Emotions of Altruism, Envy and Guilt: Experimental Evidence

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Emotions of Altruism, Envy and Guilt: Experimental Evidence

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Abstract

We run an economic experiment in order to find out the preferences of altruism, envy, and guilt at individual level. We extend Andreoni and Miller's (2002) series of Dictator Experiments and Fisman et al.'s (2007) graphical experiment in order to have additional and more precise data at individual level. We run 55 graphical dictator games including some with a positive relation between the money the Dictator and the Receiver obtain, in order to estimate individual preferences for envy and guilt. Our program is interactive, as it looks for the regions where individuals´ emotions change from altruist to envy, and altruism to guilt, and changes the form of the budget sets. We find that most individuals show the emotion of altruism when facing other individuals that have similar income as themselves. However, some individuals show the emotion of envy when facing other individuals with much higher payoffs than themselves. More surprisingly, some individuals reveal the emotion of guilt when they have much higher payoffs that other individuals.

I. Introduction

Most people have the emotion of altruism, and many people have emotions of envy and guilt. Many times, the same person has several emotions in different situations. For example, an individual may feel altruistic toward another individual in distress and the same person may feel envy toward somebody that has higher income than her. The objective of this paper is to design and conduct an economic experiment that allows us to estimate three different emotions at individual level: altruism, envy and guilty and to find in which situations each emotion is revealed. We use Andreoni and Miller (2002) series of Dictator Experiments and extend Fisman et al. (2007) graphic experiment in order to have additional and more precise data.

Andreoni and Miller (2002) developed a series of Dictator Games in order to estimate preferences of altruism. Although they obtain information at individual level that allows them to classify individual preferences (Leontief, perfect substitutes, weak Leontief, weak substitutes), their data is not large enough to estimate preferences at individual level (they estimate an aggregation of the preferences for the individuals that belong to each category). In some sessions of their experiment, Andreoni and Miller added some additional questions in order to find out if some individuals also have preferences of "jealous" (in this paper we refer to this emotion as envy). They find that 23% of their subjects have preferences of envy. Although Andreoni and Miller did not disclose how altruistic these individuals were, we can guess that some of their subjects have both emotions of altruism and envy. The objective of this paper is to extend their experiment in order to have a more comprehensive understanding of which situations an individual have each emotion of altruism and envy. Additionally, we included the emotion of guilt.

We hypothesize that the same individual may display these emotions in different situations, depending on their relative income or wealth as compared with the income of others. When having relatively equal amounts of wealth, we believe that individuals may have the emotion of altruism. However, we hypothesize that individuals may feel envy toward other individuals that have a much higher income than them, and they may feel guilty toward other individuals that have a much lower income than them. To test these hypothesizes, we group individuals in pairs and let them play a series of Dictator games. We divide the set of possible incomes of each pair of players in three different regions of relative income where each emotion may be present. In order for individuals to reveal each emotion, we use different budget sets in each of these regions. The emotions we will to analyze could be defined as:

Altruism. An individual reveals the emotion of altruism if she is willing to sacrifice her own income in order to increase the income of another individual. If we represent in a graph in the vertical axe the income of the Dictator and in the horizontal axe the income of the Receptor, preferences for altruism would be represented by indifference curves with a negative slope. In order to analyze these preferences we use standard budget restrictions with a negative slope.

Envy. An individual reveals the emotion of envy if she is willing to sacrifice her income in order to decrease the income of another individual. Graphically we could represent these preferences with indifference curves that have positive slope. We use budget constraint with a positive slope in order to analyze preferences for envy.

Guilt We call as "guilt", the emotion where an individual does not like having much more wealth than others and is willing to sacrifice her own wealth in order to decrease this difference.

Fisman et al. (2007) create a graphical interface to extend Andreoni and Miller series of Dictator games, which allows them to obtain more data and more precise information at individual level. Individuals decided on 50 dictator games (which graphically were standard budget sets), which provide them with enough information for estimating preferences for altruism at individual level.

As Fisman et al., we use a graphical interface, which allow us to increase the amount of information and the precision of the data at individual level. We run 55 dictator games; 37 of those dictator games are standard and we use them to analyze individuals' emotion of altruism. However, we also use 18 non-standard budget sets in order to analyze the emotions of envy and guilt.

An individual that has the emotion of altruism has indifference curves with negative slope. An individual that has the emotion of envy or guilt, has indifference curves with positive slopes. An individual that has the emotions of altruism, envy and guilt at the same time must have indifference curves that change the sign of her slope at some point. To find out the approximate region where the preferences change the sign of their slope, we use vertical and horizontal budget restrictions. An interior choice in a vertical or horizontal budget constraint indicates that the indifference curves change the sign of their slope.

Our program is interactive, as it looks for these interior choices in vertical and horizontal budget constraints in order to find the regions where individuals' preferences change from altruist to envy or guilt and adapts the shapes of the budget sets in function of these interior choices in order to better study each individual's emotions of envy and guilt.

Andreoni and Miller (2002) and Fisman et al. (2007) use Afriat's (1972) Critical Cost Efficiency Index (CCEI) in order to measure individual consistency. If we reduce the income in every budget set, eventually every violation to the Axiom of Revealed Preference from a set of choices is eliminated. The CCEI measures the consistency of a set of choices as the smaller reduction that is necessary for every violation to the Axioms of Revealed preference to be eliminated. However, given that we include non-standard budget restrictions with vertical, horizontal and positive slopes, some of which part from the origin, and therefore have an income of zero, we cannot use the CCEI. Instead, we use Echenique's (2011) Money Pump Index (MPI) to measure how consistent are individuals' choices. Individuals act inconsistently if they choose a higher quantity of an option in a period when it is more expensive that option and choose less of an option when that option is

cheaper. In theory, an arbitrer could earn money by buying each option when it is cheap and selling it to the subject when it is expensive. The MPI measures the consistency by the amount of money it can be made by arbitraging between the individuals' inconsistent decisions. The MPI has the advantage with respect to the CCEI that can measure inconsistent behavior even with non-standard budget sets.

The results of the paper are the following

We find that the mean number of violations to GARP is 10 and each subject lost 172 of possible Mexican pesos on average by their inconsistent behavior. That is, on average each subject left under the table 12 % of the money they could have won (or given).

Unsurprisingly, we find that most individuals have the emotion of altruism. However, when facing a region where other individuals have much more income than them, some individuals' emotion changes to envy (19 out of 41 subjects). More surprisingly, we find that many individuals have the emotion of guilt (15 out of 41 subjects) in a region where other individuals have much less income than them.

In section II, we explain in detail the experimental design. In section III we analyze the consistency of each individual's choices. In section IV we analyze the results. And in section V we conclude.

II. Experimental Design

The experiment consists in a set of 55 dictator games. In each game the dictator chooses a tuple from a continuous set of possible token distributions between himself and another player, the receiver. Each player plays both roles, as dictator in his game and the receiver of another game. Players where linked randomly in a way that there where no closed ties, so a player will be always the receiver of someone who was not their receiver.

The interface is graphical, showing an area. The axes represent the number of tokens the dictator will keep and the amount the receiver will collect. Distributions are limited to a maximum of 140 tokens per participant, while the shown area is a 150 tokens square, so the limits of the distribution set are visible. The dictator can choose any point in the area, leaving the possibility of non-efficient choices. The chosen point is also shown numerically at the right side of the graph. The choice is not made effective until the dictator presses the "next" button in the right part of the graph (figure 1).

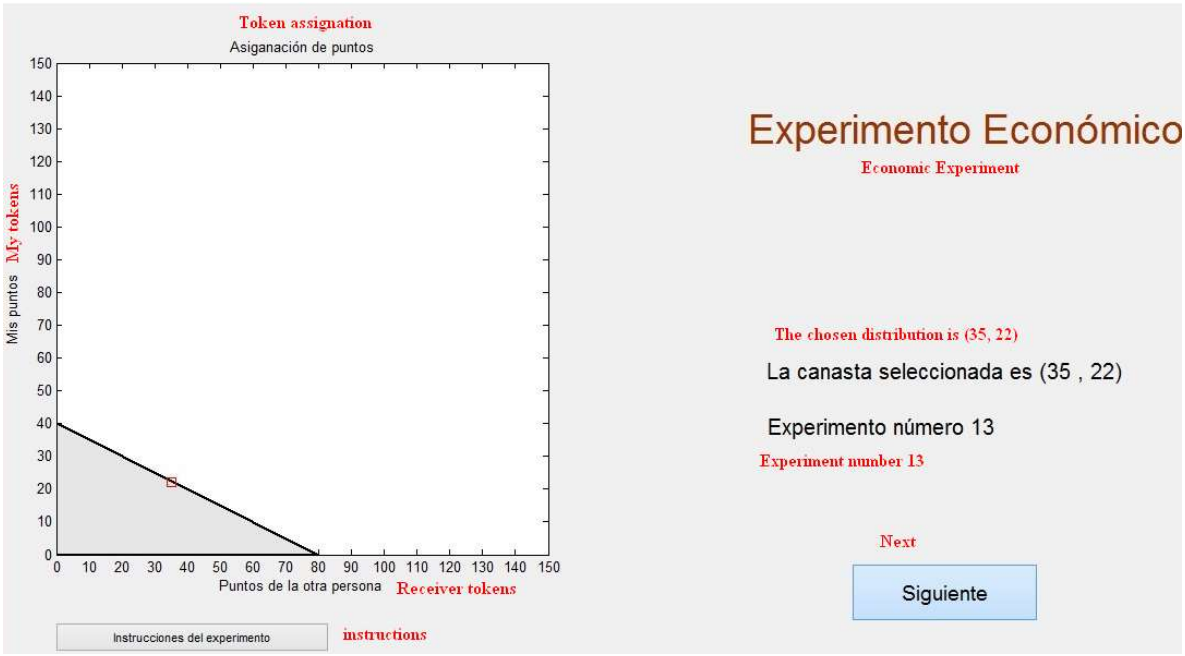


Figure 1. Experiments graphical interface. Since the experiment was made in Mexico labels are in Spanish, English translation in red. Instructions for the experiment where available at any moment pressing the "instructions" button under the graph.

In literature it is usual to relate the problem to a budget constraint with a transference price. Using that approach, in our experiment, the transference price can take negative values, zero or even infinite, so we prefer to talk about a set of possible distributions, as an area where the dictator must choose. Each set is continuous and convex, bounded, and therefore compact. The set always contains the origin (0,0), so to give and receive nothing is always an option. The set is shaped as a triangle in most cases, but rectangles and rectangle trapezoid also appear.

In the first 37 games the distributions are limited by a triangle in the sense of a positive price of transmission and a negative slope, so in the border of the set giving to the receiver reduces the dictator's tokens (figure 1). The slopes (ratio of prices) take just eleven different values, namely 1, 1.25, 1.5, 2, 3, 5, 7 and 4/5, 2/3, 1/2, 1/3, 1/5 and 1/7. The first slopes of each set appear three times and the last just twice. The 1 slope distributions correspond to maximum of 20, 40 and 60 tokens, the rest in a way that four (2,3,5,7) will cross slope one at 1/3, other four (1/2, 1/3, 1/5, 1/7) at 2/3 and other four (1.25, 1.5, 4/5, 2/3) in the middle point, in the case of 20 and 40, for 60 only three cross at 1/3 and three at 2/3 (2,3,5 and 1/2, 1/3 and 1/5 respectively). We can group the figures in a way that the 60 tokens slope one figure is related to other 10 distributions, forming a group of 11, when 40 and 20 generate groups of 13 distributions each. For each slope we obtain three parallel borders of the distribution set, except for 7 and 1/7 where only two parallels where set. Since in the previous literature a usual choice in dictator games is 1/2 to the receiver and 2/3 for the dictator, the crossing points where chosen accordingly.

In the next 6 games the distributions are shaped as a rectangle, three of them with height 140 and bases 1, 6.66 and 10, three with base 140 and height 1, 6.66 and 10. They represent infinite and zero cost of transmission (figure 2).

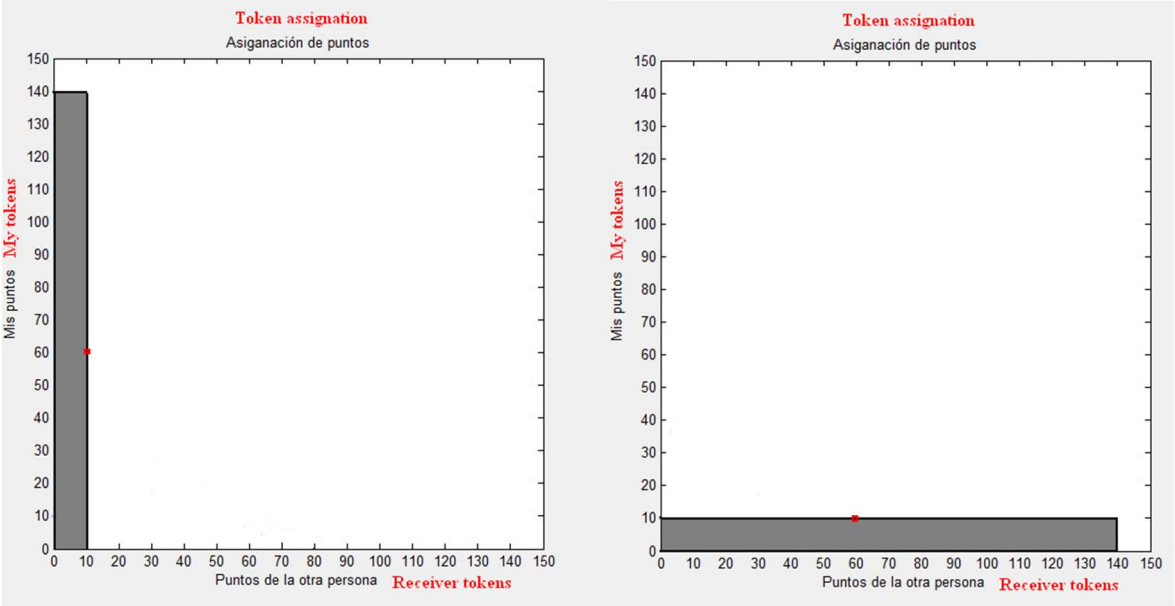


Figure 2.

In the last 12 games the distributions where limited by a triangle, or a possible trapezoid, with a positive slope, implying a negative price of transmission, giving tokens to the receiver increases the dictator's tokens. In each case the triangle has one of his vertices at the origin (zero tokes for both). In 6 cases the distribution is constructed in a way that the election is the area under the positive slope line, so that for a given value of tokens given to the receiver, the amount the dictator can assign himself is limited above, or, to give himself a higher amount, he has to increase the amount given to the receiver (figure 3), and for the other 6 cases for a given amount of tokes of the dictator, the amount he can give to the receiver is limited above, or, as more he assign himself, the more he can give to the receiver (figure 3). This difference is relevant form a psychological point of view.

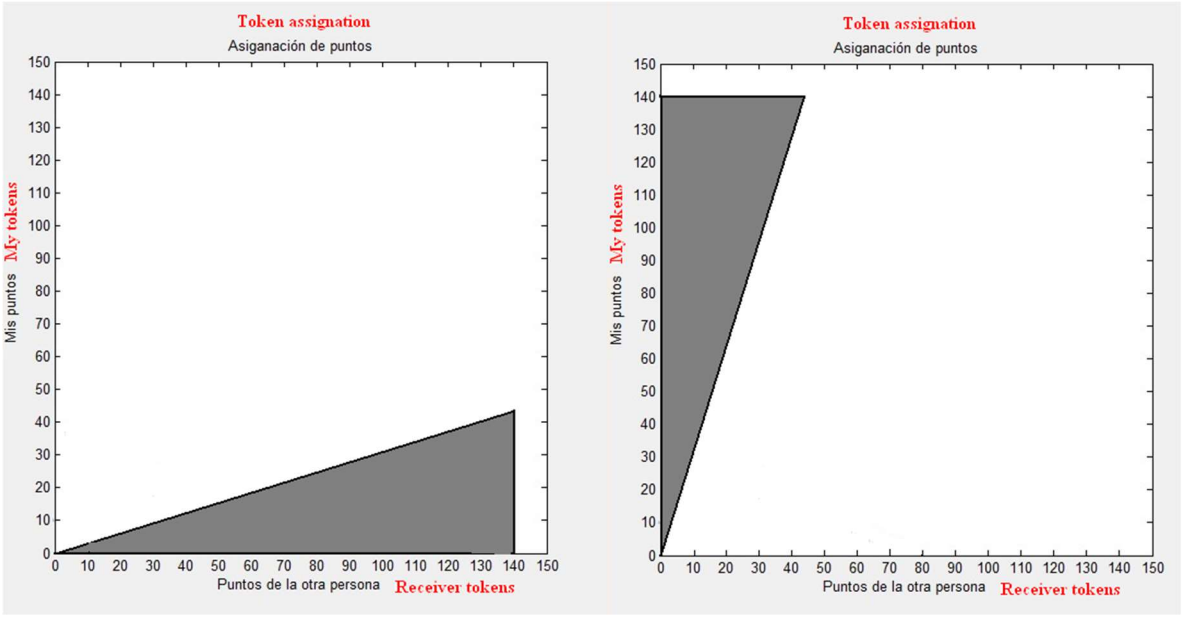


Figure 3.

The positive slopes (negative prices) where 3 and 1/3, generating triangles. The rest where established according to individual choices in for of the rectangle distributions. The internal slope of the triangle was determined with the origin (0,0) and the choice made for base 10 and 6.66 or height 10 and 6.66, another with the 90% of that slope, and for the case of base or height 10 the 66.66% (2/3) of that slope.

Observe that if individuals used traditional utility functions for the rectangles, the optimal choices are corner solutions (max possible payment for each player), so the dependent slopes would we equal for everybody. Only if the player chooses to distribute in a way that technically available tokens are not distributed, the slopes would we different accordingly. Since the slopes where choice dependent, in some cases a trapezoidal distribution set aroused (figure 4).

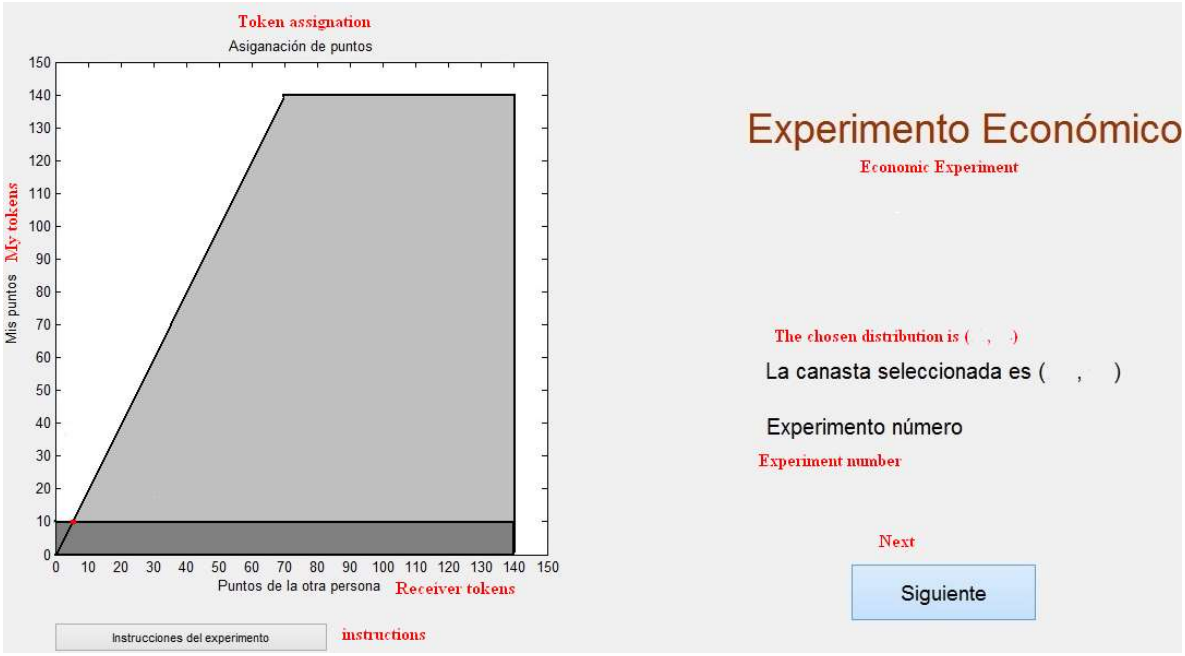


Figure 4.

During the experiment the individual faced the restrictions organized by groups, but randomly inside every group. Subjects were not aware that their choice in the second set will determine the slopes of the last group.

The experiment was performed in groups of 14 subjects in a computer room, three sessions where performed during the same day. Subjects where students of the University of Guanajuato, mainly from the economic and administrative area, who voluntarily applied for participation. There are 7 mayors in the Economics and administrative division and an equitable participation was intended, also a 50% participation for each gender was intended.

As a payoff one round was randomly chosen to be realized, the dictator will receive it´s part of the distribution and other randomly chosen subject of the session will be the receiver. Each subject received the dictator part from their chosen round and the receiver part of other subject's experiment. Subjects were aware of this payment method. Also a show-up fee was paid.

At the beginning of each session instructions where read aloud, with the support of a projection, and possible questions were answered. Instructions where available during the whole experiment pressing the instructions button. When subjects started the experiment they had a single trial-run before starting with the real experiment.

III. Consistency

Before we estimate individuals' utility functions, we test for the consistency of individuals' choices. According to Afriat (1966), if individuals behave consistently, their behavior can be represented with a well behaved utility function. We test for consistency by testing if individuals' choices violate or satisfy the Generalized Axiom of Revealed Preference.

Note that we can use GARP even if we analyze emotions that imply preferences that might be not monotone, as individuals may choose to sacrifice their own income in order to decrease the income of another individuals in the emotion of envy, or they sacrifice their income in order to decrease its difference with the income of another individual in the emotion of guilt.

Once we test for individual consistency, we can use Afriat theorem to find a utility function that represents their behavior. According to Afriat (1967), if the data satisfies "cyclical consistency", then there exists a non-satiated, continuous, concave and monotonic utility function that rationalizes this data. Varian (1981) shows that satisfying cyclical consistency is equivalent to GARP.

We test for consistency by testing if individuals' choices satisfy the GARP. However, evaluating consistency by analyzing if it the data satisfies GARP is too strict a criterion for our experiment, as the number of choices is large (55 choices) and almost every individual has a violation of the GARP, even if small. Andreoni and Miller (2002), and Fisman et.al (2007) use the CCEI index, developed by Afriat (1966) in order to test for consistency.

If we reduce the income in every budget restriction, each violation to GARP would eventually be eliminated. The CCEI measures consistency as the constant $e \leq 1$ by which the income has to be multiplied in order for every violation to GARP to be eliminated. In this sense, $1 - e$ is the size of the largest violation to GARP. In figure 1, the size of the violation to GARP is represented by the percentage that the income should be reduced in the budget restriction B in order to reach point *A*, in which case the violation would disappear (or in the percentage the income in budget restriction A should be reduced in order to reach point B, whichever reduction in income is smaller). However, for our experiment we cannot use the CCEI, as it is designed to test consistency in standard budget sets and some of our budget sets are non-standard.

Instead, we use Echenique et al.'s (2011) Money Pump Index (MPI from now on) to measure how consistent are individuals' choices. The MPI measures consistency (or inconsistency) by the amount of money it can be made by arbitraging between the individuals' inconsistent decisions. When an individual behaves inconsistently, she o he has chosen two (or more) products, where she has chosen more of the products when they were more expensive and less when they were cheaper. Theoretically, an arbitrager could profit from a violation to GARP by buying each product in the period when it is cheaper and selling it in the period when the product is more expensive.

For our experiment, the money pump index is better that the CCEI because, in a set of choices, the CCEI only takes into account the largest violation, and the CCEI can only be used to measure violations from standard budget constraints (with negative slopes), while the MPI uses the

information of every violation to GARP and can be used with nonstandard budget restrictions with different slopes, as it is the case in our experiment.

From Figure 1, we can see a violation of GARP. And individual that chose bundle A at prices p_A and bundle B at prices p_B, made and inconsistency by buying more of each good when they were expensive and less when they were cheap. We could potentially arbitrage by buying the bundle A at prices p_B and sell it at prices p_A, and buying the bundle B at prices p_A and selling it a prices p_B.

An arbitrager could earn profit $mp = p(x - x') + p'(x' - x)$ from these inconsistencies. The MPI is the addition of all possible profits an arbitrager could earn from all inconsistencies, of first, second, third, fourth degree, and so on, divided by the total expenditure of the individual in order to compare it relative to all the money expended.

The MPI is given by the formula:

$$MPI_{\{(x^{k_1},p^{k_1}),\ldots,(x^{k_n},p^{k_n})\}} = \frac{\sum_{l=1}^{n} p^{k_l} \cdot \left(x^{k_l} - x^{k_{l+1}}\right)}{\sum_{l=1}^{n} p^{k_l} \cdot x^{k_l}}, \qquad (where\ k_{n+1} = k_1)$$

The MPI can measure violations to GARP even when subjects face non-standard budget sets. The only difference with the case of standard budget sets is that the price of one of the goods is negative.

In table 1, we show the results of the MPI. Of the 41 subjects in our experiment, 37 had at least one violation to the axiom of revealed preference. However, these violations are not large. For the cycle of length two the MPI is around 6% of the average of the income of the questions where the violations occurred. The mean number of violations per subject is 4. When we include the second and third cycles, the MPI is around 7% of the average of the income of the questions where the violations occurred. The mean number of violations per subject is 5.

From Table 5.1 we can see the MPI for each subject. From the 41 subjects we consider that 39 are consistent. In Table 5.2 we resume the general results.

Table 5.1 Results of consistency

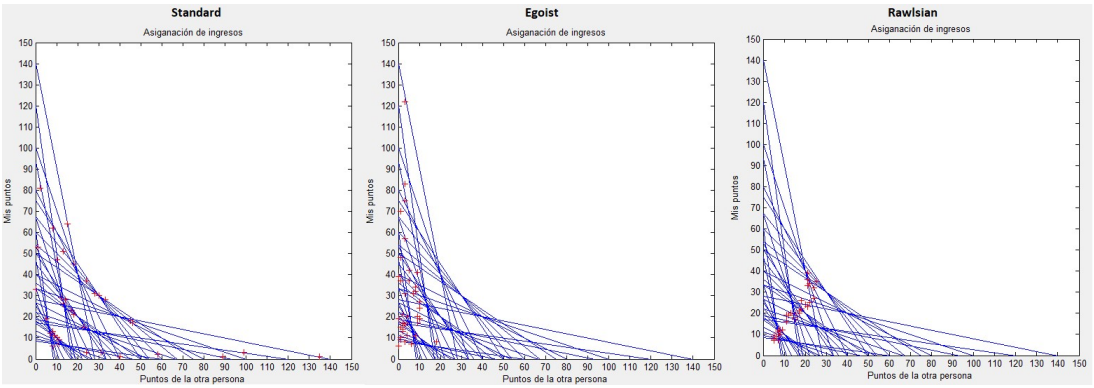
	Degree of the MPI		
	2nd	3rd	4th
Number of subjects	41	41	41
Subjects that violated GARP	2	2	2
Median MPI	15.6%	15.3%	14.2%
Mean MPI	15.3%	16%	16.2%
Total possible combinations for each subject	820	10,660	101,270
Median number of violations	7.0	39	146
Mean number of violations	15.15	244.63	2,664.44

As a criterion for deciding who is consistent and who is not, we chose to use the total value of the possible arbitrage of individuals' inconsistent decisions, instead of the proportion that this arbitrage represents from the total expenditure, as some of our budget sets are very small and small mistakes may result in large percentages. Using Bronar´s power test we find two inconsistent behaviors.

IV. Results

For the set of negative slopes behavior was structured as:

- Standard: When choices react to slopes, giving more when it is easy to give (cheaper), and retaining more whet it is harder to give (expensive). That behavior shows a desirable level of altruism or social justice concept. 16 individuals presented this behavior.
- Egoist: When disregarding the slope, an individual constantly gives less than she retains. There is some level of altruism but restricted to own gains. Also 16 individuals displayed this behavior.
- Rawlsian: When disregarding the slope, individuals constantly give according to a given slope, retaining usually as much as they give, in a Leontieff fashion. There is a strong aversion towards inequality, similar to the Rawlsian Maximin concept. (Rawls, 1971). Four individuals showed this kind of strong inequality aversion.



Those where the expected behaviors to be observed, however three extreme cases where observed, with one individual each.

- Purely selfish: An individual that kept all tokens, never giving away any token, even when it was free to do so. That is a behavior predicted by classical selfish theory, but not so often observed in experiments.
- Purely altruistic: An individual that gave all tokens away, only keeping for himself when it could not give it away.

- Perfect substitutes. Give all when slope is less than one, keep all if slope is equal or higher than one. That strategy maximizes general pay-off and expected individual profit, if followed by all individuals.

For positive and non-negative slopes, behaviors were structured as:

- Standard: Corner solutions, taking and giving as much possible. This is a classical Pareto optimal solution for such slopes, and shows a significant level of altruism.
- Envy: Having the possibility to gain more giving more, the individuals restrain from giving when this means a higher profit to the receiver than to oneself. An inequality aversion towards other´s profit. Observed for horizontal and positive with the selection area below.
- Guilt: Having the possibility to gain more, individuals restrain their own gain if it´s too high compared to the receiver's profit. An inequality aversion towards own profit. Observed for vertical and positive with the selection area above.

The results are shown in table XI

Individual	Negative Slopes	Horizontal	Positive below	Vertical	Positive above
1			Standard		
2	Egoist	Standard	Undefined	Standard	
3	Rawls		Standard		
4			Standard		
5		Standard			Undefined
6	Rawls	Undefined	Envy	Guilt	
7	Egoist	Undefined	Envy	Undefined	
8	Purely Selfish		Envy	Envy*	
9			Standard		
10	Egoist	Standard	Envy	Guilt	
11	Rawls	Standard	Envy	Guilt	
12	Standard	Envy	Envy	Undefined	Guilt
13	Egoist	Standard	Envy	Standard	Guilt
14	Egoist	Undefined	Envy	Standard	
15			Standard		
16	Egoist		Envy	Guilt	
17			Standard		
18	Egoist		Standard		
19			Standard		
20	Rawls		Envy	Undefined	
21	Pure Altruism		Guilt*	Guilt	
22	Standard		Envy	Guilt	
23	Egoist	Standard	Envy	Standard	Guilt

24	Inconsistent							
25	Egoist		Standard		Envy		Standard	
26	Egoist				Standard			
27	Standard			Envy			Guilt	
28	Egoist			Engy		Undefined		Guilt
29	Standard			Envy			Undefined	
30	Egoist				Standard			
31	Standard		Standard		Envy		Guilt	
32	Standard			Envy			Guilt	
33	Egoist			Envy			Guilt	
34	Egoist		Standard		Envy		Standard	
35	Egoist			Envy		Guilt		Undefined
36	Standard			Envy			Guilt	
37	Perfect Substitutes				Standard			
38	Standard	Envy		Undefined			Guilt	
39	Inconsistent							
40	Standard							
41	Egoist			Undefined		Envy*		Standard

* The behavior was not expected but observed (non-used tokens).

For simplicity, the behavior for non-negative slopes is simplified, we consider as standard an individual that does not show Envy or Guilt in any moment, and as Envy, Guilt or both, if such behavior is observed at least once. We can consider then correlations between observed behavior, considering only those who were consistent and did not show extreme behaviors (36 observations).

	Standard	Envy	Guilt
Standard	0.258630	-0.318529	0.037796
Egoist	-0.206904	0.254824	-0.075593
Rawls	-0.081786	0.100728	0.059761

Those who showed an Egoist behavior at the negative slopes, tend to show also envious behaviors in non-negative slopes. Standard _behavior at negative slopes has also a considerable positive correlation with a standard behavior at non-negative slopes and an even higher negative correlation with envy. Guilt is not strongly correlated to any particular behavior in the negative slopes.

Since at the non-negative slopes there can be more than one behavior observed, we show the correlation between those behaviors.

	Standard	Envy	Guilt
Standard	1		
Envy	-0.94244	1	
Guilt	-0.63539	0.55862	1

To be considered standard both guilt and envy must be not present and thus the correlation is close to minus one, however, since they do not necessarily appear both, it's not exactly minus one. There is a strong correlation between Envy and Guilt (but still less than 0.6), so they usually appear together.

The choice made in the negative slopes, for those who showed consistent choices, could be explained using a utility approach, and thus for types of utility functions where used to estimate the better utility function to fit such choices, namely a Constant Elasticity of Substitution (C.E.S.), a logarithmical quasilinear function (for own and others payoff), and a Leontief function.

Individual	Observed behavior	Best fit
1	Standard	Log Other
2	Egoist	Leontief
3	Rawls	Leontief
4	Standard	Log Self
5	Standard	C.E.S.
6	Rawls	Leontief
7	Egoist	Log Self
9	Standard	C.E.S.
10	Egoist	Log Self
11	Rawls	Leontief
12	Standard	Log Other
13	Egoist	Log Self
14	Egoist	Log Self
15	Standard	C.E.S.
16	Egoist	C.E.S.
17	Standard	Log Other
18	Egoist	Log Self
19	Standard	Log Other
20	Rawls	Leontief
22	Standard	Log Self
23	Egoist	Log Self

25	Egoist	Log Self
26	Egoist	C.E.S.
27	Standard	Log Self
28	Egoist	Log Self
29	Standard	Log Self
30	Egoist	Log Self
31	Standard	Log Self
32	Standard	Log Self
33	Egoist	Log Self
34	Egoist	Log Self
35	Egoist	Log Self
36	Standard	Log Other
38	Standard	C.E.S.
40	Standard	C.E.S.
41	Egoist	Log Self

A quasilinear utility function was the more observed fit (24), being more usual to find a quasilinear function considering own payment as the more relevant good (19). A C.E.S was the bets fit for 7 individuals, and a Leontief for the remaining 5.[1]

Thus, for most individuals (over ½), to give away is more likely described as a luxury good in a quasilinear approach, keeping the necessary amount and then giving away a small surplus, at least at low stakes. For 1/6 of the population, a C.E.S approach was the best fit, showing a more balanced view between keeping and giving, while 1/9 showed a strong aversion to inequality, looking for a strict balance between payoffs.

The correlations between the observed behavior for negative slopes and the utility function that better describes their choices is shown in table

	C.E.S.	Log. Self	Log. Other	Leontief
Standard	0.266800	-0.273720	0.449013	-0.359211
Egoist	-0.156941	0.510114	-0.359211	-0.197566
Rawls	-0.173702	-0.373773	-0.141990	0.880341

[1] All those who showed a Rawlsian behavior, unsurprisingly had the best fit with a Leontief function, however one of the individuals with a egoist behavior had also the best fit with a Leontief, dues the dispositions of her choices so close to a line that it was difficult to fit with any function, being the Leontief the best performing one. Rawlsian individuals where close to a Leontief with a x/y ratio close to one (a little skewed towards own payoff, so higher than 1), while the Egoist individual had a x/y ratio higher than 3.

Rawlsian behavior, as expected, is strongly correlated with a Leontief utility function, while egoist behavior is best explained with a quasilinear function towards one self. Standard behavior is correlated with both quasilinear towards the receiver and slightly less with a C.E.S. utility function. Both Standard and Rawlsian behaviors have a negative correlation with a quasilinear utility function towards one self, while an egoistic behavior has a negative correlation with a quasilinear approach towards the receiver.

When a Standard behavior is best explained with a C.E.S. function it shows a positive ρ parameter, indication of substitution, while egoist behaviors explained by C.E.S. show a negative Rho parameter, indication of complementarity. When there is some degree of substitution between own and other´s pay-off, you react more to changes in slope, giving more away when it is cheaper, under complementarity that reaction to a change in the slope is considerable smaller. So even that both can be sometimes explained by a C.E.S. function an Egoist and a Standard behavior show different considerations between payoffs.

Finally, there where the three extreme cases. Each one with a specification on their own. A perfect substitution function will fit perfectly the perfect substitute behavior observed. That behavior, as explained before, was the best strategy in terms to maximize general pay-off, so a kind of Kaldor-Hicks improvement on general payoffs. Mathematically, if followed by all players, it maximizes the expected payoff before the experiment starts.

A perfectly selfish behavior is consistent with a traditional homo-oeconomicus view point, considering only our own payoff, so it is a rational Nash Equilibrium for the experiment. It was played by an economics student.[2]

There was however one slightly puzzling purely altruistic behavior.[3]

V. Conclusions

In this article, we have designed and conducted an economic experiment with the purpose of discovering individual preferences for altruism, envy and guilt. Our experiment uses a graphical interface that allows us to collect more and more precise information at individual level. The program is interactive as it changes the form of some budget sets with the answers of the subjects in order to better know the different emotions of each individual.

We measure individual consistency by analyzing violations to the Generalized Axiom of Revealed Preferences (GARP) using the Echenique, et al.'s Money Pump Index. We find that the mean number of violations to GARP is 10 and each subject potentially loses on average 172 of Mexican pesos by their inconsistent behavior. That is, on average each subject left on the table 12 % of the money they could have won (or give to other players).

[2] Most of individuals had an economic background, so it is not a relevant information per se.

[3] It might be a purely altruistic individual. She might have not care about the pay-off for some personal reason, so he better give it to the receiver, or she confused the axes.

We find a high level of individual heterogeneity. However, most individuals have the emotion of altruism. When facing a region where other individuals have much more income than them, some individuals' emotion changes to envy (19 out of 41 subjects). Surprisingly, when facing a region where other individuals have a much less income than them, many individuals have also the emotion of guilt (15 out of 41 subjects). We find that those individuals that are less altruist, and therefore more selfish have a tendency to have the emotion of envy. Finally, we estimate individuals' utility functions for altruistic behavior.

There are several potential extensions to our work. We could make the program more interactive, allowing us for example to base our program in the different techniques developed by Varian (1981) to reveal individual's individual preferences.

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