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An Experimental Analysis of the Impact of Propaganda on Decision Making Regarding the Dilemma of Economic Growth vs. Economic Inequality

Proyecto de Investigación

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Economía

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A mis padres por su esfuerzo inagotable y apoyo incondicional. Una mención especial para Isabel, quien con un gran corazón me dio la oportunidad de iniciar y culminar mis estudios. A la Universidad San Francisco de Quito por su estilo de enseñanza, su excelencia, sus valores, y sus profesores. Y a Dios por el don de la vida.

Pedes in terra ad sidera visus.

ABSTRACT

This research uses a Dictator-Ultimatum game variant with fixed payoffs to undergo an experimental analysis that sheds new light into individual's preferences regarding utility maximization and economic inequality. It also examines the effect of two types of propaganda, one that evokes competition, class struggle and resentment, and one that evokes cooperation, trust and altruism on decision making regarding the game. It finds that propaganda has the expected effects on prosperity. Positive Propaganda carries individuals into societies with more economic growth and less economic inequality. It also reaffirms the role of inequality aversion in individual's utility functions. Finally, it finds that students of the field of economics tend to choose high economic growth outcomes and are less altruistic.

Keywords: Experimental economics, Ultimatum game, decision making, inequality, propaganda, Altruistic Capitalism.

RESUMEM

Este trabajo de investigación utiliza una variante del juego del Dictador-Ultimátum con pagos fijos para llevar a cabo un análisis experimental que proporciona nueva información acerca de las preferencias individuales respecto a la maximización de utilidad y desigualdad económica. También examina el efecto de dos tipos de propaganda, una que evoca competición, lucha de clases y resentimiento, y otra que evoca cooperación, confianza y altruismo, en la toma de decisiones respecto al juego. Manifiesta que la propaganda tiene los efectos esperados en la prosperidad. La Propaganda Positiva lleva a los individuos a sociedades con más desarrollo económico y menos desigualdad económica. También reafirma el rol de la aversión a la desigualdad en las funciones de utilidad de los individuos. Finalmente, descubre que los estudiantes de economía tienden a escoger resultados altos en cuanto a crecimiento económico y son menos altruistas.

Palabras clave: Economía experimental, juego del Ultimátum, toma de decisiones, desigualdad, propaganda, Capitalismo Altruista.

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1 Introduction

The main question of this research is if individuals (either rich or poor) are willing to give up a portion of their wealth so that there is a reduction of economic inequality in a society, as well as if negative and/or positive propaganda has any effect on this decision. However, this main question includes three specific objectives.

The first objective is to test the perception of *homo economicus* regarding rational decision making that states that individuals seek to maximize their selfish interests. It is evident that there are situations in which individuals don't act motivated solely by their selfish interests. It is also evident that there are situations in which individuals don't act motivated solely by the maximization of their material utility (Guth and Tietz, 1990; D'Elia, 2009). However, utility maximization may remain intact when individual's utility functions incorporate aspects like inequality valuation, social norms, loss aversion, and other less tangible aspects.

The second objective is to analyze the dilemma between economic growth and economic inequality. For instance, there are situations in which less inequality leads to more economic growth (Alonso, 2005), but there are also situations in which more economic growth leads to more inequality (Piketty, 2014). The direction of the causality is not yet clear, and econometric results are still open to interpretation. There are economists (Krugman, 2014) that hold that inequality is a drag, a liability for the economy and that redistributive policies are needed; and there are economists (Mccloskey, 2014) that hold that the problem in itself is poverty, not inequality, and that a focus on redistributive policies, instead of a focus on economic growth, will have a negative impact on rich and

poor alike. The experiment will put subjects in an scenario in which a pair of individuals, a rich individual and a poor individual, will be faced with a dilemma (assuming inequality and growth have a negative correlation in this case) in which they will have to opt for a society with a greater wealth for both, but more inequality, or a society with a lesser wealth for both, but less inequality.

Finally, the third objective is to observe the effect of exposure to immediate stimulus, specifically propaganda, on rational or irrational decision making, in favor of economic growth or in favor of a reduction of inequality when individuals play under these circumstances. Individuals are cognitive beings whose decisions are altered by stimulus (Rivas, 2004). Additionally, the experiment will test this effect under two different types of propaganda, Negative Propaganda (NP) and Positive Propaganda (PP). NP will consist on propaganda that evokes feelings against the rich, the exploitation of the poor, injustice, and abuse. It is meant to generate feelings of competition, clash struggle and resentment. On the other hand, PP will consist on propaganda that evokes feelings of generosity, of understanding the importance of rich and poor working together to construct efficient societies. It is meant to generate feelings of cooperation, trust, and altruism. The experiment will attempt to measure the effect of both types of propaganda on decision making, and to evaluate which of the two types of propaganda will have a greater impact on outcomes.

This paper will follow the methodology of experimental economics, with a laboratory experiment, using z-Tree: Zurich toolbox for ready-made economic experiments (University of Zurich, 2016). The hypotheses to be tested, and the experimental design, will be explained thoroughly in section 3.

2 Theoretical Background

2.1 Rational Decision Making

In what follows there is a brief review of the literature about the first objective of this research regarding rational decision making.

Traditional economic theory states that rational individuals seek to maximize their utility functions. A rational individual will choose good A over good B until the marginal utility received from one additional unit of A is equal to the marginal utility received from one additional unit of B. However, according to Streb (1998), this vision of individual behavior generates criticism towards economics from other disciplines. Some scholars tend to classify this economic vision as utilitarian, or even greedy (Bunge, 1998). For example, Gary Becker (1962) tried to use utility maximization to explain the increase in labor force participation of women after World War II. He merely explained that the major cause of the increase in participation was the growth of the earning power of women as they gradually gained recognition. This implied a growth of the opportunity cost of staying at home and thus more women, in order to maximize their utility functions, started to work. Nonetheless, Herbert Simon criticizes this explanation

> The true explanation will be obtained not by raising the sophistication of the economic reasoning but only by painstaking examination of occupations in manufacturing and service industries and an even more difficult empirical examination of changes in woman's attitudes about where they prefer to work (2007).

However, what Simon doesn't take into consideration, and what a big percentage of scholars from other disciplines tend to misinterpret, is that "changes in woman's attitudes about where they prefer to work" are taken into consideration within the utility function. Utility maximization does not solely mean paycheck maximization. Many utility functions are more complex and include less tangible aspects such as risk perception, social norms, the utility functions of others, altruism, and equality valuation (Fehr and Schmidt, 1999).

Consider Kunreuther´s study on the purchase of flood insurance (1978). Decisions made by property owners on purchasing insurance involved more than a cost-benefit analysis on the expected reimbursable damage of the floods vs. the premium. Evidence in the research suggested that owners that had experienced floods in the past, or that have relatives that had experienced floods in the past, tend to get insured more than others even if this doesn't naturally increase the risk of a flood or the price of the premium. Thus, perceptions are included in their utility functions.

Consider also studies regarding altruism. Moreover, pure altruism, where an individual is willing to renounce a portion of utility so that someone else gains a portion of utility, without some sort of direct or indirect gain for the individual who is performing the act of altruism. Do charitable actions fit this definition? Not always and not necessarily. For Andreoni (1990) pure altruism is extremely uncommon. On the other hand, "impure" altruism is more consistent with the observed patterns of charity. People may perform charity in order to fit within a variety of social norms (Baston, 2014), even legislative norms. Take into account corporate social responsibility. Intuitively, charitable acts may be done in order to avoid aspects that generate disutility in a subject such as the scorn of

others, guilt, and many other psychological aspects (Becker, 1974). Or the opposite, in order to obtain aspects that generate utility in a subject such as the recognition of others, prestige, respect, friendship, and many other social aspects (Olson, 1989). This phenomenon is described as warm-glow giving. The point is that giving, or helping others, is an aspect that is incorporated in an individual's utility function, and that individuals give, or help others, because they gain utility from doing so. Regardless of the reason, the empirical and experimental evidence suggests it takes place in real life decisions and interactions. Research in economics acknowledges this, and so there has been a rise in new trends such as behavioral economics and comparable specializations. Therefore, altruism is not irrational acting. Charitable actions are part of individual's utility functions.

2.2 Economic Growth and Inequality

This section contains a brief review of the literature about the second objective of this research regarding the dilemma between economic growth and economic inequality.

Thomas Piketty´s *Capital in the Twenty-First Century* (2014) has been one of the current best sellers regarding contemporary economics. Through econometric analysis, in different countries of the world, the book tries to analyze how inequality has grown over time, especially since the upsurge of Capitalism. Piketty's thesis states that Capitalism generates returns to capital faster than it generates economic growth. Because of this, there is a concentration of wealth in the hands of the few. What's more, inequality is expected to continue growing. This viewpoint suggests the implementation and importance of redistributive policies such as taxes and government control. Likewise, a trend has begun

stating and repeating that 1% of the population controls 99% of the wealth (BBC, 2016), or that 0.01% of the population controls 11.2% of the wealth (The Economist, 2014). Activism against economic inequality is not new, it could be observed at the time of Marx, and it can be observed now, for instance, with the rise of Twenty-First Century Socialism.

However, there is also a different perspective regarding the issue. Deirdre Mccloskey presents a critique of Pikettys work stating that the idea of Capitalism being unjust and exploiting people is a recycled sophism stated by Marx, Ricardo, and Malthus (2014). Capitalism generates production and wealth. Thus, Capitalism brings people out of poverty, and the social and fundamental problem is not inequality in itself, but poverty and the conditions that derive from poverty: malnutrition, lack of education, diseases, etc. Policies should be focused on addressing poverty, not inequality. A policy that benefits the rich, without harming the poor, fulfills the conditions of Pareto Optimality (Fieldstein, 1999), and can eventually, not only not harm, but benefit the poor all together. *The Great Enrichment* has been the biggest accomplishment since the invention of agriculture (Mccloskey, 2014). On average, individuals have increased their wealth by a factor of 30 if they belong to a developed country or by a factor of 10 if they belong to a developing country. In relative terms developed countries are better off than developing countries, but in general terms both countries are better off than before. This growth shouldn’t be sacrificed on behalf of a reduction of inequality.

There are investigations that predict a positive correlation between growth and inequality (Forbes, 2000), and there are investigations that predict a negative correlation between growth and inequality (Persson & Tabellini, 1994).

Also, as mentioned before, there are less tangible aspects that should be included in an individual's utility function. One of these aspects is inequality. Fehr and Schmidt (1999) included inequality in subject's i utility function in their inequality aversion model. Subject's i utility is reduced as the difference between π_i and π_j increases, whether i has more than j, or whether j has more than i.

Figure 1: Fehr-Scmidt Inequality Aversion

$$\boldsymbol{Ui(\pi i, \pi j) = \pi i - \alpha \max(\pi i - \pi j, 0) - \beta \max(\pi j - \pi i, 0)}$$

Furthermore, experimental results show consistency with inequality aversion. Oosterbeek et al. (2004) make a synthesis of 37 papers with 75 results from Ultimatum game experiments. Without equality valuation, responders should accept any offer above 0, yet on average the proposer offers 40% of the pie, and on average 16% of the offers are rejected. However, this rate varies greatly from place to place. Intuitively, culture and social norms have a big impact on fairness perception. Henrich (2000) did an experimental research with the Machiguenga tribe in the Peruvian Amazon. The purpose of this experiment was to observe results in a group of subjects that lived away from western social norms. Experimental results were interesting since the average offer for the Machiguenga group was 26%, whereas the average offer for the western society was 40%.

2.3 Effect of Propaganda on Decision Making

Finally, there is a brief review of the literature about the third objective of this research regarding the effect of immediate stimulus, specifically propaganda, on decision making.

There is a complex background process involving decision making where information, and cognitive aspects are fundamental (March, 1994). Human beings are prone to advertisement; therefore they are prone to propaganda, in the sense that propaganda has the potential to change decisions. Recent studies in the field of neuroeconomics suggest links between emotions and decisions. Specifically Sanfey et al. (2003) do an investigation at neural level regarding decision making in an Ultimatum game. They found out that unfair offers triggered activity in brain areas related to emotion and cognition, suggesting emotions and stimulus are fundamental in decision making processes. This investigation ponders disappointment as a major factor in decision making, indicating that, when other players in the game behave in a disappointing manner, this disappointment will influence further decisions. This is an important aspect in repeated games.

Likewise, Dan Ariely, one of the promotors of behavioral economics, analyzes how cognitive processes, the form in which individuals perceive information, have great influence on decision making. For instance, Johnson and Goldstein´s (2004) investigation examines how a simple detail in the formulation of a question has a huge effect on decisions made by individuals about organ donations. Also, The Economist´s (2009) investigation, *The Importance of Irrelevant Alternatives,* examines how adding a seemingly irrelevant alternative in a decision changes individual's perceptions on the alternatives, and thus changes results. There is also the case of the *Iowa Gambling Test* (Bechara et al., 2005) which is designed to analyze the effect of emotions on decision making. During the game, subjects that make a bad decision go through a degree of negative emotion, and so

they eventually learn to avoid bad decisions. However, those with a poor functioning of the prefrontal cortex are not able, or take more time, to learn and avoid bad decisions.

Propaganda has been proved to manipulate individuals in political elections. There are investigations that suggest that exposure to propaganda has the ability to strengthen previous ideals, status quo bias (Klapper, 1960), and there are investigations that suggest that exposure to propaganda has the ability to change previous ideals (Gordon, 2013).

3 Experimental Design

3.1 Control Group

With the purpose of the fulfillment of the mentioned objectives, and the analysis of the proposed themes, the methodology of this work consisted in a laboratory experiment done with students from Universidad San Francisco de Quito (USFQ). The sample consisted of 168 students from different academic departments. Students were controlled by major and number of semesters coursed. Roles were assigned randomly. The experiment was elaborated and programed using z-Tree: Zurich toolbox for ready-made economic experiments (Univeristy of Zurich, 2016).

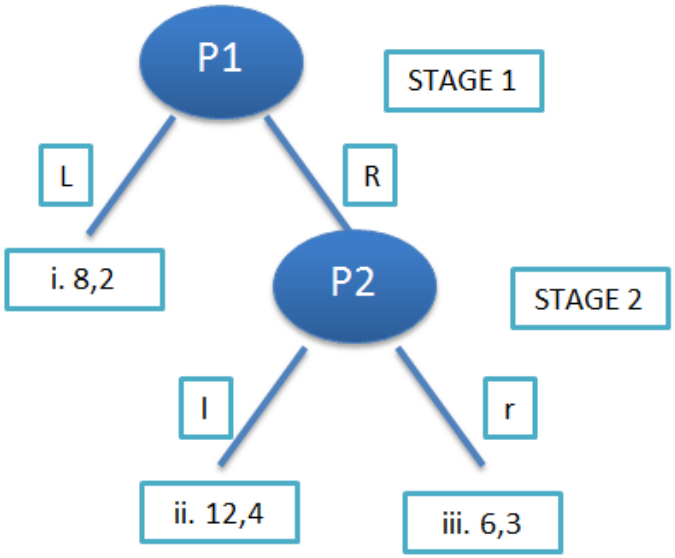
Student participation in the game was rewarded with extra points for their final grade in their respective classes. However, the amount of extra points was dependent first on their participation in the game, and second on their performance in the game. This way, the game was incentive compatible with its characteristics. The amount of game points was

dependent on decisions made by the subjects, game points were the main incentive for the subjects, and subjects are assumed to prefer more game points to fewer game points (Biel, 2006).

Participants scheduled sessions in a computer lab containing 18 computers. The average number of students per session was 12. Students arrived into to session, sat in their individual computer, general instructions were pointed out, communication among them was prohibited, and the program was run. The first screen of the game contained information about the game structure. From the beginning of the game, all players had complete information about the decision tree, the number of periods to be played, the possible different decisions, and the outcomes and its payoffs. The only information lacking was the last stage of the game regarding the transfer. The transfer stage will be explained thoroughly ahead. At the end of the experiment, subjects were thanked and data was gathered.

The game is simple. It follows the model of a decision tree with final payoffs for Player 1 (P1) and Player 2 (P2) according to the outcome of the game. Possible different outcomes depend on the decisions made by the players. The base decision tree has the following structure:

Figure 2: Base Decision Tree



If both players are rational, and don't include inequality into their utility functions, it is seen that the dominant strategy, and Nash Equilibrium, is that they play strategy (R, l), since by doing so, both players maximize their utility with payoffs of (12, 4) in outcome ii.

However, in this outcome (ii) there is a bigger inequality than in outcome iii because, as it can be seen in the decision tree, outcome ii has an inequality of 12-4=8 whereas outcome iii has an inequality of 6-3=3. This holds true when inequality is measured in ratios (12/4=3 vs. 6/3=2).

As a side note, the game follows a similar structure to a half Dictator game and a half Ultimatum game with fixed payoffs. In Stage 1 of the game, Player 1 can choose to be a dictator and divide payoffs into (8,2), or he can choose to play a sort of Ultimatum game and propose a division of (12,4) where Player 2 can accept and get to outcome (12,4) or reject and get to outcome (6,3).

The game structure is apt to analyze the objectives of this research in the sense that P1 represents a rich individual and P2 represents a poor individual. Therefore, the game is played in groups of 2 determined randomly by the program. Roles, meaning if a subject is chosen to be P1 or P2, are also determined randomly. Partners and roles remain constant for the duration of the entire game. The decisions made by the rich and the poor determine the rate of economic growth (total profit Player 1 + total profit Player 2) and economic inequality (total profit Player 1 – total profit Player 2) in the simulated society (conformed only by one rich individual and one poor individual). It is assumed the dilemma of economic growth vs. economic inequality is real in the game, meaning that a bigger growth implies a bigger inequality and vice versa.

Some of the relevant questions regarding the possible decisions are:

- Is P1 willing to play R instead of L, taking into consideration the risk of having a lower payoff if P2 plays r instead of l?
- Assuming that P1 plays R, is P2 willing to play r instead of l giving up 1 point of payoff so that there is a reduction of inequality?
- Do individuals play the Nash Equilibrium (R, l)?

The game is played repeatedly for 10 periods. At the end of the game a questionnaire is filled out to get variables that may be relevant. These variables include academic variables such as major, demographic variables such as age, and auto perception variables such as if a subject considers himself capitalist or socialist. Variables will be explained thoroughly on section 4.

3.2 Treatment 1: Negative Propaganda

The experiment also seeks to analyze the effect of propaganda on decision making. Therefore, subjects involved in Treatment 1 are exposed to Negative Propaganda before playing the game. As mentioned, NP focuses on competition, and generating feelings of unfairness and abuse.

Propaganda is projected in the form of a video that is approximately five minutes long. Propaganda is shown at the beginning of period 2, so that individuals already have information about the game before the stimulus. Then players play the exact same game with the same decision tree model until period ten. A transcript of what was said in the video is included in Appendix C.

3.3 Treatment 2: Positive Propaganda

Subjects involved in Treatment 2 are exposed to Positive Propaganda before playing the game. Positive Propaganda focuses on cooperation, and generating feelings of trust and altruism.

Likewise, propaganda is projected in the form of a video that is approximately five minutes long. The setup is identical to Treatment 1. Then players play the exact same game with the same decision tree model until period ten. Again, a transcript of what was said in the video is included in Appendix D.

It is evident that the game must be carried out with a between-subjects methodology. This is so because each subject must be exposed to only on type of propaganda. Being exposed to one type of propaganda first, and to another type of propaganda second wouldn't work, since there would be no way to differentiate the effect of NP and PP on decisions.

3.4 Transfer

As a separate and additional step, at the end of period ten, Player 1 is presented with a last decision. P1 can choose to transfer a portion of his total profit to P2. This transfer fits within the range of 0 to his total profit. The additional stage in the game analyzes an optional, totally altruistic decision. Player 1 is basically choosing whether to give away points. As mentioned, this stage follows a separate analysis because players lacked information about this stage when they were playing all other stages. This was done intentionally so that a possible transfer doesn't affect decisions made in earlier stages of the game.

3.5 Hypotheses

There are several hypotheses about the possible decisions players must make in the game:

- H1: Players play the optimal outcome regardless of propaganda.

- H2: Players exposed to Negative Propaganda tend to play strategies that lead to a more equal-less growth outcome, compared to the control group.
- H3: Players exposed to Positive Propaganda tend to play strategies that lead to a more growth- less equal outcome, compared to the control group.

4 Experimental Results

Experimental results lead to data containing a sample of 168 subjects. Since the experiment had a between-subjects focus, 68 individuals were control subjects, 50 individuals were Negative Propaganda treatment subjects, and 50 individuals were Positive Propaganda treatment subjects. Variables gathered in the database are shown in Table 1.

Table 1: Variables

Category	Name of variable STATA	Description
Demographic		
	age	Subjects current age
	sex	Subjects sex
Auto perception		
	sclass	Subject was asked if he considers himself high class, medium-high class, medium class, medium-low class, low class.
	equality	Subject was asked how much importance does he give to economic equality in a society being 5 the most important and 1 the least important.
	priority	Binary variable that takes a value of 1 when subject considers economic growth is more important than economic equality.
	capitalism	Binary variable that takes a value of 1 when subject considers himself capitalist.
	socialism	Binary variable that takes a value of 1 when subject considers himself socialist.
Academic		
	study	Binary variable that takes a value of 1 when the subjects academic major is economics.
	semester	Subjects number of semesters coursed.
Experimental		
	np	Binary variable that takes a value of 1 when subject was exposed to the NP treatment.
	pp	Binary variable that takes a value of 1 when subject was exposed to the PP treatment.
	p1	Binary variable that takes a value of 1 when subject was chosen to be P1.
	totalprofit	Subjects total profit at the end of period ten prior to transfer.
	totalprofit2	Subjects partner total profit at the end of period ten prior to transfer.
	transfer	The amount of total profit transferred from P1 to P2 at the final stage of the game.

First of all, before running regression models, Negative and Positive propaganda seemed to have an effect on total profit as was expected. Average total profit for the control

group was 61.51; average total profit for the Negative Propaganda treatment was 55.3; and average total profit for the Positive Propaganda treatment was 63.54. To understand the magnitude of these values it must be noted that the maximum total profit possible for a game was 80 since the maximum total profit possible for a P1 was 120, the maximum total profit possible for a P2 was 40, and the average of the two is 80 ($\frac{120+40}{2}$). Only 7 out of 84 couples played (R, l) during all ten periods reaching the optimal outcome and getting payoffs of (120, 40), despite this being the Nash Equilibrium. Only 1 out of 84 couples played (R, r) during all ten periods reaching the less optimal outcome and getting payoffs of (60, 30). Also, only 1 out of 84 couples played (L) during all ten periods basically playing a dictator game with fixed payoffs and getting payoffs of (80, 20).

Yet, as expected, subjects valued inequality also and not total profit only. It must be noted that average inequality was measured in nominal values instead of ratios because approximately 84.4% of the sample measured inequality in nominal values. Part of the questionnaire included questions to appreciate if participants measured inequality in nominal values or in ratios, and only 15.6% of participants measured inequality in ratios. Examples of these questions are given in Appendix B. Therefore inequality was calculated by $\frac{\sum|totalprofit-totalprofit2|}{n}, P1 = 1$ where n is 34 for the control group and 25 for the NP treatment and the PP treatment. Absolute values were used because a few subjects that were P1 ended with a $totalprofit < totalptofit2$ after transfers. In fact, 13 out of 84, meaning 15.4%, ended with a $totalprofit < totalptofit2$. This is interesting because it shows how important altruism or equality valuations are relative to total profit for a few subjects. Average inequality for the control group was 35.91; meaning that on average P1 ended with 35.91 more game points than P2. Average inequality for the Negative Propaganda treatment

group was 25.08. This indicates that propaganda focused on competition, clash struggle and resentment did reduce inequality. However, an interesting result is that average inequality for the Positive Propaganda treatment group was 16.76. This indicates that propaganda focused on cooperation, trust and altruism does not only generate more economic growth; it eventually generates more equality as well. Players are better off, and more equal, on a Positive Propaganda society.

Considering multiple regression models, auto perception variables proved to have no significant effect on total profit. It was expected that subjects that prioritized reduction of inequality over economic growth would have chosen strategies that lead to a more equal-less growth outcome, and that subjects that prioritized economic growth over reduction of inequality would have chosen strategies that lead to a more growth-less equal outcome; yet, it didn't happen. There seems to be a difference between individual's perceptions and actions. Likewise, perceiving oneself as capitalist or socialist didn't have a significant effect on totalprofit. The same happened with variables such as perceived social class and demographic variables such as age and sex (Appendix A).

However, some variables that proved to have a significant effect on totalprofit were study and semester. Table 2 shows a multiple regression equation correlating variable totalprofit120 and variables p1, np, pp, and study:

Table 2: Multiple Regression Model (OLS) with Study

	Dependent Variable: totalprofit120					
Independent Variables	**Coef**	**Robust Std. Error**	**t**	**P>|t|**	**[95% Conf. Interval]**	
p1	0.4794053	0.0157654	30.41	0.000	0.4482745	0.5105361
np	-0.0342292	0.0205599	-1.66	0.098	-0.0748272	0.0063688
pp	0.0248799	0.0170919	1.46	0.147	-0.0088703	0.0586301
study	0.0531052	0.0163537	3.25	0.001	0.0208127	0.0853976
cons	0.2479258	0.0125844	19.7	0.000	0.2230762	0.2727753

Variable totalprofit120 is the total profit divided by 120, which is the maximum payoff a player can obtain. This way, data is transformed into percentages relative to the total possible payoff. This equation, with an R^2 of 85.27%, estimates coefficients for Negative Propaganda and Positive Propaganda of -0.034 and 0.025 respectively. This means that, on average, a subject exposed to Negative Propaganda will reach an outcome 3.4% less optimal in terms of total utility. It also means that, on average, a subject exposed to Positive Propaganda will reach an outcome 2.5% more optimal in terms of total utility, taking into consideration that np coefficient is significant at a confidence level of 10% whereas pp coefficient is significant only at a confidence level of 15%; However, a joint significance F-test shows variables are jointly significant at 1% (Appendix A). Moreover, study is proved to have more effect on totalprofit120 than any of the two types of propaganda. On average, a subject that majors in economics has a 5.3% higher total profit.

Additionally, the subject's number of semesters coursed was introduced into the equation as a variable in itself and also as an interaction with study. This was done in order to ponder the effects of being in a more advanced semester, for students that major in economics and for students that major in any other subject.

Table 3: Multiple Regression Model (OLS) with Study and Semester

	Dependent Variable: totalprofit120					
Independent Variables	**Coef**	**Robust Std. Error**	**t**	**P>|t|**	**[95% Conf. Interval]**	
p1	0.4820805	0.0157484	30.61	0.000	0.4509805	0.5131806
np	-0.0338859	0.0201615	-1.68	0.095	-0.0737011	0.0059292
pp	0.0293156	0.0169412	1.73	0.085	-0.00414	0.0627713
study	-0.0601227	0.0380164	-1.58	0.116	-0.1351978	0.0149525
semester	-0.0082229	0.0042843	-1.92	0.057	-0.0166836	0.0002379
study*semester	0.0192702	0.0060606	3.18	0.002	0.0073016	0.0312387
cons	0.2701216	0.0192626	14.02	0.000	0.2320816	0.3081617

With an R^2 of 85.82%, results indicate that Negative Propaganda still has a negative effect on totalprofit and Positive Propaganda still has a positive effect on totalprofit, as expected. Also, the positive effect of studying economics is increasing relative to the number of semesters coursed (the higher the semester, the higher the effect on total profit). If study is considered significant then majoring in economics would have a positive effect on total profit starting only at the fourth semester. Surprisingly, majoring in any other

subject seems to reduce profit. This is shown with the -.008 coefficient on semester. It must be noted, however, that the coefficient is very small.

Another interesting result is that, when a regression equation is done only for Player 2, Positive Propaganda is significant whereas Negative Propaganda is not. In other words, when Player 2 is presented with the opportunity to choose l or r in Stage 2 of the decision tree, Positive Propaganda does move Player 2 to choose the optimal solution. T-statistic cannot prove NP coefficient to be statistically different from 0.

Table 4: Multiple Regression Model (OLS) P2

	Dependent Variable: totalprofitt					
Independent Variables	**Coef**	**Robust Std. Error**	**t**	**P>|t|**	**[95% Conf. Interval]**	
np	-0.0004101	0.0573974	-0.01	0.994	-0.1146346	0.1138145
pp	0.0971275	0.0509654	1.91	0.060	-0.0042969	0.198552
study	0.2401734	0.0479517	5.01	0.000	0.1447464	0.3356003
cons	0.4719823	0.0407832	11.57	0.000	0.3908212	0.5531435

Dependent Variable totalprofitt follows a linear transformation $\pi' = \frac{5\pi - 100}{100}$ in order to set Player's 2 total profit between 0 and 1, taking into consideration that the minimum total profit any P2 can have at the end of the game (prior to transfer) is 20, and the maximum total profit is 60. In this case, the exposure to Positive Propaganda, on average, improves Player's 2 total profits by 9.7%. Also, a Player 2 that majors in economics is much better off than a Player 2 that majors in any other subject by 24%.

Regarding the transfer, which follows a separate analysis to the one done before, some auto perception variables are relevant, Positive Propaganda is statistically significant whereas Negative Propaganda is not, and once again study comes into the scene. The transfer was a completely optional decision by Player 1. It followed the criteria of altruism since a transfer done by Player 1 didn't generate any in game payoff to Player 1. However, only 11 out of 84 subjects, meaning only 13% of the sample, did a transfer of 0. The average transfer for the control group was 13.91, for the Negative Propaganda treatment group was 19, and for the Positive Propaganda treatment group was 26. Table 5 shows this relationship between variables:

Table 5: Multiple Regression Model (OLS) Transfer

	Dependent Variable: transfer					
Independent Variables	**Coef**	**Robust Std. Error**	**t**	**P>|t|**	**[95% Conf. Interval]**	
ineq	0.4052481	0.1121127	3.61	0.001	0.1819564	0.6285399
np	3.302775	3.55389	0.93	0.356	-3.775409	10.38096
pp	6.801811	3.966209	1.71	0.090	-1.097578	14.7012
study	-18.03992	3.642356	-4.95	0.000	-25.2943	-10.78554
semester	0.8355798	0.5193662	1.61	0.112	-0.1988277	1.869987
equality	7.19469	2.897584	2.48	0.015	1.423651	12.96573
sclass	3.664716	2.147937	1.71	0.092	-0.6132707	7.942702
cons	-48.65546	15.32787	-3.17	0.002	-79.18355	-18.12737

Ineq is a generated variable that measures the difference in total profit between Player 1 and Player 2 in the same group. The bigger the difference, the bigger the inequality, the more responsible Player 1 feels regarding making a transfer, hence the positive coefficient, and the low p-value. When inequality increases in 1 unit, transfer increases in 0.41 units. Also, the exposition to Positive Propaganda, on average, increases transfer in 6.8 units; majoring in economics, on average, decreases transfer in 18.04 units. Auto perception variable equality in this case is consistent; when subject give more importance to economic equality in a society, their average transfer increases in 7.2 units. Likewise, perceived social class seems to have an effect on transfer. When subjects perceive they belong to a higher social class, their transfer increases by 3.66 units.

Models were run with robust errors in order to avoid heteroscedasticity problems.

4 Conclusions

Summarizing, this research conducted a laboratory experiment with 168 students. The purpose was to evaluate decision making regarding a dilemma between economic growth and economic inequality and the effect of propaganda on decisions. The experiment had no complications and gathered enough data to complete the analysis.

In general terms, results follow expected patterns. As was anticipated of an experimental analysis, individuals don't play as traditional economic theory states in the sense that they don't play the optimal solution, the Nash Equilibrium in most of the cases, assuming inequality is not included in their utility functions. Additionally, propaganda does seem to influence decision making up to a certain extent. Negative Propaganda focused on

competition, clash struggle, and resentment reduces economic growth and reduces inequality. Positive Propaganda focused on cooperation, trust and altruism increases economic growth, and a not so expected result, reduces inequality in a more efficient way than Negative Propaganda, this of course, when individuals are presented with the opportunity of transferring payoffs, which in most of the cases, holds true in a normally functioning society. Tacking this into consideration, it is important that subjects in positions of power generate spaces within a society for these transfers to occur. Experimental design generated a space for these transfers to occur, and results were optimistic. It is also important that these transfers are optional and not obligatory. When these transfers were optional, altruism was big, to the point that a few subjects ended with a $totalprofit < totalptofit2$ as mentioned. This implies that subjects don't think only about themselves but think also about other individuals in their group. Most governments use taxes as the main system to redistribute income, and donations are left to private initiatives. However, government efforts to generate spaces for these voluntary transfers to occur, to facilitate transactions, etc. would be an interesting alternative to reduce poverty.

Furthermore, Positive Propaganda may be translated into distribution of information about cooperation, trust, and altruism within a society, at a media level, at an educational level and at an institutional level. Positive results are probable if resources are spent on generating the values linked to Positive Propaganda in this experiment instead of on the values linked to Negative Propaganda in this experiment, which are more common in populism. Many socialist countries invest millions of dollars on propaganda that generates competition, class struggle, and resentment. This money would be better invested on propaganda that generates cooperation, trust, and altruism, and results would be much more

efficient. Individuals can develop a sense of responsibility about the wellbeing of others, but actions must come from them instead of being imposed on them. This way transaction costs are reduced and utility is generated for rich and poor alike. Paying a tax generates disutility in a subject, but making a donation generates utility in a subject. If a critique against Capitalism is greed and inequality, the problem lies more on individual behavior rather than on the system of Capitalism. If individuals in a capitalistic society would be altruistic, inequality wouldn't be as much as a problem, and economic growth wouldn't have to be sacrificed. Efforts need to be spent on constructing what this research is going to call an Altruistic Capitalism.

Finally, regarding utility functions, it is true that individuals incorporate many less tangible aspects into their utility functions. The valuation of equality, or inequality aversion, holds true. However, a distinction must be made. There are two aspects to take into consideration: First, when a subject incorporates into his utility function the wellbeing of others; and second, when a subject incorporates into his utility function the amount of inequality in a relationship. Both aspects are not the same. It is not as straightforward in the experimental results, but it must be mentioned that, in the particular game design, both individuals maximize their wellbeing by playing (R, l). Therefore, when subject plays away from this strategy, it is not only that they are giving away a portion of their utility on behalf of a reduction of inequality; they are also giving away a portion of the utility of the other player on behalf of a reduction of inequality. This behavior proves that they are not incorporating the wellbeing of others into their utility functions; they are incorporating the idea of inequality in itself.

Further studies should be focused on this distinction. Why do individuals want to reduce inequality? Is it because they care about the wellbeing of others? Or is it because they feel some sort of guilt in an unequal society? The motivations for inequality aversion should be studied more in depth. Additionally, variants of this game can be tested, especially variants regarding the structure of payoffs, and the development of a model without fixed payoffs. The messages conveyed in the propaganda can also be changed and tested.

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Appendix A STATA TABLES

A.1 Multiple Regression Model (OLS) many Variables

Linear regression

Number of obs	= 168
F(12, 155)	= 85.26
Prob > F	= 0.0000
R-squared	= 0.8573
Root MSE	= .10208

totalpro~120	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
p1	.4823932	.0167861	28.74	0.000	.4492343	.5155522
np	-.0309299	.0211112	-1.47	0.145	-.0726328	.0107729
pp	.0244811	.0182488	1.34	0.182	-.0115674	.0605295
age	-.0048291	.0034717	-1.39	0.166	-.011687	.0020288
sex	.008117	.0182154	0.45	0.656	-.0278655	.0440995
study	.046301	.0246096	1.88	0.062	-.0023126	.0949146
semester	.0018467	.0049792	0.37	0.711	-.0079891	.0116826
socialclass	-.0056656	.0117433	-0.48	0.630	-.0288632	.017532
equality	-.0061643	.0092951	-0.66	0.508	-.0245257	.0121971
priority	.0149265	.0237651	0.63	0.531	-.0320188	.0618717
capitalist	.0216219	.0202559	1.07	0.287	-.0183913	.0616351
socialist	.0366178	.0254578	1.44	0.152	-.0136712	.0869068
_cons	.3540223	.0908361	3.90	0.000	.1745857	.5334588

A.2 Multiple Regression Model (OLS) with Study

Linear regression

Number of obs	= 168
F(4, 163)	= 252.54
Prob > F	= 0.0000
R-squared	= 0.8527
Root MSE	= .10113

totalpro~120	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
p1	.4794053	.0157654	30.41	0.000	.4482745	.5105361
np	-.0342292	.0205599	-1.66	0.098	-.0748272	.0063688
pp	.0248799	.0170919	1.46	0.147	-.0088703	.0586301
study	.0531052	.0163537	3.25	0.001	.0208127	.0853976
_cons	.2479258	.0125844	19.70	0.000	.2230762	.2727753

A.3 F-test Joint Significance of np and pp

```
( 1)  np = 0
( 2)  pp = 0

       F(  2,    163) =    4.27
            Prob > F =    0.0156
```

A.4 Multiple Regression Model (OLS) with Study and Semester

Linear regression

Number of obs	= 168
F(6, 161)	= 184.50
Prob > F	= 0.0000
R-squared	= 0.8582
Root MSE	= .09984

totalpro~120	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
p1	.4820805	.0157484	30.61	0.000	.4509805	.5131806
np	-.0338859	.0201615	-1.68	0.095	-.0737011	.0059292
pp	.0293156	.0169412	1.73	0.085	-.00414	.0627713
study	-.0601227	.0380164	-1.58	0.116	-.1351978	.0149525
semester	-.0082229	.0042843	-1.92	0.057	-.0166836	.0002379
studysem	.0192702	.0060606	3.18	0.002	.0073016	.0312387
_cons	.2701216	.0192626	14.02	0.000	.2320816	.3081617

A.5 Multiple Regression Model (OLS) P2

Linear regression

Number of obs	= 84
F(3, 80)	= 13.07
Prob > F	= 0.0000
R-squared	= 0.3015
Root MSE	= .20647

totalprofitt	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
np	-.0004101	.0573974	-0.01	0.994	-.1146346	.1138145
pp	.0971275	.0509654	1.91	0.060	-.0042969	.198552
study	.2401734	.0479517	5.01	0.000	.1447464	.3356003
_cons	.4719823	.0407832	11.57	0.000	.3908212	.5531435

A.6 Multiple Regression Model (OLS) Transfer

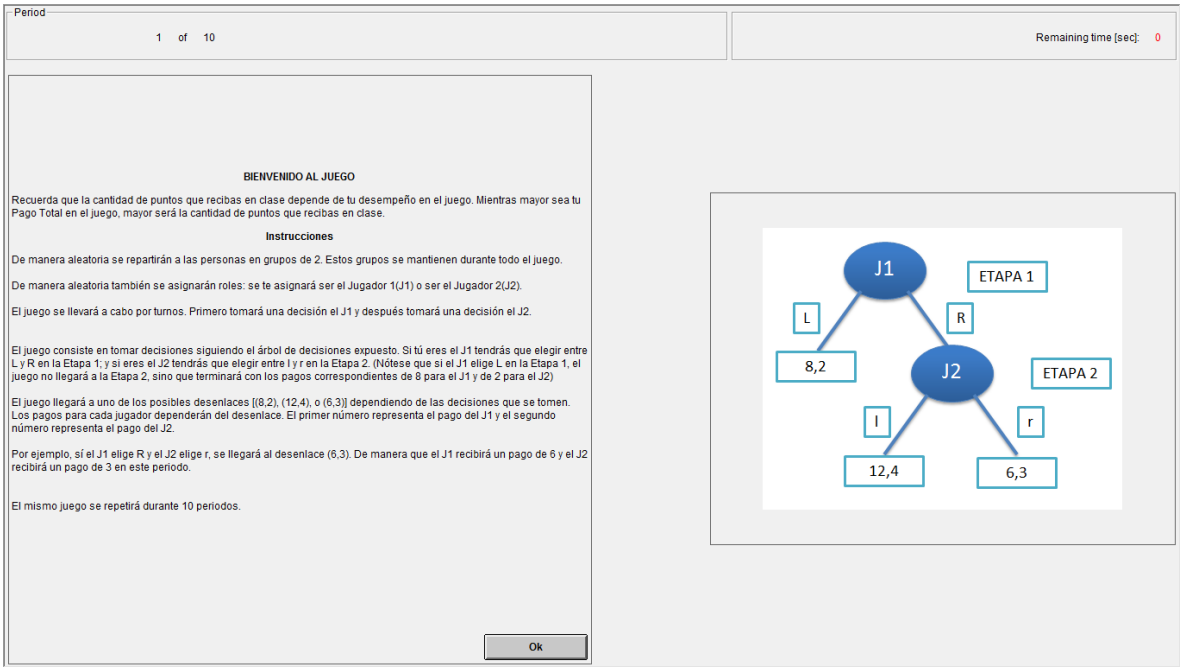
Linear regression

Number of obs	84
F(7, 76)	8.23
Prob > F	0.0000
R-squared	0.3700
Root MSE	12.846

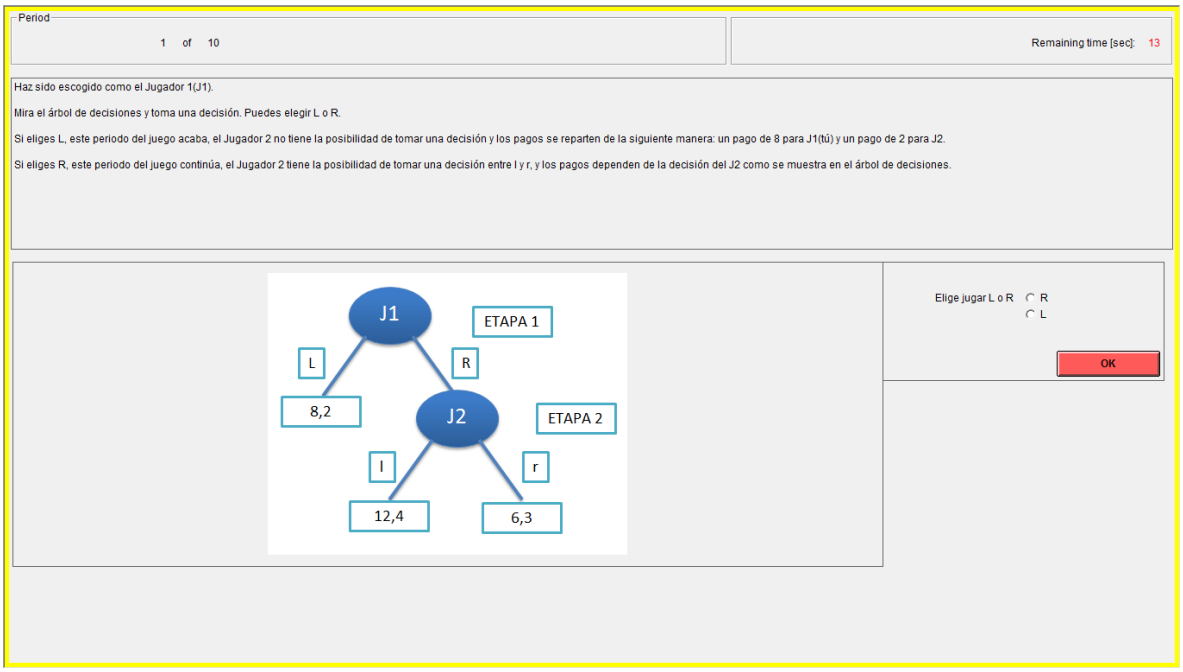
transfer	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ineq	.4052481	.1121127	3.61	0.001	.1819564	.6285399
np	3.302775	3.55389	0.93	0.356	-3.775409	10.38096
pp	6.801811	3.966209	1.71	0.090	-1.097578	14.7012
study	-18.03992	3.642356	-4.95	0.000	-25.2943	-10.78554
semester	.8355798	.5193662	1.61	0.112	-.1988277	1.869987
equality	7.19469	2.897584	2.48	0.015	1.423651	12.96573
sclass	3.664716	2.147937	1.71	0.092	-.6132707	7.942702
_cons	-48.65546	15.32787	-3.17	0.002	-79.18355	-18.12737

Appendix B z-Tree Screens

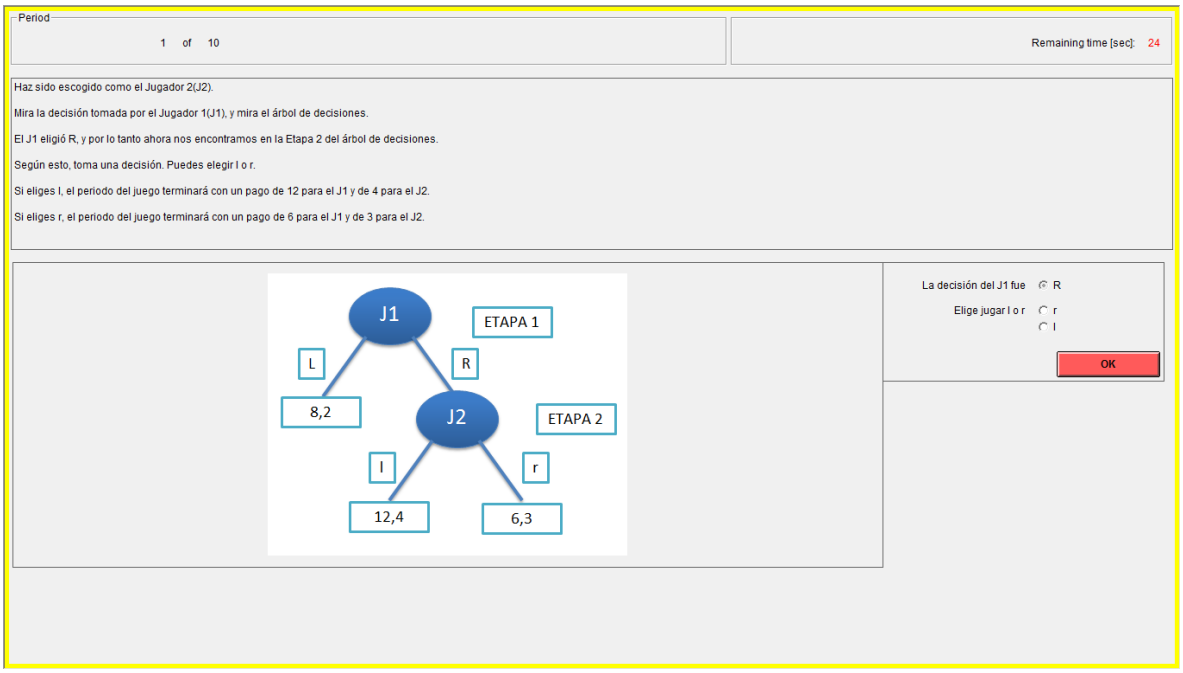
B.1 Instructions



B.2 Decision P1

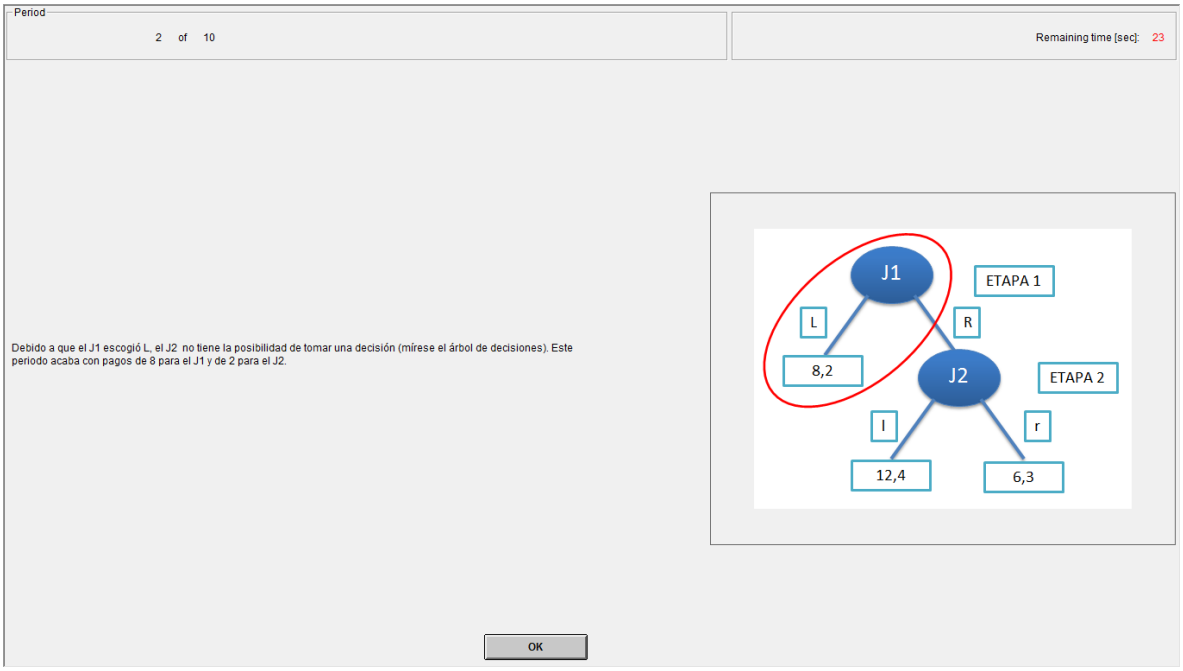


B.3 Decision P2



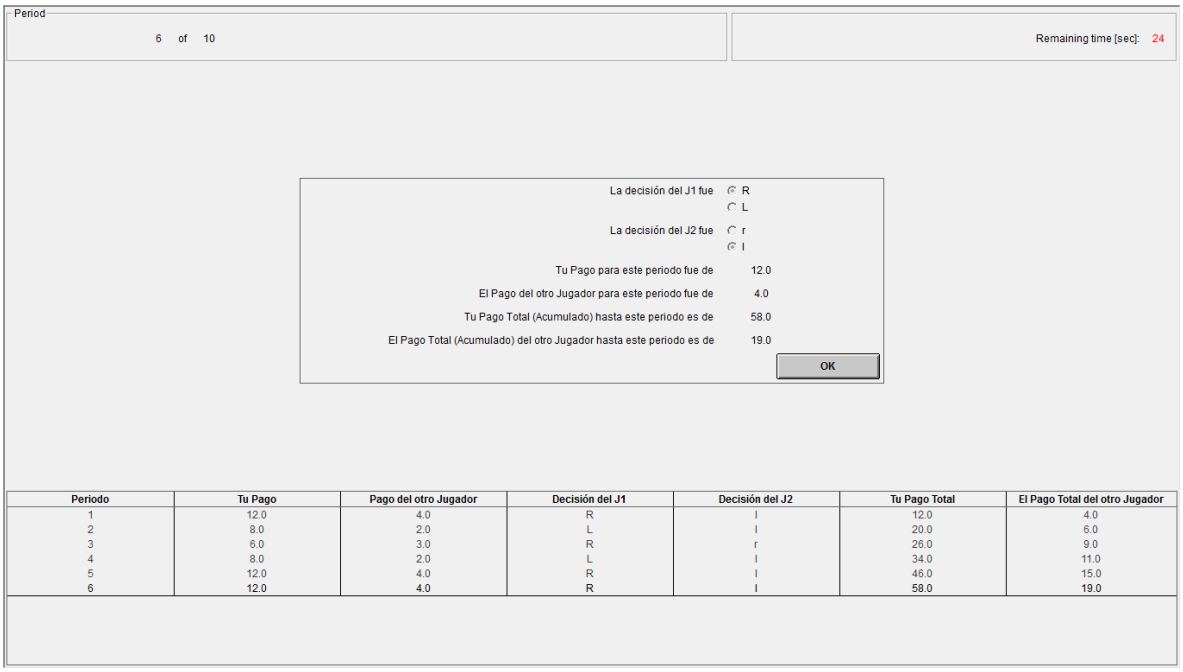
B.4 Strategy L

*If P1 chooses L then P2 cannot make a decision, instead he sees this screen.



B.5 History

*At the end of each period both players are presented with a history box of both players accumulated payoffs, and the strategies played by both players on previous rounds.

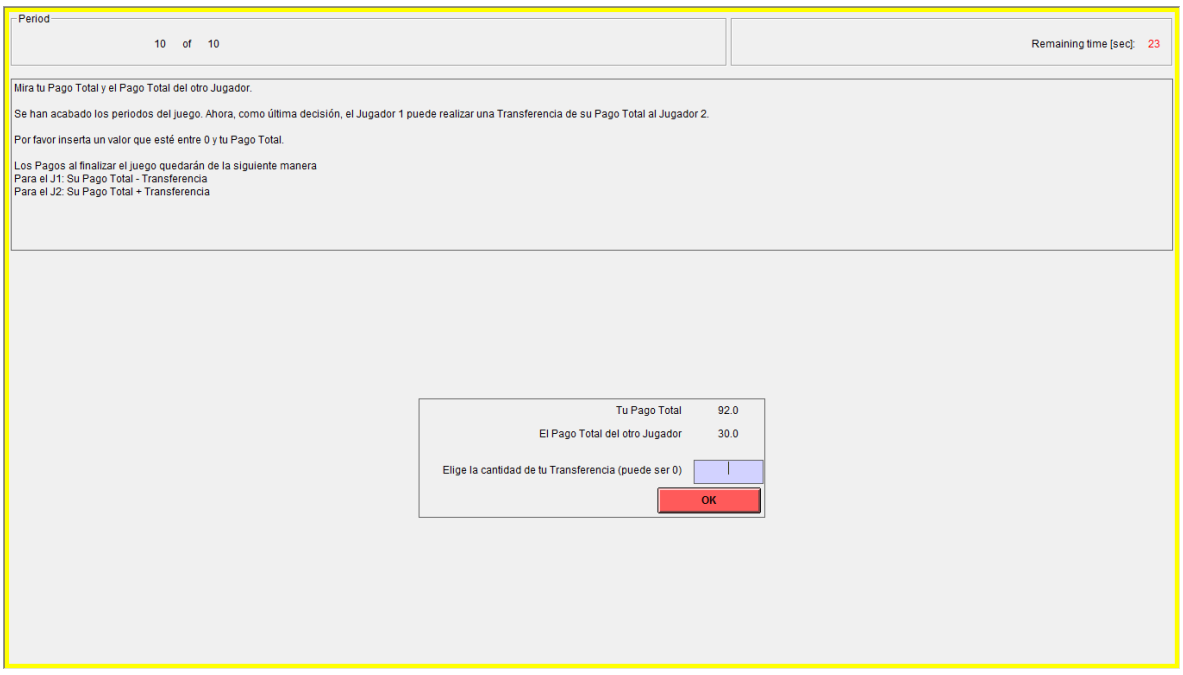


Periodo	Tu Pago	Pago del otro Jugador	Decisión del J1	Decisión del J2	Tu Pago Total	El Pago Total del otro Jugador
1	12.0	4.0	R	l	12.0	4.0
2	8.0	2.0	L	l	20.0	6.0
3	6.0	3.0	R	r	26.0	9.0
4	8.0	2.0	L	l	34.0	11.0
5	12.0	4.0	R	l	46.0	15.0
6	12.0	4.0	R	l	58.0	19.0

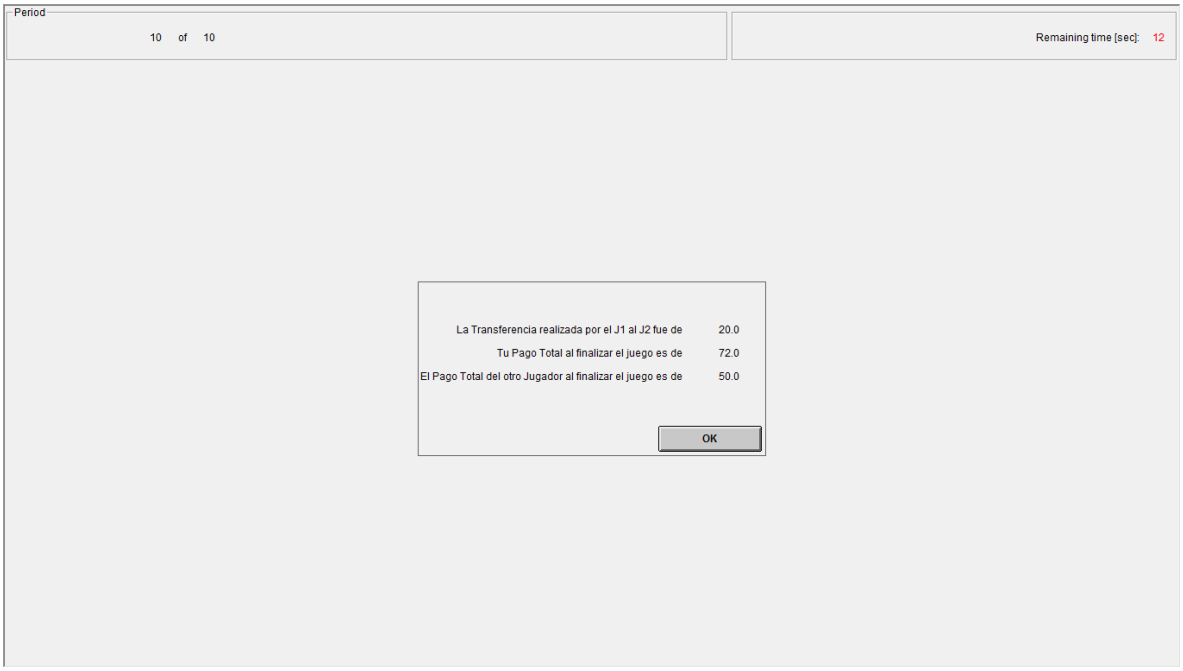
B.6 Transfer

*This is the screen shown for P1 at the end of period ten regarding the transfer decision.

How payoffs are going to be at the end of the game is very clear.



B.7 Final Payoffs



B.8 Question about Inequality Measurement

*This screen presents an example of the questions asked to the participants to evaluate if they measured inequality in nominal values or in ratios.

3
¿Cuáles pagos piensas son más desiguales [40, 10] (ósea el J1 recibe 40 y el J2 recibe 10) o [45, 15] (ósea el J1 recibe 45 y el J2 recibe 15)?
Los pagos de [40,10] son más desiguales
Los pagos de [45,15] son más desiguales
Son igual de desiguales
OK

Appendix C NP Transcript

This appendix contains keynotes and part of the transcript regarding the message transmitted in the video of NP. *Transcript is translated from Spanish.

We all know inequality is a problem, but do we know the magnitude of the problem? (...) We all know an unequal distribution of income exists (...) and I'm not talking about something that is far from us, I'm not talking about the poorest African countries (...) I'm talking about something that has a direct impact on us (...)

**graphics are presented that show the magnitude of inequality in the world.*

Less than 1% of the population gets 41% of the global income. They are people that are presented as role models, but they are not really an example to people (...) how is it possible that the wealth of the richest 1% of the population is 65 times bigger than the wealth of the poorest half of the population? (...) even if there has been merits, this wealth has always come from the exploitation of those with less resources (...) these people take advantage of society and are not investing in society (...)

Differences are increasing everyday (...) money generates money because when you have money you can impose rules that benefit you, you can put pressure on workers decreasing their salaries, for example, you can force competition out of the market, you can brain wash population minds with propaganda and lies (...)

If you feel disadvantaged and don't take action, inequality will continue to grow.

The rich live beyond our possibilities. We don't have to make expenditure cuts; they have to make expenditure cuts. Since 2009 it's very likely you have lost acquisitive power, and there are a lot of studies that prove this (...) The rich will tell you that salaries have to become smaller, that you have to make sacrifices because there is no money. They are constantly lying. There is money, but these people want to keep all of the money, it's never enough for them, they have their hands stained with the blood of the people.

You cannot trust that the rich are going to give you wealth or opportunities; you have to take them yourself.

It's our duty, especially the duty of P2 to take measures that reduce this inequality and lack of opportunities.

P1 cannot keep winning alone, his wealth depends on us, and we have to make decisions for a healthier and fairer society.

Appendix D PP Transcript

This appendix contains keynotes and part of the transcript regarding the message transmitted in the video of PP. *Part of the transcript is translated from Spanish.

We all know inequality is a problem that affects many people, but the solution is not to divide ourselves into a class struggle.

Great populist leaders like Peron, Mussolini, Kirchner, and Chavez agree to take a portion of the population and denote them as the internal enemy of the common people. The internal enemy joins the external enemy and they become the "anti-people". A division is created between the people and the "anti-people".

With every speech, the populist tries to insert hate and distrust into the society (...) The "Anti-people" may take different forms such as the oligarchy, Yankees, the Spanish conquerors, the local businesspersons (...) On the other hand, the people are seen as victims (...).

**examples of how this wrecks the economy (unsustainable government expenditure, increase in taxes, increase in initial consumption and decrease in savings and investment, malinvestments, artificial information such as price controls, etc.)*

When the economy is in crisis, they blame the "anti-people" (...)

While in 2/3 of the world people are coming out of poverty, people in countries with this system and ideology are getting poorer.

Is P1 to be blamed for inequality? Is it about a competition between P1 and P2? No, it's not a competition between P1 and P2. It's more efficient if P1 and P2 cooperate so that there is a bigger economic growth.

In a free market economy people become wealthy making what the rich enjoy today into something almost everybody can enjoy tomorrow (...)

**examples of how we can enjoy technology now because there was wealthy people that could afford and eventually make this technology affordable to everybody.*

Should I resent the people that became wealthy because they have more money than I do or should I be grateful for the economic system that allows them to enrich my life and the life of millions of other people?

For a society to develop it has to be rooted in trust. Employees have to trust employers and vice versa.

P1 has to trust that P2 will make decisions that favor growth.

**Story of how people were indifferent to a little girl being hit with a car.*

I wonder how many of you, looking at the story, said to yourselves just now "I wouldn't have done that" (...) But before you give yourself too much credit, look at this:

**Data on more social problems is presented*

Can we reduce death toll? Can we help? Yes we can. Each of us spend money on things that we don't really need (...) You can take the money you're spending on this unnecessary things and you can give it to organizations like this "Bee Against Malaria", which would take the money you've given and use it to buy nets like this one, to protect children like this one (...)

Fortunately, more and more people are understanding this idea, and the result is a growing movement: effective altruism.

Society has to be kind and altruistic. P1 has to be conscious of inequality, and take chances to make decisions to help those who have less.

We have to make decisions for economic growth that are rooted on trust and generosity.