Working papers series

WP ECON 18.13

The Effect of Initial Inequality on Meritocracy: a Voting Experiment on Tax Redistribution

Natalia Jiménez
Universidad Pablo de Olavide & Middlesex University

Elena Molis-Bañales
Departamento de Teoria e Historia Economica, University of Granada & Globe

Angel Solano-García
Departamento de Teoria e Historia Economica, University of Granada & Globe

Keywords: income redistribution, voting, taxation, real-effort task, leisure.

JEL Classification: C92, D72, H30, J41.

Department of Economics

The Effect of Initial Inequality on Meritocracy: a Voting Experiment on Tax Redistribution

Natalia Jiménez-Jiménez[123]

Elena Molis-Bañales[4]

Angel Solano-García[5]

[1] Departamento de Economía, Métodos Cuantitativos e Historia Económica, Edificio 3, Planta 3, Universidad Pablo de Olavide. Carretera de Utrera, km 1, 41013, Sevilla, Spain. njimjim@upo.es.

[2] Economics Department, Middlesex University London, The Burroughs, London, NW4 4BT, United Kingdom.

[3] GLOBE Experimental Group, Universidad de Granada, Spain.

[4] Departamento de Teoria e Historia Economica, Universidad de Granada, Campus Cartuja, s/n, Granada E-18071, Spain & GLOBE emolis@ugr.es.

[5] Departamento de Teoria e Historia Economica, Universidad de Granada, Campus Cartuja, s/n, Granada E-18071, Spain & GLOBE asolano@ugr.es.

This work was supported by Ayudas Fundación BBVA a Investigadores y Creadores Culturales [reference number BBVA2015-3] and by Ministerio de Economía, Industria y Competitividad [reference number ECO2016-76789-P].

Abstract:

According to Alesina and Angeletos (2005), societies are less redistributive but more efficient when the median voter believes that effort and talent are much more important than luck to determine income. We test these results through a lab experiment in which participants vote over the tax rate and their pre-tax income is determined according to their performance in a real effort task with leisure time. Subjects receive either a high or a low wage and this condition is either obtained through their talent in a tournament or randomly assigned. We compare subjects' decisions in these two different scenarios considering different levels of wage inequality. In our framework, this initial income inequality turns out to be crucial to support the theoretical hypothesis of Alesina and Angeletos (2005). Overall, we find that, only if the wage inequality is high, subjects choose a lower level of income redistribution and they provide a higher effort level in the scenario in which high-wage subjects are selected based on their talent through a tournament (than when it is randomly). Thus, we confirm almost all theoretical results in Alesina and Angeletos (2005) when the wage inequality is high enough. The big exception is for efficiency (measured as the sum of total payoffs), since theoretical results only hold for the scenario in which wage inequality is low.

Keywords: income redistribution, voting, taxation, real-effort task, leisure.

JEL: C92, D72, H30, J41.

1. Introduction

One of the main aims of a democratic government is to choose the level of income redistribution from the rich to the poor to reduce income inequality. The main tool used to redistribute income is the fiscal policy which mainly consists in the choice of the tax rate and the design of how tax revenues are rebated to society. There is a wide variety of tax schemes and redistribution policies across countries. For instance, in West European countries the overall size of the government is 50% larger than it is in the US (see e.g. Alesina and Galeser, 2004). A consistent explanation of this fact is the presence of a large heterogeneity in individual preferences for the level of income redistribution across countries (see e.g. Corneo and Gr'uner, 2002).

There are many studies that aim at disentangling the individual motivations for the demand of income redistribution (see Alesina and Galeser, 2004). The most straightforward determinant of income redistribution is individual's self interest: the poor prefer to tax the rich to redistribute income towards them. Standard models on the choice of the level of income redistribution are based upon the self interest motivation. Romer (1975), Roberts (1977) and Meltzer and Richard (1981) model the choice of a flat tax rate and a lump sum transfer to all voters in a democracy. These studies rely mainly on the median voter theorem. They obtain that the tax rate chosen by majority voting rule is the optimal one for the voter with the median income. The poorer is the median voter, the higher is her optimal level of tax rate and consequently, the higher the level of income redistribution.

On the other hand, there is consistent evidence that contradicts the more redistributive predictions of standard models (see, e.g., Roemer, 1998 and citations therein). There are several theoretical proposals to explain the limited demand for redistribution. Some of them rely on the prospect of upward mobility (Benabou and Ok, 2001) or the effects of considering two related salient issues in elections (see Lee and Roemer, 2006 for the case of income redistribution and race). Other theoretical models are based on the perception of fairness for the distribution of wealth (Piketty 1998 and Fong 2001). In this line, Alesina and Angeletos (2005) propose that the equilibrium levels of redistribution depend on voters' beliefs about how important is luck versus effort (merit) to determine their life time earnings. In societies where the median voter believes that luck is much more important than merit to determine income, the support for income redistribution is higher than in societies where the opposite happens. Nevertheless, they also find that these societies are less efficient in terms of production.

The main purpose of this paper is to test the results of Alesina and Angeletos (2005) through a lab experiment in which individuals vote over the tax rate and their pre-tax income is determined according to their performance in a real effort task. This task implies the computation of several summations and it was taken from Corgnet et al. (2015). A novel aspect that these authors introduced is that they consider leisure time in the workplace environment, so workers have the opportunity to browse the internet or use, for instance, social networks. We classify individuals into two groups according to two different fix wages, that is, we have the high-wage and the low-wage participants. We compare two scenarios; in one scenario, we group individuals randomly, whereas in the other scenario, groups are formed according to their talent. In particular, the high-wage agents are selected from the best participants of a tournament based in the same real effort task all individuals will perform during the experiment. In addition, we consider two different inequality settings in which we vary the initial income inequality through the rate between the high and the low wages.

Overall, we confirm almost all the results in Alesina and Angeletos (2005) for the case in which the wage gap is high. The most important results we obtain for this case are the following. First, we find that the support for income redistribution is higher in the scenario in which the wage is randomly assigned. Second, we find that high-wage agents are less productive when the income redistribution is high and luck determines the wage. As a consequence of the previous result, post-tax income inequality is lower in the scenario in which luck is more important than merit to determine the wage. Nonetheless, our data do not support their result about efficiency.

There is a recent extensive experimental literature in economics aimed at measuring preferences for redistribution. Tyran and Sausgruber (2006) adapt the Fehr and Schmidt (1999) model into a redistribution problem. They test the predictions of the adapted inequality aversion model in a simple redistribution experiment and find that it predicts voting outcomes far better than the standard model of voting assuming rationality and strict self-interest. Ackert et al. (2007) extend the results of Tyran and Sausgruber in a framework with different degrees of tax progressivity. In all the previous papers, the total amount to be distributed is exogenous and also the initial distribution of income. By contrast, in our setting, income is endogenously determined by the effort level provided in the labour market and initial wages are determined by a tournament.

In a more recent paper, Agranov and Palfrey (2015) test in the lab the Meltzer-Richard model of equilibrium tax rates, inequality, and income redistribution. The experiment varies the amount of wage inequality and the political process used to determine tax rates. Their main findings are that the higher the inequality, the higher the tax rates. The result is robust to the political institution. They also incorporate social preferences in the Meltzer-Richard model but they have an insignificant effect in the data. The main difference with our setting is that their assignment of initial wages is always random, thus, they cannot test the Alesina and Angeletos (2005) hypothesis. In addition, we consider a real-effort task (instead of stated effort levels) to determine pre-tax income and we include leisure time. Nevertheless, their experimental setting is more exhaustive, since participants could vote for any tax rate, whereas in our case we just consider two fixed tax rate options.[6]

Charité et al. (2015) offer an alternative explanation for the limited demand for redistribution, based on reference-dependent preferences. To this aim, they design two experiments. In a first experiment, subjects are given the opportunity to redistribute unequal, unearned initial endowments between two anonymous recipients. They find that the chosen level of redistribution is smaller when the recipients know the initial endowments than when the recipients do not know. In a second experiment, respondents are asked to choose a tax rate for someone who (due to luck) became rich either five or one year(s) ago. Subjects faced with the five-year scenario choose a lower tax rate, indicating respect for the more deeply embedded (five-year) reference point. Their results, thus, suggest that respect for reference points of the high-wage may help explain why voters demand less redistribution than standard models predict.

The next two studies are the ones more closely related to our framework for either one or both of the following reasons: Income is endogenously determined and they study the luck versus merit motivation for income redistribution. Krawczyk (2010) experimentally tests the so called in the literature the "fairness–legitimacy" hypothesis. First, he checks whether unequal probabilities of reaching a high social status will imply higher income redistribution in the society. Second, when this high social status is attained through effort or skill, individuals will opt for less income redistribution. With this aim, he designs an experiment in which individuals face different probabilities of winning a prize and according to them they indicate their preferences of how the winner should share the price with the losers. They find that the average redistributive transfers were about 20% lower in the sessions in which winning was determined by performance in a task rather than by sheer luck. In this study, the voting procedure is absent since the transfer for each group is randomly determined by the choice of one member of the group. In addition, pre-tax income comes from a fixed prize, whereas in our experiment initial income is earned by a real-effort task.

Durante et al. (2014) examine how demand for redistribution of income depends on self-interest, insurance motives, and social concerns relating to inequality and efficiency. They analyze subjects' tax choices under four different settings: different direct costs of experimental income, different dead-weight losses of tax revenue, different methods to assign pre-tax earnings and finally, different degrees of decisions involvement and information. Thus, they consider a treatment where pre-tax income is endogenously determined by performance on a quiz and another one where it is based on performance in a game of skill. Overall, they find that subjects' preferences for redistribution decrease substantially when the initial distribution of endowments is determined based on the quiz or game of skill performance (earned income) rather than randomly (luck). Again, there is no voting procedure in their analysis.

[6] In a similar line, Agranov and Palfrey (2016) present an experimental study of a dynamic version of the models of Romer (1975), Roberts (1977) and Meltzer and Richard (1981) on the effects of stochastic income mobility and tax persistence. They obtain theoretically a negative relationship between the previous two effects and the equilibrium tax rates. Overall, experimental results support their model.

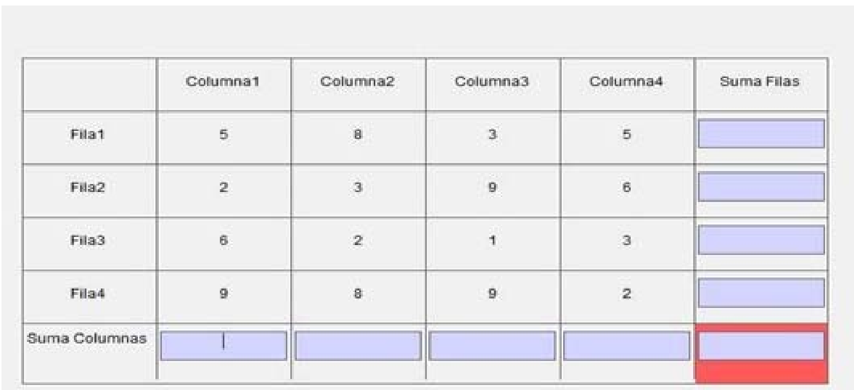
In sum, our main contribution to the existent experimental literature testing the Alesina and Angeletos (2005) hypothesis is that we consider a voting procedure in our design in order to make more realistic the consequences of preferences for redistribution in individuals' final payments. A novel aspect of our design is that we introduce initial income inequality through the assignment of two different wages: a high and a low one. This assignment is random in one condition (luck) and through a tournament (merit) in the other one. Moreover, pre-tax income is purely determined by a real-effort task which includes time for leisure, with the objective to provide high-wage subjects with a way of expressing their dissatisfaction with the tax rate chosen by majority rule. Finally, we consider two scenarios which differ in the level of initial wage inequality to check the robustness of the results.

The rest of the paper is organized as follows. The design of the experiment and the hypotheses to test are presented in Section 2. Section 3 reports the main results and discusses the validity of the hypotheses and Section 4 concludes.

2. Experimental design and hypothesis.

Our experiment was conducted at the University of Valencia by the experimental laboratory LINEEX with 336 participants in 4 sessions (one by treatment), who were online recruited with software developed by LINEEX. All sessions were run in the lab, using z-Tree software (Fischbacher, 2007). No one was allowed to participate in more than one session.

The real-effort task. This task was taken from Corgnet et al. (2015). It consisted of performing several summations. Subjects had to sum up 16 one-digit numbers in 4x4 tables (see Figure 1). Before writing the final solution (see red cell on the right upper corner of Figure 1), they must add up sum of columns and rows. They could not use calculator or any other electronic devices. The idea of the task was that it requires a considerable mental concentration and that it was quite monotone to resemble a real workplace environment in which workers will browse the internet or chat with their friends through social networks web pages such as *Facebook* or *Twitter*. Also, the longer the time doing the task, the harder the effort to stay focused on it.



	Columna1	Columna2	Columna3	Columna4	Suma Filas
Fila1	5	8	3	5	
Fila2	2	3	9	6	
Fila3	6	2	1	3	
Fila4	9	8	9	2	
Suma Columnas					

Figure 1. The work task

2.1. Treatments

Low Inequality Tournament treatment (TT_low, hereafter)**.** In each treatment there were three stages. In the first stage, each subject had to perform the former real effort task during 4 minutes. The best one-third of the participants in this stage were assigned to the A group (high-wage workers) and the rest to the B group (low-wage workers). In case of ties, there was an additional round in which subjects compete during 3 minutes. After this round, if there were additional ties, subjects were assigned randomly to the A or B group. Subjects knew that A group members would earn more per correct table in the following stages of the session than those in the B group (see instructions in Appendix 3 for further details). In particular, participants in A group earned 113 ECUS per correct table, whereas those in B group earned 75 ECUS. This stage was only played once at the beginning of the session.

In the second stage that we call *Training,* subjects were allocated in three-person groups: 1 person from the A group and 2 persons from the B group. The group was fixed throughout the rest of the session. This stage lasted two periods. In each period a different tax rate $t \in \{0.2, 0.6\}$ (either a low or a high one) was announced. Agents knew that the total tax collected within each group will be equally distributed between group members. After the tax rate announcement, subjects had to decide how to divide the 8 minutes of the period between the real-effort task and leisure time. Following the design of Corgnet et al. (2015), leisure time consisted of surfing the web in the Chrome surfer. This stage was irrelevant for payoffs, that is, it was hypothetical but the idea was to help participants to compare their payoffs for different tax rates. This was common information (see instructions in Appendix 3).

The third stage, labelled as *Voting*, lasted 9 periods, although participants did not know this number. Subjects remain in the same group as in the previous stage. At the beginning of each period, each member of a group votes for one of the two previous tax rate schemes (either 0.2 or 0.6) to be implemented in their group. In each group, the tax rate was selected by simple majority rule and it was announced for all group members. Subsequently, subjects had to decide how to divide the 8 minutes of the period between the real-effort task and leisure time, as in the previous stage, to earn their pre-tax income. This stage was the only source of real payoffs for participants. This was common information (see instructions in Appendix 3).

High Inequality Tournament treatment (TT_high, hereafter)**.** This treatment was exactly the same as the previous one except that participants in the A group earned 188 ECUS per correct table.

Random treatments. These treatments were the same as the two previous with tournament except for the first stage in which subjects did not compete for being assigned to the A group. Instead, they were randomly allocated to the A or B groups. As before, there were two treatments with different ex-ante inequality defined by the rate of the piece-rate (wage) between the A and the B groups. We will denote **TR_low** and **TR_high** the treatments with low and high inequality, respectively.

2.2 Information and Payoffs

The material payoffs in ECUS for subject *i* (*i = 1,2,3*) in group *j* (*j = A, B*) in each period of the *Voting* stage was given by the function:[7]

$$\pi_{ij} = (1-t) \times w_{ij} h_{ij} + t \frac{w_{1B} h_{1B} + w_{1A} h_{1A} + w_{2A} h_{1A}}{3}$$

where $t \in \{0.2, 0.6\}$ is the tax rate selected by simple majority within a group; w_{ij} is the payment per correct table for subject *i* in group *j* (75 ECUS for subjects in group B and 113 ECUS or 188 ECUS for subjects in group A for Low or High Inequality treatments, respectively) and h_{ij} is the number of correct tables solved by subject *i* in group *j*. Note that tax revenues are equally distributed between all members of the group. We paid out one randomly selected period among the 9 periods of the third stage. This was common information for all participants.

In the *Training* and *Voting* stages, participants received the following information after each round: the tax rate implemented the number of correct tables, payoffs before and after taxes for themselves and other group members.

Regarding payoffs, each ECU subjects earned was converted to Euros at an exchange rate of 1 euro = 65 ECUS in treatments TT_low and TR_low and 1 euro = 88 ECUS in treatments TT_high and TR_high. Note that in the Low Inequality treatments, the wage rate in Euros between A and B groups was 1.5, whereas this rate was 2.5 for the High Inequality treatments. On average, each person received about 24.13€ (including a 2€ show-up fee) for a 120-minute session. We summarize our treatments in Table 1:

Table 1. Treatments

Treatments	Tournament	Wage rate (A/B)	Participants
TT_low	Yes	1.5€	87
TR_low	No	1.5€	81
TT_high	Yes	2.5€	87
TR_high	No	2.5€	81

[7] Payoffs for the *Training* stage were the same except that *t* represents the exogenous tax rate implemented by the experimenter instead of the one obtained through the voting procedure by the members of each group.

2.3. Hypothesis.

In Alesina and Angeletos (2005) agents' income is affected by their inherent talent, effort and a random shock.[8] Besides, they consider a "fair" level of utility for which agents get the income that they deserve according to their talent and effort (absent of any random shock). Deviations from this level produce a disutility in agents.

They define two types of equilibria that may coexist under certain conditions. They call them the EU-type and the US-type equilibrium. In the EU-type equilibrium a high tax rate is implemented whereas in the US-type equilibrium a low tax rate is chosen. Consequently, the US-type equilibrium yields to a more efficient but more unequal society. They find that the EU-type equilibrium survives if the effect of luck versus talent is high enough and the US-type equilibrium survives if the opposite occurs.

To capture this equilibrium selection, we consider in our design two scenarios in which the effect of luck versus talent is different. In our Random treatments the effect of luck is higher than the effect of talent in determining agents' final payoffs, whereas in the Tournament treatments the opposite happens. Moreover, we consider two different payment schemes, one more unequal than the other (High and Low Inequality), for both Random and Tournament treatments. In the High Inequality treatments, the effect of luck versus talent is stronger than in the Low Inequality ones. In this manner, we can analyze to what extent the intensity of this effect changes the equilibrium outcome.

A caveat here, we will label hereafter the high-wage and the low-wage agents as *Rich* and *Poor*, respectively. The reason is that we try to avoid confusion with other low and high terms such as the inequality and the tax rate. These are just labels and do not pretend to have any implication at all.

According to the concept of fairness used in Alesina and Angeletos (2005), agents participating in the tournament may perceive the initial inequality in wages as more reasonable than in the Random treatments since they have earned this right somehow. Thus, we state the following hypothesis:

Hypothesis 1: *For a given inequality level, the low tax rate will be more frequently chosen in the Tournament than in the Random treatments.*

Let us now analyze how the effect of luck versus merit affects agents' productivity. Alesina and Angeletos (2005) suppose that talent and effort depend on both subjects' productivity and their willingness not to postpone consumption and hard work. We have tried to introduce the latter in our design by giving subjects the opportunity to devote time to leisure activities during the real-effort task. Thus, we consider that an agent has a good performance in the task according to both the number of correct tables and her working time. Taxation harms productivity (Meltzer and Richard (1981)) but this effect may vary in different treatments. If the low tax rate is implemented, Rich agents may work harder in the task in the Tournament treatment because they had earned this privilege and society has rewarded them with less income redistribution. For the same reasoning, a high tax rate may lead them to provide less effort in the Tournament treatment.

[8] In their model, they also assume that the income is determined by a decision of investment. However, for the sake of simplicity we have omitted that element of their model in our experimental design.

Hypothesis 2: *When the low tax rate is chosen, Rich agents have more correct tables and spend less leisure time in Tournament treatments than in Random ones. However, when the high tax rate is chosen, the opposite happens.*

If we assume that the low tax rate is more frequently chosen in the Tournament treatments (than in the Random ones), then, agents may have more incentives to increase their effort levels in these treatments. In addition, by Hypothesis 2 Rich agents work more in the Tournament treatments. As a consequence of the two previous results, total payoffs will be higher under the tournament. We state this hypothesis as follows:

Hypothesis 3: *Efficiency, measured as the total sum of payoffs, is higher in the Tournament than in the Random treatments.*

If Hypothesis 1 is supported, i.e. if we assume that the high tax rate is more frequently voted in the Random treatments (than in the Tournament ones), we may have two effects. On one hand, the high tax rate will imply higher income redistribution in the population. On the other hand, the high tax rate may decrease effort levels supplied by Rich subjects, so the ex-post income differences between low and Rich agents may be reduced.

Hypothesis 4: *Income inequality (measured through the Gini index) after tax redistribution is higher in the Tournament treatments.*

As we have mentioned before, for each type of treatment (Tournament and Random) we consider two different scenarios with different wage gaps. We conjecture that the greater the wage gap, the stronger the effect of luck versus talent. Hence, we state the following hypothesis:

Hypothesis 5: *The validity of all previous hypotheses will be enhanced in the High Inequality treatments.*

In what follows, we report our results and test the previous hypotheses with the data obtained from our lab experiment.

4. Results

In order to test all previous hypotheses, we study the effect of assigning agents' two different wages (high and low) through a tournament or randomly on their voting decisions about redistribution and their productivity in a real effort task. Moreover, we also analyze these effects in terms of efficiency and income inequality after income redistribution. We consider in our analysis two scenarios with different levels of wage inequality (low and high). Throughout this section, our nonparametric statistics reflect Mann-Whitney one-tailed tests unless stated otherwise. These tests are conducted at an individual level computing the average of all observations in the 9 periods. Table 2 reports some descriptive statistics about participants' decisions in the experiment.

Insert Table 2 here

4.1. Voted and implemented tax rates

First, from Table 2, we can observe that in all treatments the percentage of votes for the low tax rate (t = 0.2) is very similar for the two Low Inequality treatments (TT_low and TR_low). In fact, differences are not statistically significant (*p=0.549*, *p=0.546* and *p=0.755*, for all, Rich and Poor agents, respectively; two-tailed tests). If we focus on the comparison within the High Inequality setting, the low tax rate is more frequently voted in the Random (TR) than in the Tournament (TT) treatment, and this result is mainly driven by the participants who were assigned the low wage (*p=0.067*, *p=0.010* and *p=0.088*, for all, Rich and low wage agents, respectively). Regarding voters, Rich agents vote mainly for the low tax rate, while only around half of Poor agents vote for the high tax rate.

Regarding the implemented tax rate, in the Low Inequality setting, the low tax rate is more frequently implemented in the Random treatment than in the Tournament one although the significance is weak (*p = 0.096*). Since the differences in votes are not significant for all categories of agents (all, Rich and Poor agents), the most likely explanation for this result is that the allocation of subjects to different groups was more advantageous to increase the percentage of low tax rate implemented in the Random treatments than it was in the Tournament treatment. As expected, in the High Inequality setting, the implementation of high tax rate is more likely in the Random treatment (*p = 0.001*). Therefore, Hypothesis 1 is mainly supported for the High Inequality treatments.

To check the robustness of previous results, we develop an econometric analysis. Here, we can take advantage of the panel data set structure (time, participants) and we do not lose individual information as we did with the tests. We consider a Random Effects Probit model where the dependent variable is the probability that the low tax rate is implemented in the next period. As explanatory variables we use a dummy for Rich participants (*Rich*), the amount collected by the tax in each group in the present period (*Tax collect*), the number of correct tables in the present period (C*orrect*), the amount of surf time in the present period (*Surf*), the group each individual belongs to (*Group*), the current period (*Period*) and a dummy treatment (*Tournament*) which takes the value 1 when the high wage was assigned through a tournament and 0 otherwise. We also consider the individual payment after income redistribution in the present period (*Payoffs after tax*), the interaction between the dummy for the Tournament and Low Inequality treatment (which takes the value 1 when the high wage is assigned by a tournament in the Low Wage Inequality scenario and 0 otherwise) and the surf time (*Surf*TT_low*), the interaction between the dummy for the Random and Low Wage Inequality treatment (which takes the value 1 when the high wage is randomly assigned in the Low Inequality scenario and 0 otherwise) and the surf time (*Surf*TR_low*), the interaction between the dummy for the Tournament and High Inequality treatment and the surf time (*Surf*TT_high*) and the interaction between the dummy for the Random and High Inequality treatment and the surf time (*Surf*TR_high*). In order to avoid including highly correlated explanatory variables together, we consider two specifications with different explanatory variables, (1) and (2), (3) and (4), for the Low and the High Inequality setting, respectively.[9]

[9] We also consider a Random Effects Probit model where the dependent variable is the probability of voting for the low tax rate in the next period (see Table 5 on Appendix 1 for further details). We confirm the tournament effect for the High Inequality scenario and as with the statistical inference, we do not find any significant effect of the Random versus the Tournament treatment in the Low Inequality setting.

Insert Table 3 here

The low tax rate is more frequently implemented when agents' type is earned through a tournament only if the wage gap is high enough. This is because the tournament dummy is never significant in the Low Inequality environment but it is positive and highly significant in the High Wage one. This result supports Hypothesis 1 only partially. The result of not significance of this variable for the Low Inequality scenario is different from the statistical tests. This suggests that our conjecture, that the distribution of agents between groups was more advantageous for the low tax rate being the one selected in the Random treatment than in the Tournament one, was pertinent.[10]

As expected, the higher the amount of tax revenue collected in the current period, the lower the probability that the low tax rate was the one chosen in the next period. Interestingly, the surfing time is only significant for the Tournament treatments, both in the Low and the High Wage Inequality scenarios. However, this effect is negative for the Low Inequality treatment whereas it is positive for the High one. That is, in the High (Low) Inequality Tournament treatment, the higher the leisure time spent, the higher (lower) the likelihood that the low tax rate will be implemented in the next period. We do not have a clear explanation for this result. We may conjecture that a possible reason lays on the fact that in the High Inequality treatment the opportunity cost of leisure is higher than in the Low Inequality one. Thus, agents may vote for the low tax rate to increase working time in the future if the wage gap is high enough.

Result 1. Hypothesis 1 (voting behavior) is only supported for the High Inequality treatments.

4.2. Performance in the task

In order to analyze agents' performance, we have two possible measures. The most straightforward one is the number of correct tables. This variable is indeed productivity. To study pure effort levels, we need to compute the total number of tables (correct and incorrect) solved. As one may expect, the number of total tables and only those correct are highly correlated (89%, minimum for the four treatments). Thus, it does not seem very sensitive to analyze both of them. A different alternative to explore effort levels is to consider the time spent solving the tables, that is, the complementary of the surfing time.

First of all, notice that all previous variables are reported in Table 2 but they are split by the tax rate implemented. The reason is the following. As tax rates implemented are significantly different between the Random and the Tournament treatments (in both wage inequality scenarios), differences in the number of correct tables may be due to the distribution of the tax rate and not to effort levels *per se*.[11] For the Low Inequality case, and when the tax rate implemented is 20% (t = 0.2), there are no significant differences for any participants' category (*p=0.820*, *p=0.674* and

[10] As in the econometric analysis, we control for several effects and we use all individual observations in all periods. Thus, it seems more likely that there are no significant differences between treatments (Random vs. Tournament) in the tax rate implemented when the wage inequality is low.

[11] Here, we will focus only in the low tax rate (t = 0.2) since except for the Random treatment with high wage inequality, the number of groups implementing the high tax rate is much reduced.

p=0.964, for all, Rich and Poor agents, respectively, two-tailed tests). On the other hand, when wage inequality is high, Rich agents are more productive in the Tournament treatment (than in the Random one), whereas the opposite happens for Poor agents (*p=0.014* and *p=0.011*, for Rich and Poor, respectively).[12]

Regarding the time spent in solving the summations of the tables, in the Low Inequality scenario, individuals devote more time to work in the Random than in the Tournament treatment when the winner tax was the low one (20%). This result is against the conjecture stated in Hypothesis 2. Nevertheless, we may say that this result is mainly driven by the behavior of Poor agents (*p=0.054*, *p=0.492* and *p=0.068*, for all, Rich and Poor, respectively). Moreover, in the High Inequality scenario, Hypothesis 2 is again not supported for any subsample of participants (*p=0.709*, *p=0.200* and *p=0.662*, for all, Rich and Poor, respectively), since agents spent on average similar time working in the Tournament treatment and in the Random one. A possible explanation for this result comes from the fact that this variable may be highly related with agents' capacity constraint. In the Tournament treatments Rich agents complete more correct tables but spend the same time to do it than they do in the Random treatments. This may reflect the existence of an upper bound in agents' productivity.[13]

Result 2. Hypothesis 2 is only supported for the High Inequality scenario when productivity is measured by the number of correct tables.

4.3. Efficiency and Income Inequality

Considering the total payoffs within groups in each period as the measure of efficiency, we can observe in Table 2 that in the Low Inequality scenario, average total payoffs are slightly higher in the treatment without tournament, although differences are not statistically significant ($p = 0.749$, two-tailed test). On the other hand, when inequality is high, the effect goes in the opposite direction but it is still not significant ($p = 0.743$, two-tailed test). Interestingly, if we consider the sum of total payoffs in all 9 periods in both inequality scenarios, the tournament implies an efficiency enhancement (563,025 vs. 547,163, 2.9%, and 781,125 vs. 709,012, 10.2%, for the Low and High Wage Inequality, respectively).

Result 3. We do not find enough support to validate Hypothesis 3 on efficiency.

Regarding equity, in the Low Inequality treatments Poor agents' payoffs after tax redistribution represent a similar percentage of average payoffs (84% and 85% in the Tournament and Random treatments, respectively). In treatments with High Inequality, it seems that equity is higher in the Random treatment where Poor subjects' payoffs after tax redistribution represent a higher percentage of the average payoffs (79% vs. 65%).

[12] The differences are not significant when we consider jointly all types of subjects since the effects of Rich and Poor agents cancel each other out (*p=0.601*, two-tailed test).

[13] In Appendix 2, we develop an econometric analysis to confirm those statistical results regarding the performance on the task.

A standard measure used in the economics literature for income inequality is the Gini Index[14]. In the Low Inequality scenario, the evolution of the Gini index from payoffs before to after tax redistribution is from 0.255 to 0.195 under the tournament (-30.6%), whereas it is from 0.284 to 0.230 in the Random treatment (-23.5%). Thus, both the final income inequality and its reduction are lower when the tournament is present. By contrast, when the wage inequality is high, the evolution of the Gini index from payoffs before to after tax redistribution is from 0.441 to 0.332 under the tournament (-32.9%), whereas it is from 0.344 to 0.242 in the Random treatment (-41.9%). Thus, both the final income inequality and its reduction are lower when the tournament is not present.

Since it is difficult to conduct a statistical analysis with the previous two measures, we will examine significance of these results with an econometric analysis. To this aim, we consider a RE GMM where the dependent variable is the difference in absolute terms between payoffs after tax income redistribution and the mean payoffs for each group. As explanatory variables we use the implemented tax rate after the voting procedure in each period (*Winner tax*) and some of the variables used before in Table 3 such as *Rich, Period*, the *Tournament* dummy and the interactions between the surf time and the four treatments (*Surf*TT_low, Surf*TR_low, Surf*TT_high* and *Surf*TR_high*).

Insert Table 4 here

The main result of Table 4 is that in the Low Wage Inequality scenario the Tournament treatment is negative and significant, whereas in the High Wage Inequality one this effect is positive and significant. Those results are driven by the Poor participants. The latter is a confirmation of the results previously obtained using the Gini index.

Result 4. Hypothesis 4 (income inequality) is only supported for the High Wage Inequality setting.

Finally, let us briefly analyze the validity of Hypothesis 5. We find that in almost all previous measures: the tax rate implemented the number of correct tables and the ex-post income inequality; our hypotheses are only statistically satisfied for the High Inequality case. One of the exceptions is efficiency (sum of total payoffs): There are no differences between Random and Tournament treatments in both inequality settings. The other exception is the working time: In the high inequality scenario, subjects devote to work the same time in the Tournament treatment than they do in the Random treatment.

Result 5. Hypothesis 5 (stronger effect of the High Wage Inequality) is supported for all variables except for efficiency and working time.

---

[14] The Gini coefficient was proposed by the statistician Corrado Gini and it is a number between 0 and 1, where 0 corresponds to perfect equality (all have the same income) and where the value 1 corresponds to the perfect inequality (one person has all the income and the other none). Its formula is:

$Gini\ Index = \left|1 - \sum_{k=1}^{n-1}(X_{k+1} - X_k)(Y_{k+1} + Y_k)\right|$, where X is the cumulative proportion of the population variable, Y is the cumulative proportion of the variable income and n is the total number of citizens in the country.

4.4. Evolution on time of the voting behavior

To finish the analysis of results, let us examine the evolution on time of the voting behavior. First, we will focus on the Low Wage Inequality scenario. Figure 2 displays the average percentage of votes for the low tax rate (t = 0.2) in each of the 9 periods. We can observe that in both treatments (the Tournament and the Random one), the percentage of votes is pretty stable between 50% and 60%. In fact, the two lines representing these two treatments are really close in all periods. Hence, previous results of no significant differences between the Random and the Tournament treatment also hold over time.

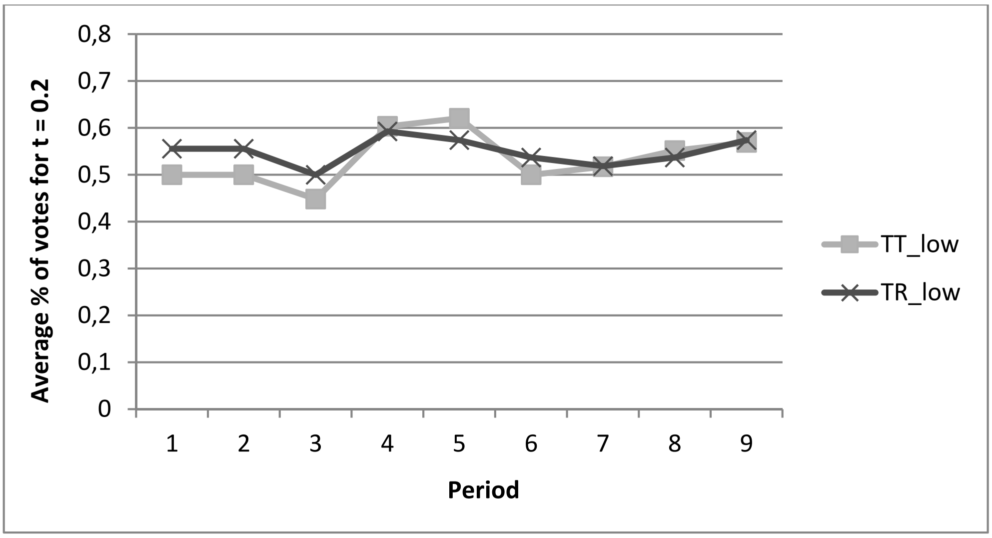


Figure 2. Evolution on time of the average percentage of votes for t = 0.2 in the Low Wage Inequality scenario.

On the other hand, when wage inequality is high (see Figure 3), the evolution of the voting behavior for the two treatments diverge. Interestingly, the starting point for both is around 50%. Nevertheless, when the tournament is present, there is an increasing trend to vote the low tax rate (t = 0.2), whereas with a random assignment of high wages the trend is decreasing. Thus, it seems that participants need some experience and feedback in the game in order to support Hypothesis 1.

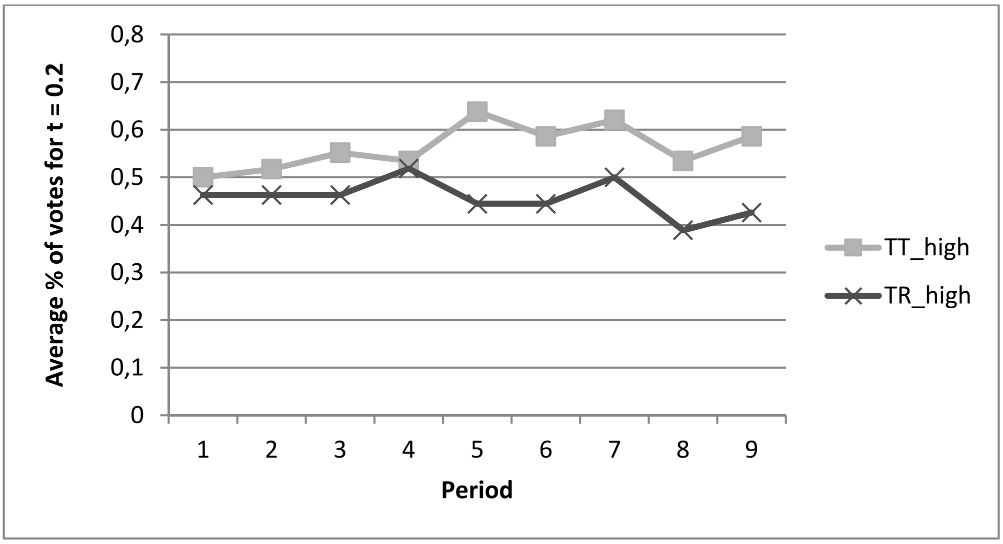


Figure 3. Evolution on time of the average percentage of votes for t = 0.2 in the High Wage Inequality scenario.

5. Concluding Remarks.

This paper presents an experiment to test the theoretical predictions presented by Alesina and Angeletos (2005), in which they evaluate how important is luck versus talent in the determination of a high or low income redistribution. Our experiment incorporates some new ingredients to the existent experimental literature addressing this issue with the aim to create a more realistic setting. In particular, we design a lab experiment in which individuals vote over two fixed tax rates and their pre-tax income is determined according to their performance in a real effort task. The voting procedure is a novel aspect in our design and although Alesina and Angeletos (2005) do not have exactly a voting process, they assume that the tax rate implemented comes from the preferences of the median voter. Thus, in equilibrium our setting is equivalent to theirs. Moreover, to be closer to reality, we gave subjects the possibility of spending part of their working time in leisure activities. We test whether democracies choose less redistributive programs when it is believed that effort and talent are much more important than luck to determine income. We also analyze whether these democracies gain in efficiency in spite of being less egalitarian. Finally, we consider two different scenarios of initial income inequality.

The main finding is that initial income inequality may be crucial for the theoretical results in Alesina and Angeletos (2005), since we obtain quite different outcomes for the two wage inequality settings. Our experimental data support mostly the results in Alesina and Angeletos (2005) only for the case in which the wage inequality is high enough. First, the higher is the wage inequality, the higher is the effect of luck versus talent. We also obtain that the income redistribution is significantly higher in the scenario in which the wage is randomly assigned than when it is determined by merit. The evolution of the voting behavior is in line with the previous results although participants need some experience in the game to reach this outcome. In addition, we find that high-wage subjects are less productive when the wage is randomly assigned. However, based on our results, we cannot state that societies in which wage is randomly determined are less efficient in terms of production. Finally, in line with the theory, we obtain that post-tax income inequality is lower in the scenario in which luck is more important than merit to determine the wage.

To keep things simple, we try to have our experimental environment very stark. Thus, we choose to have only two fixed tax rates. The main reason is that we are interested in analyzing whether voters prefer a high tax rate rather than a low one under certain circumstances. Although it is beyond the scope of our research questions in this paper, it would be interesting to consider a continuum of tax rates, as in Agranov and Palfrey (2015), in order to have more precise information about voters' preferences on the choice of the redistributive policy for our considered treatments. Moreover, our results suggest that there is a threshold in the level of wage inequality that makes individuals behave in a different manner regarding their voting behaviour and choice of effort. Hence, another open question that remains would be to extend our framework to find that threshold.

References

Ackert, L. F., Martinez-Vazquez, J., and Rider, M. (2007). "Social Preferences and Tax Policy Design: Some Experimental Evidence." *Economic Inquiry* 45(3), 487-501.

Agranov, M. and Palfrey, T. R. (2015). "Equilibrium Tax Rates and Income Redistribution: A laboratory Study." *Journal of Public Economics* 130, 45-58.

Agranov, M. and T. R. Palfrey. (2016). "The Effects of Income Mobility and Tax Persistence on Income Redistribution and Inequality." NBER Working Paper no. 22759.

Alesina, A., Galeser, E.L., (2004). Fighting poverty in the US and Europe: a world of difference. Oxford University Press, Oxford.

Alesina A. and Angeletos G.M. (2005). "Fairness and Redistribution." *The American Economic Review* 95(4), 960-980.

Benabou, R., & Ok, E. A. (2001). "Social mobility and the demand for redistribution: the POUM hypothesis." *The Quarterly Journal of Economics*,116(2), 447-487.

Charité, J., Fisman, R., and Kuziemko, I. (2015). "Reference Points and Redistributive Preferences: Experimental Evidence." *National Bureau of Economic Research*, No. w21009.

Corgnet, B., Hernán-González, R., and Schniter, E. (2015). "Why Real Leisure Really Matters: Incentive Effects on Real Effort in the Laboratory." *Experimental Economics* 18(2), 284-301.

Corneo, G., Gr'uner, H.P., 2002. Individual preferences for political redistribution. *Journal of Public Economics* 83, 83–107.

Durante, R., Putterman, L., and Weele, J. (2014). "Preferences for Redistribution and Perception of Fairness: An Experimental Study." *Journal of the European Economic Association* 12(4), 1059-1086.

Fehr, E., and Schmidt, K. M. (1999). "A Theory of Fairness, Competition, and Cooperation." *Quarterly journal of Economics*, 817-868.

Fischbacher, U. (2007), "Z-Tree: Zurich Toolbox for Ready-made Economic Experiments." *Experimental Economics*, 10(2): 171-178.

Fong, C. (2001). "Social preferences, self-interest and the demand for redistribution." *Journal of Public Economics* 822, 225–246.

Krawczyk, M. W. (2010). "A glimpse through the veil of ignorance: Equity of opportunity and support for redistribution. " *Journal of Public Economics* 94(1), 131-141.

Lee, W., Roemer, J.E. (2006) "Racism and redistribution: a solution to the problem of American exceptionalism. " *Journal of Public Economics* 90, 1027–1052.

Meltzer A. H. and Richard S. F. (1981). "A Rational Theory of the Size of Government." *Journal of Political Economy* 89, 914–927.

Piketty, T.(1998). “Self-fulfilling beliefs about social status” *Journal of Public Economics* 70, 115–132.

Roberts K. W. (1977). “Voting over Income Tax Schedules.” *Journal of Public Economics* 8, 329–340.

Romer T. (1975). “Individual Welfare, Majority Voting, and the Properties of a Linear Income Tax.” *Journal of Public Economics* 4, 163–185.

Tyran, J. R., and Sausgruber, R. (2006). “A little fairness may induce a lot of redistribution in democracy.” *European Economic Review* 50(2), 469-485.

TABLES

Table 2: Descriptive statistics of agent's decisions.

		Low Inequality			High Inequality		
Agents		All	Rich	Poor	All	Rich	Poor
% votes for tax= 0.2	**TT**	62	79	53	65	83	56
	TR	64	82	55	55	73	46
% tax=0.2 implemented	**TT**	67			72		
	TR	72			54		
Correct t=0.2	**TT**	7.9	9.6	7.1	7.8	10.7	6.4
	TR	8.1	9.4	7.4	8.4	8.5	8.3
Correct t=0.6	**TT**	8.3	8.7	8.1	8.4	10.7	7.3
	TR	9.3	9.1	9.5	8.7	9.2	8.5
Surf time 9 periods	**TT**	17	18	16	27	20	30
	TR	7	3	9	20	5	28
Surf time 9 periods t=0.2	**TT**	14	11	16	17	5	23
	TR	7	3	10	24	9	31
Surf time 9 periods t=0.6	**TT**	6	7	6	16	26	11
	TR	2	1	2	4	0	6
Total Payoffs within groups	**TT**	2157.2			2992.8		
	TR	2251.7			2917.7		
Payoffs after redistribution	**TT**	719	946	606(84%)	998	1693	650(65%)
	TR	751	966	642(85%)	973	1386	766(79%)
N		84	28	56	84	28	56

Note: In the *Low* and *High inequality* settings, the rate between high and low wages was 1.5 and 2.5, respectively. *Rich[Poor]* refers to those subjects receiving the high[low] wage. *TT* refers to treatments where the high wage was assigned through a tournament, whereas in *TR* the high wage was randomly assigned. The two tax rates agents could vote for were 0.2 and 0.6. *Correct* is the average number of correct tables solved by participants in the 9 periods. *Surf time 9 periods* is the sum of all time subjects were surfing the web in the 9 periods and it is measured in seconds. *Payoffs after redistribution* are average individual payoffs after the tax collected was redistributed within groups. *Total payoffs in all periods* are the total sum of the payoffs in all 9 periods from all the participants in the corresponding treatment. All variables are displayed on average terms except *Surf time 9 periods* and *Total payoffs in all periods.*

Table 3. Probability of low tax being the winner in the next period

	Low Wage Inequality		High Wage Inequality	
Variables	(1)	(2)	(3)	(4)
Rich	0.080	-	0.043	-
	(0.416)		(0.465)	
Tax collect	-0.005***	-	-0.002***	-
	(0.001)		(0.001)	
Correct	-0.057	-	-0.009	-
	(0.048)		(0.045)	
Surf	0.0004	-	0.014**	-
	(0.011)		(0.006)	
Group	0.088**	0.125**	0.024	0.019
	(0.044)	(0.057)	(0.047)	(0.055)
Period	0.074**	0.030	-0.029	-0.051
	(0.037)	(0.051)	(0.040)	(0.045)
Payoffs after tax	-	-0.002***	-	-0.0002
		(0.001)		(0.0004)
Surf*TT_low	-	-0.014**	-	-
		(0.007)		
Surf*TR_low	-	0.085	-	-
		(0.063)		
Surf*TT_high	-	-	-	0.0232***
				(0.007)
Surf*TR_high	-	-	-	0.002
				(0.008)
Tournament	-0.583	-0.709	1.492***	1.736***
	(0.404)	(0.516)	(0.445)	(0.503)
Constant	2.630***	2.527***	1.285	0.922
	(0.950)	(0.752)	(0.954)	(0.582)
Observations	1,344	1,344	1,344	1,344

Note: *** and * refers to p < 0.01 and < 0.1, respectively. Robust standard errors in parentheses.

Table 4. Inequality measured as (payoffs after tax redistribution- groups mean payoffs)

Variables	TT_low vs TR_low (1) All	(2) Rich	(3) Poor	TT_high vs TR_high (4) All	(5) Rich	(6) Poor
Winner tax	-195.4***	-265.9***	-160.7***	-401.9***	-520.8***	-340.1***
	(28.17)	(55.56)	(25.55)	(41.81)	(98.97)	(49.15)
Rich	-101.0***	-	-	-329.5***	-	-
	(25.41)			(75.90)		
Surf*TTlow	0.067	-0.205	0.660***	-	-	-
	(0.389)	(0.150)	(0.236)			
Surf_TRlow	1.208**	-3.161**	1.553***	-	-	-
	(0.492)	(1.398)	(0.520)			
Surf*TThigh	-	-	-	0.828***	0.688***	1.260***
				(0.203)	(0.210)	(0.221)
Surf_TRhigh	-	-	-	0.777**	-0.536	0.801*
				(0.393)	(0.970)	(0.437)
Period	3.643***	6.492**	2.109	5.426***	6.041	5.143**
	(1.287)	(3.178)	(1.383)	(1.894)	(5.793)	(2.173)
Tournament	-10.34**	-8.078	-11.79***	28.22***	43.12	20.42**
	(5.232)	(14.23)	(4.236)	(9.963)	(35.12)	(9.183)
Constant	410.3***	327.9***	198.4***	1,252***	1,049***	525.6***
	(50.29)	(63.95)	(21.05)	(170.1)	(254.0)	(63.55)
Observations	1,512	504	1,008	1,512	504	1,008

Note: *** and * refers to p < 0.01 and < 0.1, respectively. Robust standard errors in parentheses.

APPENDIX 1

Table 5. Probability of voting the low tax rate in the next period (TT vs TR)

Variables	TT_low vs TR_low			TT_high vs TR_high		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Rich	Poor	All	Rich	Poor
Rich	2.693***	-	-	2.635***	-	-
	(0.571)			(0.537)		
Tax collect	-0.004***	-0.005*	-0.003***	-0.002**	-0.002	-0.002**
	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Correct	0.08	0.230*	0.034	0.060	0.277**	-0.006
	(0.053)	(0.118)	(0.059)	(0.047)	(0.116)	(0.052)
Surf	0.005	0.002	0.018*	0.018***	0.063	0.015**
	(0.007)	(0.005)	(0.010)	(0.005)	(0.039)	(0.006)
Group	0.086	-	0.080	0.006	-	0.033
	(0.054)		(0.059)	(0.052)		(0.051)
Period	0.022	-0.083	0.054	0.016	0.119	-0.003
	(0.047)	(0.099)	(0.054)	(0.045)	(0.112)	(0.049)
Tournament	-0.264	-1.006	-0.086	0.891*	1.167	0.602
	(0.471)	(0.957)	(0.505)	(0.457)	(1.013)	(0.491)
Constant	5.277***	4.067**	-0.054	4.878***	0.743	0.118
	(1.249)	(1.480)	(0.794)	(1.228)	(1.278)	(0.678)
Observations	1,344	448	896	1,344	448	896

Note: High wage is 1 if when the high wage is the one assigned and 0 otherwise. Tournament is 1 if the high wage is assigned by a tournament and 0 otherwise. *** and * refers to p < 0.01 and < 0.1, respectively. Robust standard errors in parentheses.

APPENDIX 2

We develop an econometric analysis to confirm the statistical results regarding the performance on the task. We consider a Random Effects General Linear Model (RE GMM, hereafter) for the analysis of the number of correct tables. Results hold for both inequality wage environments. Interestingly, we observe a positive effect in the number of correct tables for both inequality environments but in the Low one, this effect is driven by the Poor participants since the effect is negative although no significant for the Rich agents. Not surprisingly, there is learning in the task as the effect is positive with the number of periods.

Table 6. RE GMM on the number of correct tables (TT vs TR)

Variables	TT_low vs TR_low (1) All	(2) Rich	(3) Poor	TT_high vs TR_high (4) All	(5) Rich	(6) Poor
Winner tax	0.642*	-0.239	1.117**	1.249***	1.165**	1.366***
	(0.378)	(0.594)	(0.485)	(0.353)	(0.579)	(0.440)
Rich	1.591***	-	-	2.264***	-	-
	(0.525)			(0.626)		
Surf	-0.025***	-0.032***	-0.019***	-0.017***	-.027***	-0.012**
	(0.006)	(0.003)	(0.006)	(0.004)	(0.004)	(0.005)
Group	0.017	-0.026	0.040	0.103	0.178	0.0683
	(0.054)	(0.089)	(0.067)	(0.063)	(0.113)	(0.075)
Period	0.241***	0.222***	0.249***	0.191***	0.181***	0.195***
	(0.023)	(0.043)	(0.027)	(0.023)	(0.041)	(0.027)
Tournament	0.402	-0.013	0.610	0.518	1.940*	1.735***
	(0.501)	(0.869)	(0.612)	(0.536)	(1.052)	(0.577)
Constant	9.583***	8.507***	6.129***	10.14***	6.111***	6.439***
	(1.091)	(1.089)	(0.748)	(1.267)	(1.219)	(0.684)
Observations	1,512	504	1,008	1,512	504	1,008

Note: High wage is 1 if when the high wage is the one assigned and 0 otherwise. Tournament is 1 if the high wage is assigned by a tournament and 0 otherwise. *** and * refers to p < 0.01 and < 0.1, respectively. Robust standard errors in parentheses.

Table 7. Random Effects GMM on the working time (TT vs TR)

Variables	TT_low vs TR_low (1) All	(2) Rich	(3) Poor	TT_high vs TR_high (4) All	(5) Rich	(6) Poor
Winner tax	-0.471	-5.090	1.823	-1.569	-8.042	3.016
	(1.815)	(4.950)	(1.127)	(3.412)	(6.803)	(2.703)
Rich	0.207	-	-	-1.762	-	-
	(0.905)			(1.367)		
Surf	0.080	-0.016	0.127	0.040	-0.335*	0.230
	(0.058)	(0.051)	(0.084)	(0.182)	(0.174)	(0.256)
Group	0.049	0.325	-0.089	0.016	0.081	-0.018
	(0.131)	(0.307)	(0.122)	(0.128)	(0.226)	(0.157)
Period	1.112	1.525	0.905	-0.837	-2.214	-0.052
	(0.769)	(1.431)	(0.914)	(1.643)	(1.798)	(2.235)
Tournament	481.1***	481.9***	480.1***	483.1***	486.9***	476.3***
	(1.425)	(0.731)	(1.043)	(1.397)	(3.303)	(3.337)
Constant	1,512	504	1,008	-1.569	-8.042	3.016
	-0.471	-5.090	1.823	(3.412)	(6.803)	(2.703)
Observations	1,512	504	1,008	1,512	504	1,008

Note: High wage is 1 if when the high wage is the one assigned and 0 otherwise. Tournament is 1 if the high wage is assigned by a tournament and 0 otherwise. *** and * refers to $p < 0.01$ and < 0.1, respectively. Robust standard errors in parentheses.

APPENDIX 3: Instructions for the Low Inequality Tournament Treatment[15]

The aim of this experiment is to study how individuals make decisions in certain environments. The instructions are simple and if you follow them carefully, you will get a monetary payoff at the end of the experiment. This payoff will be confidential, since nobody will know the payoffs received by the other participants. You can ask all the questions you have by raising your hand at any moment. Apart from these questions, any kind of communication between you is forbidden and it will mean an immediate expulsion from the Experiment.

This experiment has two phases:

<u>Phase 1</u>

In the first phase, you will have to do a task based on additions during **4 minutes** (240 seconds). The task will consist of summing up 16 numbers in a table of 4 rows and 4 columns. The difficulty of the tables will be the same for all participants. Before writing in the screen a final solution

[15] Instructions for other treatments are available upon request.

(the summation of all the numbers in the table), you will have to complete the 4 cells that correspond to the addition of each row and the 4 cells that correspond to the addition of each column. You will be able to write the final solution of the table (red box in Figure 1) once you have completed the 8 previous cells.

The use of calculator or any other electronic device is forbidden. If you use any of them, you will be expelled from the experiment with no payoffs. You can see an example of what will be shown in the screen in Figure 1:

Figure 1

FASE 1

Primero suma las filas y las columnas. Luego completa la casilla de color rojo.

	Columna1	Columna2	Columna3	Columna4	Suma Filas
Fila1	5	8	3	5	
Fila2	2	3	9	6	
Fila3	6	2	1	3	
Fila4	9	8	9	2	
Suma Columnas					

At the end of the **4 minutes**, the number of tables that have been summed up correctly will be calculated for all the participants in the current session. **The number of correct tables will only depend on the solution written in the red box** (the remaining cells will help you to calculate the final solution but they will not be taken into account). The one third of participants with the best results will belong to **group A**, while the remaining two third of participants will belong to **group B**. The members of group A will receive **113 ECUS** (experimental currency unit) for each correct table in the second phase of the experiment. While the members of group B will receive **75 ECUS** (experimental currency unit) for each correct table in the second phase of the experiment. In the event of a tie in the number of correct summations, the tied participants will do the same task during **1 minute and a half**. If there is again a tie, the tie-breaking will be randomly decided between the tied participants.

Phase 2

In this phase, you will be matched with two other people participating in the session to form a group of three. In this way, there will be **one participant of group A** and **two participants of group B** in each group.

You must know that in all rounds of Phase 2 **your group will be always the same**. This means that you will be matched to the same people along all rounds.

Phase 2 is formed by several rounds with a length of **8 minutes** each. Along this time you can do the task of summations (identical to the task of Phase 1) or surf the Internet. To change from one task to the other you need to push the button **SURF** (in the upper right part of the screen, Figure 2).

A certain amount of the ECUS earned by the members of your group during the task will be redistributed among the members of the group through a **tax rate**. Figure 2 shows an example of the screen in Phase 2.

Phase 2 is formed by two blocks of rounds. In the first block **the tax rate will be set** (you cannot choose it) and these rounds will be trial rounds, so they will not be taken into account to calculate payoffs. In the second block **the tax rate will be chosen by voting** in all rounds.

In summary, Phase 2 is formed by:

Block 1 (set tax rate, trial rounds)

At the beginning of each round, a tax rate will be announced. This tax rate will be the one applied to the ECUS you will obtain in that round according to the number of correct tables. Subsequently, the 8 minutes of the round to perform the task will start. The collected tax revenues in your group will be equally distributed among all the group members. The calculus of your payoff and how the tax will be implemented will be further explained in detail below.

Figure 2

Block 2 (tax chosen by voting)

At the beginning of each round two different tax rates are presented. You will have to choose one of them. The tax rate that receives more votes in the group will be applied in that round. Notice that since the groups are formed by 3 people there is no option of a tie in the voting procedure. As in the rounds with a fixed tax rate, the tax rate elected by majority rule will be announced before starting the 8 minutes of the round.

Your payoff in each round

For calculating your payoff in a round, we need several steps. Your payoff before taxes will be calculated multiplying the number of correct tables obtained in that round by **113 if your type is A** or by **75 if your type is B**. Secondly, for calculating your payoff after taxes, your payoff before taxes will be multiplied by (1-t), where t is the tax rate announced in rounds with the tax rate is set or the one elected by majority rule in rounds with voting. Finally, the collected taxes (t*addition of payoffs before taxes) in your group divided equally among all the members of your group (that is, divided by 3) will be added to your payoff. The payoff of a round can be calculated as follows:

$$payoff\ (typeB) = (1-t)\times correct_B \times 75 + t\times\left(\frac{correct_{B1}\times 75 + correct_{B2}\times 75 + correct_A \times 113}{3}\right)$$

where t is the tax rate, $correct_j$ is the number of correct tables obtained in that round, depending on your type j=A,B.

__**Example 1**__

Suppose that your **type is A** and the announced tax rate in that round is 30%, that is *t = 0.3*. If you have solved 6 correct tables during the 8 minutes of the round ($correct_A$=6), another member has solved 5 ($correct_{B1}$=5) and the other member 4 ($correct_{B2}$=4), then, your payoffs will be:

Before taxes:

$correct_A*113$ = 6*113 = **678 ECUS**

After taxes (including distribution of collected tax revenues):

$[(1-t)*correct_A*113] + [(t/3)*(correct_{B1}*75+correct_{B2}*75+ correct_A*113)] =$

= [(1-0.3)* 6*113] + [(0.3/3)*(5*75+4*75+6*113)]= 474.6 + 153.3 = **609.9 ECUS**

Example 2

Suppose that your **type is B** and the announced tax in that round is 30%, that is $t = 0.3$. If you have solved 4 correct tables during the 8 minutes of the round ($correct_{B1}$=4), the other member of type B has solved 5 ($correct_{B2}$=5) and the member of type A has solved 7 ($correct_{A}$=7), then, your payoffs will be:

Before taxes:

$correct_{B1} *75$ = 4*75 = **300 ECUS**

After taxes (including distribution of collected taxes):

$[(1-t)*correct_{B1}*75] + [(t/3)*(correct_{B1}*75+correct_{B2}*75+ correct_{A}*113)] =$

= [(1-0.3)* 4*75] + [(0.3/3)*(4*75+5*75+7*113)]= 210 + 146.6 = **356.6 ECUS**

At the end of each round, you will be informed about the decisions made by the members of your group. At the end of the experiment, we will pay you for your decisions of **2 rounds of Block 2 (rounds with voting)**. These rounds will be randomly chosen**.**

In order to pay you according to your decisions, we will exchange your earnings in ECUS into Euros using the exchange rate **65 ECUS = 1€**. Your earnings will be anonymously given at the end of the experiment.