposer and the other was the responder. Their task was to divide 10 dollars between themselves in multiples of 0.50 cents.The proposer proposed an amount and if the responder rejected the proposer's amount each player received 0 dollars. The theoretical solution occurs when both players act in accordance with the rational/self-interest model. Responders

prefer any positive offer than 0 dollars. Knowing this, the proposer proposes a division with 9.50 dollars to himself and 0.50 cents to the responder. Then the responder accepts. The conclusion of the experiment is that economists accept lower offers and keep more for themselves. In particular, economists accept 1.70 dollars while others accept a minimum of 2.44 dollars and economists keep 6.15 dollars while others keep 5.44 dollars. Clearly, then, there is a big difference between the two groups. Economists seem to behave more in accordance with the rational and self-interest model. Yet, other studies have found opposite results. For instance, the study by Frey and Meier (2003) analyze selfish behavior of economic students at the University of Zurich in a natural setting. For five semesters every student had to decide whether to donate money to two social funds managed by the university. The results show that the willingness to donate money does not diminish by studding economic theory. Rather, the students of business administration gave significantly less than other students. Likewise, Yezer et al. (1996), based on an experiment called lost letter in which participants decide whether to return a lost letter, i.e. envelopes containing money that were dropped in the classrooms of economists and non-economists. They find that the number of envelopes returned by economists was larger than that of non-economist students. In the same line, Laband and Beil (1999) conclude that economists in the real word are significantly more honest and cooperative than professional political scientists and professional sociologists.

Revealed Preference

In economics, preferences are represented by utility functions. These are formed by choices and they are studied by means of the theory of revealed preferences. Indiviuals' choices are made under different circumstances, particularly under different incomes

and prices, forming bundles. The underlying preference proposes that each person has a unique demand for a bundle at each budget. However, the revealed preference that was introduced by Samuelson (1938) shows that this is not necessary true. The underlying preference has a unique demand that's equal to an optimal bundle which uses all budget. On the other hand, the revealed preference is not about people having a unique demand, but about people choosing certain bundles that may be within their budget or lower than the budget line.

According to Varian (2010), revealed preference is a model of consumer behavior (where people are choosing the best that they can afford) that considers that the choices actually made are preferred to the choices that they could have made. Thus, revealed preference is a relation that holds between the bundle that is actually demanded at some budget and the bundles that could have been demanded at that budget.

The principle of revealed preference can be stated as follows: Let $X = (x_1, x_2)$ be the chosen bundle when prices are (p_1, p_2), and let $Y = (y_1, y_2)$ be some other bundle such that $p_1x_1 + p_2x_2 \geq p_1y_1 + p_2y_2$. The fact that Y is affordable at the budget then if the consumer is choosing the most preferred bundle she can afford, we must have that $(x_1, x_2) \succ (y_1, y_2)$. Bundle X is directly revealed preferred over Y when X is chosen when Y could have been picked, in other words "X is chosen over Y". Indirectly revealed preferred is defined as follows. If X is directly revealed preferred to Y, and Y is directly revealed preferred to Z, then bundle X is indirectly revealed preferred to Z (Varian, 2010).

The revealed preferences is a bit misleading. Thus the revealed preference is a relation that holds between the bundle that is actually demanded at some budget and the bundles that could have been demanded at that budget (less than the budget). We may say X is chosen over Y when Y is affordable, and not that X is preferred to Y.

The Weak Axiom of Revealed Preference (WARP) states that if the Y-bundle is affordable when the X-bundle is purchased, then when the Y-bundle is purchased, the X-bundle must not be affordable. When people choose both bundles x and y, they violate WARP (Varian, 2010).

The Strong Axiom of Revealed Preference (SARP) states that if a bundle of goods X is revealed preferred to a bundle Y, and Y is in turn revealed preferred to a bundle Z, then X must in fact be preferred to Z. If the consumer has consistent preferences, then we should never observe a sequence of choices that would reveal that Z was preferred to X. According (Varian, 2010), SARP is a sufficient condition for optimizing behavior aligned with the economic model of consumer choice, given linear budget constraints.

In conclusion, the General Axiom of Revealed Preference (GARP) states that if X is indirectly revealed preferred to Y, then Y is not strictly directly revealed preferred to X, that is, X is not strictly within the budget set when Y is chosen (Andreoni and Miller, 2002).

In this paper, we use the notion of revealed preferred to estimate the parameters of a utility function of economists and non-economists, assumed to incorporate own payoffs and other payoffs as its arguments.

Methodology

Experimental Design

To evaluate differences in utility functions between economists and non-economists we use an experimental Dictator Game, following Andreoni and Miller (2002). We

incorporate some differences, however. The first difference is in the payoffs. In our experiment we use two types of payments, money and academic points.

The second difference is in the allocation of choices known as budgets. Andreoni and Miller (2002) have 11 budgets in total; we use only the eight core budgets.

Third, this experiment was programmed and conducted in z-Tree.[1] As consequence, the recruited students had to go to the economics laboratory at Universidad San Francisco de Quito. There were eleven experimental sessions with 20 to 36 subjects. The duration was approximately one hour.

Recruitment Procedures

The recruitment is a key part of experiment. As Greiner (2015) mentions, a correct process of recruitment prevents the same person's participation multiple times since this may invalidate the data and conclusions. Besides, recruitment ensures that we obtain exactly the right number of participants to obtain a significant result and to minimize the direct costs of recruitment and unnecessary payments.

The participants were students recruited from different majors at Universidad San Francisco de Quito, shown Table 2. The students were recruited in their classes after authorization of the professor who gave points in the final grade as incentive for participation in the experiment. Therefore, the sample was selectively chosen by us, without the use of statistical methods. The reason is that we wanted to have a disproportionate participation of economists and also that we wished to evaluate behavior under academic points.

[1] z-Tree is a software package for developing and carrying out economic experiments. See `https://www.ztree.uzh.ch/en.html`.

Table 1: Students' distribution by major

Major	Freq.	Percent
All	304	100
Economists	132	43.42
Non economists	172	56.58
CADE	74	24.34
COCISOH	50	16.45
POLI	17	5.59
Others	31	10.2

Source: Author's elaboration.

The explanation of the variables in table 2 is as follows. All includes economists, non-economists, CADE, COCISOH, POLI and other students. Economists includes only economics students. Non-economists includes all non-economics students. Then, the non-economists are divided into USFQ schools: CADE, COCISOH, POLI and others. The acronym CADE translated from Spanish means school of administration and economics. It includes students of marketing, business administration and finance. COCISOH is the school of social sciences and humanities. It includes students of contemporary arts, international relations and psychology. POLI is the polytechnic faculty. It includes students in food, industrial, environmental, mechanical and civil engineering. Finally, Others includes students of communication design, fashion design, multimedia, journalism, advertising, nutrition and dentistry. The grouping of majors where taken as the university groups the academic schools.[2]

[2]For more information see `http://www.usfq.edu.ec/programas_academicos/pregrado/Paginas/pregrado_dmision_agosto_2017.aspx`.

Utility Function

The utility function is a key part of the experiment, as it defined the students' preferences. Following Andreoni and Miller (2002), the variables used and the types of functions that help to categorize students' preferences are explained below.

Subject i ($i = \{s, o\}$, where s indicates self and o indicates other) receives a payoff $\pi_{i,k}$. The parameter k represents the type of payoff ($k = \{m, p\}$, where m represents a monetary payoff and p represents academic points payoff for each round.[3] A person (s) chooses a bundle between $\Pi = (\pi_{s,k}, \pi_{o,k})$ that maximizes utility, where Π denotes the set of possible payoffs. Thus, the general form of the utility function is given below:

$$U_{s,k} = u_{s,k}(\pi_{s,k}, \pi_{o,k})$$

In the dictator games used in this experiment, the students faced different choices endowments (m) and prices ($p_{s,k}, p_{o,k}$), i.e. the returns for each token kept or passed. The budget constraint is thus the following:

$$\begin{aligned} p_{s,k}\pi_{s,k} + p_{o,k}\pi_{o,k} &= m \\ \pi_{s,k} + \left(\frac{p_{o,k}}{p_{s,k}}\right)\pi_{o,k} &= \frac{m}{p_{s,k}} \\ m' &= \pi_{s,k} + p\pi_{o,k} \end{aligned} \tag{1}$$

These budget sets over payoffs cross in ways that provide a test for whether well-behaved preferences of the form $U_{s,k} = u_{s,k}(\pi_{s,k}, \pi_{o,k})$ (Andreoni and Miller, 2002).

[3] The maximum earnings were USD 13 and 2 points for one class.

It's also useful to define budgets share, we explain the importance of understanding b_s in the parameters calculation. Is as follows:

$$b_s = \frac{p_{s,k}\pi_{s,k}}{m} \tag{2}$$

From the general form of the utility function, three different types of preferences can be determined. The first one is the form of utility where the preferences are adjusted according to rationality theory, i.e. according to the preferences of a homo economicus. In this form, other's utility does not enter into self's utility function and thus the utility function is reduced as follows:

$$U_{s,k} = \pi_{s,k}$$

The second one is the function that describes people who give exactly equal payoffs, called Leontief preferences or Perfect Complements:

$$U_{s,k} = min\{\pi_{s,k}, \pi_{o,k}\}$$

The last is Perfect Substitutes, which describes people who divide their tokens according the highest redemption value, i.e. to maximize the sum of the utilities:

$$U_{s,k} = \pi_{s,k} + \pi_{o,k}$$

Budget Formation

The participants' decisions depend on the income (endowment), prices (for self and other) and these are analyzed by type of payments. Participants played sixteen rounds, eight rounds for money and eight rounds for academic points. In each round subjects

Table 2: Budgets

Budget	**Token Endowment**	**Price Self** p_s	**Price Other** p_o	**Relative Price of giving** $\frac{p_s}{p_o}$
1	40	3	1	3
2	40	1	3	0.33
3	60	1	1	1
4	60	2	1	2
5	60	1	2	0.5
6	75	2	1	2
7	75	1	2	0.5
8	100	1	1	1

Source: Author's elaboration based on Andreoni and Miller (2002)

were paired randomly and anonymously with another subject. An example of the message that they saw on the computer screen is the following:

Divide 40 tokens:

Hold ____ tokens at 1 point each, and Pass ____ tokens at 3 points each.

The combination of tokens and points are called budgets. In each round the phrase was updated according to the budgets in Table I. Participants played each budget to win money and again the same budgets to win academic points, for a total of sixteen decisions.

Table 1 presents five variables. Budgets are a combination of token endowments set from 1 to 8. They can be identified as: price to self (p_s), price to other (p_o) and relative price of giving ($\frac{p_s}{p_o}$). Token endowments are the initial income. Price to self is the value that is multiplied by the amount of the endowment that remains for self. Price to other is the value that is multiplied by the amount of endowment given to the other. Relative Price of giving is the price to self relative to the price to the other.

The results are divided into two analyses. The first one is given by the budgets in Table 1. These where assigned to the students following two criteria. First, students are assumed to give more tokens as the endowment increased. Second, for budgets that have the same endowment (1 and 2),(3,4 and 5) and (6 and 7), the amount passed to other is assumed to be lower when p_0 is higher.

At the same time, the price changes in the budgets shown in the Table 1 involve two effects. The first one is a substitution effect where alteration in prices may change the allocation patterns.[4]. The second one is an income effect that arises for price variations that necessarily change real income, leading to a jump to another indifference curve (Nicholson and Snyder, 2010).

3.1 Parameters

Following the previous discussion of the CES utility function, we are interested in estimating the parameters α, ρ, and σ for economists and non-economists. These parameters help us define the degree of selfishness and the equality-efficiency trade-off.

3.1.1 Constant Elasticity of Substitution (CES)

The Constant Elasticity of Substitution (CES) is commonly used in production and consumption contexts. The concept of Elasticity of Substitution was introduced by (Hicks, 1932) and is defined as a measure of ease, in which the factors of production can be substituted for one another. In the experiment we have two factors $(\pi_{s,k}, \pi_{o,k})$.

[4]The behavioral alterations are measured through average tokens passed according to the budget presented

Table 3: Meaning of the values of ρ

ρ<0	Concern for equality in payoffs
0<ρ<1	Concern for efficiency in payoffs

Source: Moffatt (2016).

Hence, the behavior can be understood with a CES utility function in the following way:

$$U_{s,k} = [\alpha \pi_{s,k}^{\rho} + (1-\alpha)\pi_{o,k}^{\rho}]^{\frac{1}{\rho}}, \qquad 0 \leq \alpha \leq 1, \quad -\infty \leq \rho \leq 1, \tag{3}$$

where α is a measure of selfishness. If $\alpha = 1$ we have perfect selfishness and the opposite occurs if $\alpha = 0$; ρ indicates willingness to trade off equality and efficiency in response to the change in prices (see Table 3 for more details).

The parameter $\sigma = \frac{1}{1-\rho}$ represents the elasticity of substitution. σ is an increasing function of ρ. Table 4 provides more details about σ.

Table 4: Meaning of the values of σ, CES functions

	Meaning of values σ	Indifference curves	CES functions
$\sigma \to +\infty$	People care more about efficiency	Downward-sloping straight lines	Perfect Substitutes
$\sigma \to 0$	People care more about equality	L-shaped	Perfect Complements
$\sigma = 1$	Cobb-Doglas preferences $U = \pi_1^{\alpha}\pi_2^{1-\alpha}$	Convex from the origin	

Source: Moffatt (2016).

3.1.2 Marshallian demand function

The Marshallian demand was described by Marshall (1920). It specifies the amount that the consumer would buy at different prices and income (Nicholson and Snyder, 2010). As defined in the utility section, its important to considerate the budgets share, because by equation (2) we obtain the Marshallian demand function. That's important for the calculation of the parameters. To get the Marshallian demand function we maximize equation (3) constrained by equation (1) (Moffatt, 2016). The resulting equation

is:

$$b_s = \frac{p_s^{\frac{\rho}{\rho-1}}}{p_s^{\frac{\rho}{\rho-1}} + (\frac{\alpha}{1-\alpha})^{\frac{1}{\rho}} - p_o^{\frac{\rho}{\rho-1}}} + \varepsilon, \tag{4}$$

where b_s denotes the budget shares. Previously b_s was already defined in equation (2). The stochastic term ε is included in order to turn the deterministic budget-share equation into an estimable model.

3.1.3 Non-linear least squares

The reason why non-linear least squares is required is that equation (4) is a non-linear function of the two parameters, and there is therefore no closed form expression for the solution to the minimization problem, as there is when the model is linear. Instead, a numerical routine is used to locate the solution (Moffatt, 2016):

$$\sum_{i=1}^{n} = \left[w_s i - \frac{p_s^{\frac{\rho}{\rho-1}}}{p_s^{\frac{\rho}{\rho-1}} + (\frac{\alpha}{1-\alpha})^{\frac{1}{\rho}} - p_o^{\frac{\rho}{\rho-1}}} \right]^2 \tag{5}$$

Results

We present the results with respect to the order of the decision, which we call tasks. These are presented in a beanplot. In a beanplot, individual observations are shown as small lines in a one-dimensional scatter plot. Also, the estimated density of the distributions is visible and the average is shown, making it easy to compare different groups of data (Kampstra, 2007).

First, we present in figure 1 the results when the participants played to earn money. Then, in figure 2 we present the results of the participants when they played for academic points. Figure 2 and 3 (a) shows the average of tokens passed in the entire sam-

ple. Figure 2 and 3 (b) present the results for economists and non-economists. Figures 2 and 3 (c) indicate the distribution of tokens passed by task and separated by major.

In figure 2 and 3 its evident that the differences between the economist and non economist (b), and the difference of economist with sub-groups (c). The blue beanplot represents the economist seeing in the widening beginning, that gives the results similar to those proposed by Gerlach (2017) who indicates that economists give relative less than the other students of the other major. Besides in average economists always give less than non-economists for monetary and academic points. Furthermore, the major that gives more, considered as altruistic, is COCISOH in both money and points.

Budgets

We first discuss the results looking at the different budgets. In the following tables we present the average passed tokens according by budget, Tables 5 and 6 for money and Tables 7 and 8 for academic points. The tables provides information about differences in behavior between economists and non-economists, and non-economists subgroups.

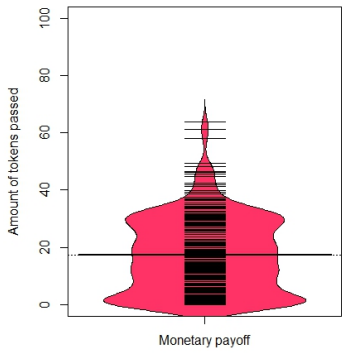
Table 5 shows that there is a significant difference in the tokens passed by economists and non-economists in every budget. The p-values of the Mann-Whitney test[5] are significant at the 1% level. As can be seen, economist give on average less than non-economists.

The comparison between economists and the rest of majors is shown in Table 6. Again, p-values of the Mann-Whitney tests are provided that compare economists to non-economists sub-groups. While economists tend to be different to most groups, it is interesting to note that their behavior does not differ from the POLI students.[6]

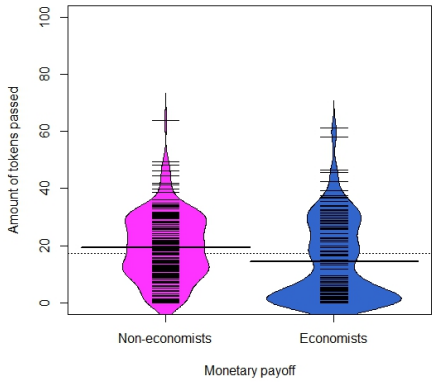
[5]The Mann-Whitney test evaluates the hypothesis that two independent samples come from populations having the same distribution (Mann and Whitney, 1947; Wilcoxon, 1945).

[6]But recall the the sample of POLI students is very small.

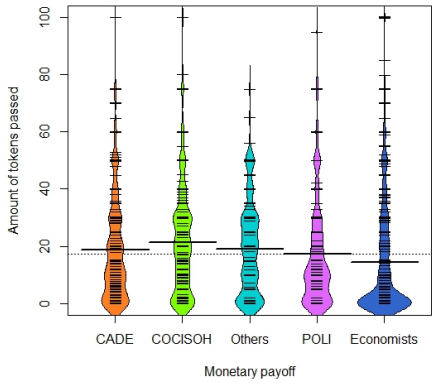
Figure 2: Beanplot of tokens passed - all decisions with monetary payoff



(a) Full sample

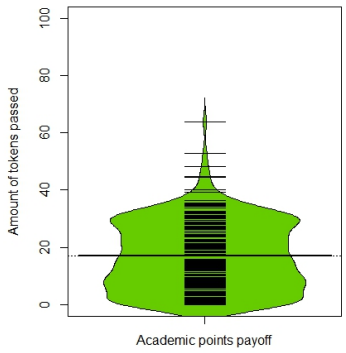


(b) Economists and Non-economists

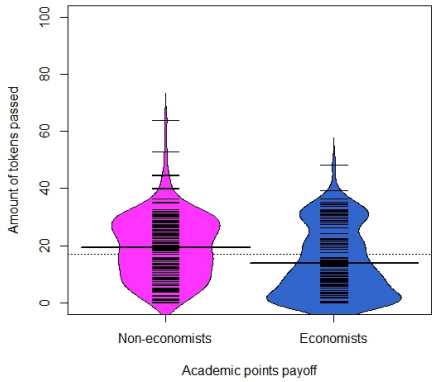


(c) Economists and Non-economists majors
Source: Authors's elaboration.

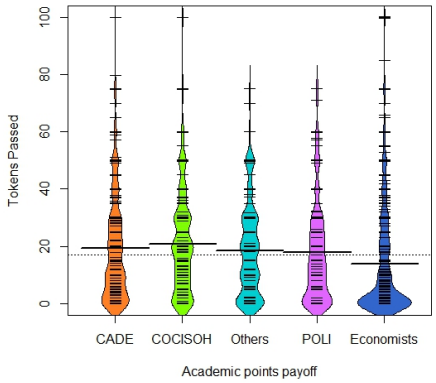
Figure 3: Beanplot of tokens passed - all decisions with academic points payoff



(a) Full sample



(b) Economists and Non-economists



(c) Economists and Non-economists majors
Source: Authors's elaboration.

Table 5: Differences between economists and non-economists, average tokens passed bu budget - monetary payoff

Budget	All	Economists	Non-economists	p-value
1	4.13	2.95	5.04	0.0004***
2	7.08	5.02	8.67	0.0000***
3	13.97	11.58	15.80	0.0003***
4	10.38	8.29	11.99	0.0001***
5	17.18	14.44	19.28	0.0003***
6	21.87	18.20	24.69	0.0001***
7	26.93	22.74	30.15	0.0002***
8	35.91	31.59	39.23	0.0031***

Note: *p<0.1; **p<0.05; ***p<0.01

Source: Author's elaboration.

The results in Table 7, which show average tokens passed by budget when playing for academic points, are quite different from the average tokens passed shown in Table 5. Economists and non-economists gave much more when faced with budgets 1 to 4 with academic points than with money. Still, in most cases, economists passed significanly less than non-economists.

Similarly as the case with money, Table 8 shows no significant difference between economists and POLI students when playing for academic points. With respect to the rest of the majors it can be observed that the p-value of the Mann-Whitney test is less than 1%, with some exceptions, particularly with respect to "Others".

As can be observed in Tables 5, 6, 7 and 8, POLI students tend to behave similarly to economists, while there are significant differences in the amount of tokens passed with respect to the other majors.

Table 6: Differences between economists and CADE, COCISOH, POLI and Others, average tokens passed by budget - monetary payoff

Budget	Economists	CADE	p-value	COCISOH	p-value	POLI	p-value	Others	p-value
1	2.95	4.16	0.0103***	6.98	0.0005***	3.59	0.8419	4.81	0.0102**
2	5.02	7.82	0.0002***	10.42	0.0003***	7.71	0.0820	8.39	0.0065***
3	11.58	14.22	0.0206**	18.26	0.0007***	14.18	0.2444	16.52	0.0177**
4	8.29	11.01	0.0022***	14.90	0.0006***	9.88	0.2051	10.81	0.0719*
5	14.44	18.89	0.0065***	21.12	0.0020***	15.00	0.5133	19.58	0.0155**
6	18.20	24.01	0.0049***	26.78	0.0017***	21.06	0.2848	24.90	0.0178**
7	22.74	30.76	0.0024***	31.28	0.0038***	26.47	0.2643	28.90	0.0558*
8	31.59	38.04	0.0303**	41.44	0.0147**	41.18	0.1302*	37.45	0.1674

Note: *p<0.1; **p<0.05; ***p<0.01
Source: Author's elaboration.

Task

Table 9 shows the average tokens passed by task when playing for money, separating economists and non-economists. The economists passed an average of 14.35 tokens, which was 5.01 tokens less than the non-economists. For almost all tasks, the difference is significant at the 1% level. Interestingly, there is no pattern of declining tokens passed.

Looking at Table 10, students of COCISOH passed on average 21.40 tokens, which is around 50% more tokens than the economists. The students of POLI passed only 3.03 tokens more than economists (17.38 tokens) the behavior of this group is similar to the economists group, table 9.

Referring to the table 11 economists passed in average 13.76 tokens (0.59 less than when they played for money payoff). The non-economist who passed 19.41 tokens (0.05 more than when they played for money). In the table 12 similar to in table 10 the students from COCISOH passed in average 20.74 tokens, which is close to a 50% more that the economists gave. There aint significant differences between the group from POLI and the rest of students.

Table 7: Differences between economists and non-economists, average tokens passed by budget - academic points

Budget	All	Economists	Non economists	p-value
1	17.04	14.86	18.72	0.0006***
2	16.04	14.35	17.34	0.0121**
3	17.00	12.33	20.58	0.0000***
4	17.60	14.23	20.19	0.0000***
5	17.35	12.81	20.83	0.0000***
6	16.91	14.92	18.44	0.0025***
7	16.39	12.03	19.73	0.0000***
8	17.33	14.55	19.45	0.0012***

Note: *p<0.1; **p<0.05; ***p<0.01

Source: Author's elaboration.

Students' behavior when playing for points does not seem to be very different when compared to their behavior when playing for money. Again, the students of COCISOH gave 6.98 more tokens (20.74) than the economists, while POLI students gave 3.54 tokens more than economist playing for academic points.

Estimation of CES Parameters

The previous discussion provides strong evidence of a difference in behavior between economists and non-economists both when playing for money and when playing for points. To further establish this difference, in this section we estimate the parameters α and ρ of the CES utility function for economists, non-economists and each of the non-economists subgroups. We also estimate σ.

The parameter α takes a values between 0 and 1 that individuals keep for themselves; as such it is a measure of selfishness. In table 13 it can be seeing that economists'

Table 8: Differences between economists and CADE, COCISOH, POLI and Others, average tokens passed by budget - academic points

Budget	Economists	CADE	p-value	COCISOH	p-value	POLI	p-value	Others	p-value
1	14.86	18.23	0.0054***	22.02	0.0007***	20.24	0.6329	16.67	0.1395*
2	14.35	15.65	0.1290	20.60	0.0116**	15.06	0.3948	17.23	0.1331*
3	12.33	21.66	0.0001***	18.72	0.0013***	13.47	0.4189	24.03	0.0008***
4	14.23	18.00	0.0029***	23.90	0.0002***	20.41	0.0735*	19.10	0.0148**
5	12.81	20.05	0.0006***	23.68	0.0001***	17.00	0.0480**	19.23	0.0034***
6	14.92	19.68	0.0148**	18.72	0.0061***	19.76	0.4746	17.13	0.1707
7	12.03	20.32	0.0000***	18.46	0.0003***	19.94	0.0024***	17.52	0.0156**
8	14.55	20.39	0.0055***	19.82	0.0173**	13.18	0.2065	17.03	0.1239

Note: *p<0.1; **p<0.05; ***p<0.01
Source: Author's elaboration.

α is 0.76, while it is 0.68 for non-economists. This results is similar in the case of academic points, table 14.

In general, ρ which indicates willingness to trade off equity and efficiency in response to price changes (Moffatt, 2016) and σ (elasticity of substitution) from economists and non-economist is similar and with the same sign in table 13 by monetary payoff. The ρ is negative in table 14 for economists which implies when playing for points they are more concerned about equality than efficiency in payoffs. This is also the case for CADE and COCISOH students, although not for students from POLI and Others, who are more interested in efficiency than in equality.

On the other hand the students that gave more are from COCISOH. In terms of α for table 13 and 14, COCISOH is the one of all the groups that stayed with less.

Conclusion

This paper provides evidence that economists show a different behavior compared to students from other majors. This behavior occurs independently of whether the in-

Table 9: Differences between economists and non economists, average tokens passed according task - monetary payoff

Task	All	Economists	Non economists	p-value
1	17.53	14.92	19.55	0.0024***
2	16.30	13.80	18.22	0.0015***
3	17.14	14.67	19.04	0.0020***
4	17.72	13.19	21.20	0.0000***
5	15.86	13.41	17.73	0.0003***
6	17.20	14.99	18.90	0.0026***
7	18.43	15.32	20.82	0.0002***
8	17.27	14.50	19.40	0.0002***
Mean	17.18	14.35	19.36	0.0000***
Note: *p<0.1; **p<0.05; ***p<0.01				
Source: Author's elaboration.				

centive is money or points. We analyzed these differences looking at aggregate behavior throughout the use of beanplots, as well as looking at disaggregated behavior by budgets and tasks. Finally, we presented the analysis of the parameters α, ρ and σ that are specific to the CES utility function.

We find that more economists gave less than the others students. The Kernel density and the beanplots indicate the group of students who gave more tokens are the COCISOH students (considered more altruistic with the α parameter). Finally, the Mann-Whitney test confirms the significantly difference between the economists and non economist students.

The career with less significant differences regarding selfishness relative to economists are POLI students.

In the budget analysis when playing for money, the economists and the non-economists gave less than what they gave when playing for academic points. This difference can be explained as an elasticity in terms of the endowment, where the elasticity with respect

Table 10: Differences between economists and CADE, COCISOH, POLI and Others, average tokens passed according task - monetary payoff

Task	Economists	CADE	p-value	COCISOH	p-value	POLI	p-value	Others	p-value
1	14.92	16.93	0.0644*	22.80	0.0077***	20.24	0.1574	20.16	0.0404**
2	13.80	18.62	0.0056**	20.32	0.0070***	15.06	0.5684	15.58	0.1505
3	14.67	16.86	0.0547**	23.10	0.0015***	13.47	0.9052	20.74	0.0208**
4	13.19	21.92	0.0001***	22.10	0.0005***	20.41	0.1129*	18.48	0.0065***
5	13.41	16.70	0.0077***	20.00	0.0032***	17.00	0.0484**	16.97	0.0707*
6	14.99	18.26	0.0202**	20.18	0.0074***	19.76	0.4788	17.90	0.1025*
7	15.32	21.70	0.0024***	19.94	0.0049***	19.94	0.1033*	20.61	0.0404**
8	14.50	17.93	0.0109*	22.74	0.0003***	13.18	0.4397	20.90	0.0169**
Mean	14.35	18.61	0.0000***	21.40	0.0000***	17.38	0.0018***	18.92	0.0000***

Note: *p<0.1; **p<0.05; ***p<0.01

Source: Author's elaboration.

money was bigger than for points. Additionally, to verify the difference between winning money and academic points the following parameters are analyzed: α measures selfishness between 0 and 1, which is not so different between dollars and academic points in the subgroups. However, the economists look to be marginally more selfish in points, while the other subgroups are marginally less selfish. On the other hand, the parameter ρ indicates the trade off between equality and efficiency. All the groups shown a major concern for efficiency besides equality when playing for money.

The main conclusion is that besides economists having a greater concern for efficiency when playing for money, the parameter α indicates that they are more selfish regarding all the other students.

Table 11: Differences between economists and non economists, average tokens passed according task - academic points

Task	All	Economists	Non economists	p-value
1	18.573	16.60	20.09	0.0056***
2	16.35	13.97	18.17	0.0006***
3	16.22	13.36	18.42	0.0003***
4	15.63	12.06	18.38	0.0000***
5	16.56	12.35	19.78	0.0000***
6	16.80	12.80	19.88	0.0000***
7	17.78	14.99	19.91	0.0011***
8	17.74	13.97	20.63	0.0001***
Mean	16.96	13.76	19.41	0.0000***

Note: *p<0.1; **p<0.05; ***p<0.01

Source: Author's elaboration.

Table 12: Differences between economists and CADE, COCISOH, POLI and Others, average tokens passed according task - academic points

Task	Economists	CADE	p-value	COCISOH	p-value	POLI	p-value	Others	p-value
1	16.60	19.50	0.0759*	23.44	0.0018***	20.82	0.3074	15.68	0.3499
2	13.97	18.22	0.0076***	19.36	0.0049***	17.18	0.2065	16.71	0.0674*
3	13.36	17.81	0.0048***	19.32	0.0038***	15.00	0.2721	20.32	0.0262**
4	12.06	17.51	0.0003***	21.60	0.0000***	14.53	0.4162	17.35	0.0233**
5	12.35	18.54	0.0006***	23.72	0.0000***	19.53	0.0075***	16.55	0.0118***
6	12.80	20.05	0.0000***	17.98	0.0084***	16.06	0.1564	24.61	0.0001***
7	14.99	21.47	0.0051***	18.22	0.0198***	20.88	0.0578*	18.39	0.2046
8	13.97	20.88	0.0036***	22.28	0.0009***	18.88	0.4374	18.32	0.0251**
Mean	13.76	18.61	0.0000***	20.74	0.0000***	17.86	0.1501	18.49	0.0000***

Note: *p<0.1; **p<0.05; ***p<0.01

Source: Author's elaboration.

Table 13: Parameters - monetary payoff: α, ρ and σ

Parameter	All	Economists	Non-economists	CADE	COCISOH	POLI	Others
α	0.71	0.76	0.68	0.69	0.66	0.71	0.69
ρ	0.18	0.17	0.20	0.21	0.17	0.19	0.20
σ	1.23	1.21	1.24	1.27	1.21	1.24	1.25

Source: Author's elaboration.

Table 14: Parameters - academic points: α, ρ and σ

Parameter	All	Economists	Non economists	CADE	COCISOH	POLI	Others
α	0.72	0.78	0.67	0.68	0.65	0.69	0.68
ρ	-0.05	-0.10	-0.02	-0.05	-0.05	0.09	0.02
σ	0.96	0.91	0.98	0.95	0.95	0.24	1.02

Source: Author's elaboration.

Bibliography

Andreoni, J. and Miller, J. (2002). Giving according to garp: An experimental test of the consistency of preferences for altruism.

Barro, R. (1974). Are government bonds net wealth? *Journal of Political Economy*, 82(6):1095–1117.

Carter, J. and Irons, M. (1991). Are economists different, and if so, why? *Journal of Economic Perspectives*, 5:171–77.

Caruso, S. (2012). *Homo oeconomicus. Paradigma*.

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

Frey, B. S. and Meier, S. (2002). Selfish and indoctrinated economists ?

Frey, B. S. and Meier, S. (2003). Are political economists selfish and indoctrinated? evidence from a natural experiment. *Economic Inquiry*, 41(3):448–462.

Frey, B. S., Pommerehne, W. W., and Gygi, B. (1993). Economics indoctrination or selection? some empirical results. *The Journal of Economic Education*, 24(3):271–281.

Gerlach, P. (2017). The games economists play: Why economics students behave more selfishly than other students. *PLOS ONE*, 12(9):1–17.

Greiner, B. (2015). Subject pool recruitment procedures: organizing experiments with orsee. *Journal of the Economic Science Association*, 1(1):114–125.

Hammond, P. (2019). Rationality in economics.

Haucap, J. and Just, T. (2010). Not guilty? another look at the nature and nurture of economics students. *European Journal of Law and Economics*, 29:239–254.

Hicks, J. R. (1932). *The Theory of Wages*. Royal Economic Society, Wiley, Toronto.

Ingram, J. K. (1888). *A History of Political Economy*. Reprint, Cambridge Library Collection -British and Irish History, 19th ed, 2013.

Kampstra, P. (2007). Beanplot: A boxplot alternative for visual comparison of distributions. *Journal of Statistical Software*, 28.

Laband, D. N. and Beil, R. O. (1999). Are economists more selfish than other 'social' scientists? *Public Choice*, 100(1/2):85–101.

Lundquist, T., Ellingsen, T., Gribbe, E., and Johannesson, M. (2009). The aversion to lying. *Journal of Economic Behavior Organization*, 70(1):81 – 92.

Mankiw, G. (2011). *Principles of Economy*. South-Western: Cengage Learning, USA.

Mann, H. B. and Whitney, D. R. (1947). On a test of whether one of two random variables is stochastically larger than the other. *The Annals of Mathematical Statistics*, 18(1):50–60.

Marshall, A. (1920). *Principles of Economics*. Macmillan Co., London, 8th edition.

Marwell, G. and Ames, R. (1981). Economists free ride, does anyone else? *Journal of Public Economics*, 15.

Moffatt, P. (2016). *Experimetrics Econometrics for Experimental Economics*, chapter Social Preference Models, pages 351–359. APLGRAVE, London.

Nelson, R. H. (2001). *Economics as Religion From Samuelson to Chicago and Beyond*.

Nicholson, W. and Snyder, C. M. (2010). *Microeconomic Theory :Basic Principles and Extensions*. South-Western/ Cengage Learning, Ohio, 11th edition.

Persky, J. (1995). Retrospectives: The ethology of homo economicus. *The Journal of Economic Perspectives*, 9(2):221–231.

Samuelson, P. A. (1938). A note on the pure theory of consumer's behaviour. *Economica*, 5(17):61–71.

Scott, J. H. and Rothman, M. P. (1975). The effect of an introductory economics course on student political attitudes. *The Journal of Economic Education*, 6(2):107–112.

Simon, H. A. (1955). A behavioral model of rational choice. *The Quarterly Journal of Economics*, 69(1):99–118.

Simon, H. A. (1957). *Models of Man*.

Smith, A. (1759). "the theory of moral sentiments," by adam smith, 1759. *Journal of Philosophical Studies*, 1(3):333–353.

Smith, A. (1976). *The Wealth of Nations*. R.H Campbell and A. S. Skinner, New York: Oxford.

Stigler, G. (1959). The politics of political economists. *The Quarterly Journal of Economics*, 73(4):522–532.

Varian, H. R. (2010). Intermediate microeconomics: a modern approach. *New York: W.W. Norton & Co*, 5:118–130.

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

Wilcoxon, F. (1945). Individual comparisons by ranking methods. *Biometrics Bulletin*, 1(6):80–83.

Yezer, A. M., Goldfarb, R. S., and Poppen, P. J. (1996). Does studying economics discourage cooperation? watch what we do, not what we say or how we play. *Journal of Economic Perspectives*, 10(1):177–186.