FACULTAD DE CIENCIAS ECONÓMICAS Y DE ADMINISTRACIÓN

IECON INSTITUTO DE ECONOMÍA

UNIVERSIDAD DE LA REPÚBLICA URUGUAY

Dissecting Inequality-Averse Preferences

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INSTITUTO DE ECONOMÍA 11/2020
Serie Documentos de Trabajo DT 19/2020

ISSN: 1510-9305 (en papel)
ISSN: 1688-5090 (en línea)

Los autores agradecen a los participantes del Ridge (mayo, 2019), Aucip (julio, 2019), ECINEQ (julio, 2019) e IIPF (August, 2019) y los comentarios recibidos en el taller del grupo de desigualdad y pobreza del IECON. Esta investigación recibió el apoyo de la Agencia Nacional de Investigación e Innovación (ANII) - Proyecto FCE_1_2014_104284. El diseño experimental fue registrado en el *Registry for Randomized Controlled Trials* gestionado por *American Economic Association*: RCT ID AEARCTR-0002471.

Forma de citación sugerida para este documento: Bérgolo, M. Burdin, S., Burone, S. De Rosa, M. Giaccobasso, M. y Leites M. (2020) "Dissecting Inequality-Averse Preferences". Serie Documentos de Trabajo, DT 19/2020. Instituto de Economía, Facultad de Ciencias Económicas y Administración, Universidad de la República, Uruguay.

Dissecting Inequality-Averse Preferences

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Resumen

Existe cierto consenso que los individuos (al menos en promedio) están dispuestos a pagar por reducir la desigualdad. Si bien existen diversos enfoques que ofrecen fundamentos para explicar este resultado, no hay acuerdo aún sobre su relevancia empírica. En este estudio aplicamos un cuestionario experimental a una muestra de más de 1815 estudiantes de primer año de la Facultad de Ciencias Económicas y Administración en Uruguay para comprender en qué medida las personas les disgusta la desigualdad y cuáles son los fundamentos. Elicitamos el parámetro de aversión a la desigualdad individual a partir de una secuencia de elecciones entre sociedades hipotéticas, donde los participantes implícitamente deben optar entre sacrificar ingreso propio por menor desigualdad agregada. Además, aplicamos tratamientos aleatorios de información respecto al origen de la desigualdad en dichas sociedades. Los principales hallazgos son que: (1) la prevalencia de la aversión a la desigualdad es alta: las elecciones de la mayoría de los participantes revelaron preferencias adversas a la desigualdad; (2) el grado de aversión a la desigualdad depende de la posición del individuo en la distribución del ingreso; (3) es más probable que los individuos acepten mayores niveles de desigualdad cuando ésta es explicada por los niveles de esfuerzo en contraposición a las circunstancias, independientemente de su posición en la distribución del ingreso; (4) el efecto de la movilidad social sobre la aversión a la desigualdad está condicionado a la posición ocupada por el individuo en la distribución del ingreso: mayor movilidad reduce la aversión a la desigualdad para los individuos ubicados en la parte inferior de la distribución del ingreso, donde la aversión al riesgo no puede desempeñar ningún papel.

Palabras clave: Aversión a la desigualdad, equidad, riesgo, esfuerzo, suerte, redistribución, cuestionarios experimentales.

Código JEL: D63, D64, D81 C13, C91.

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Dissecting Inequality-Averse Preferences

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Abstract

Although different approaches and methods have been used to measure inequality aversion, there remains no consensus about its drivers at the individual level. We conducted an experiment on a sample of more than 1815 first-year undergraduate economics and business students in Uruguay to understand why people are inequality averse. We elicited inequality aversion by asking participants to make a sequence of choices between hypothetical societies characterized by varying levels of average income and income inequality. In addition, we use randomized information treatments to prime participants into competing narratives regarding the sources of inequality in society. The main findings are that (1) the prevalence of inequality aversion is high: most participants' choices revealed inequality-averse preferences; (2) the extent of inequality aversion depends on the individual's position in the income distribution; (3) individuals are more likely to accept inequality when it comes from effort rather than luck regardless of their income position; (4) the effect of social mobility on inequality aversion is conditional on individual's income position: preferences for mobility reduces inequality aversion for individuals located at the bottom of the income distribution, where risk aversion cannot play any role.

Keywords: Inequality aversion, fairness, risk, effort, luck, redistribution, questionnaire-experiments.

JEL Code: D63, D64, D81 C13, C91.

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1 Introduction

Diverse strands of economic literature provide evidence that a substantial fraction of individuals dislike inequitable outcomes in many settings (Fehr and Schmidt, 1999, 2001; Charness and Rabin, 2002; Clark and D'Ambrosio, 2015). There are different approaches and methods to measure inequality aversion in individuals' preferences but there is no consensus about the drivers of the phenomenon. This paper relies on a unified conceptual framework and experimental design to elicit inequality aversion and test competing hypotheses for its driving mechanisms.

Inequality aversion is an important mechanism through which individual well-being may be affected by others' outcomes. Therefore, understanding the roots of inequality aversion can reveal useful insights about individual behavior and social welfare (Bolton and Ockenfels, 2000; Charness and Rabin, 2002; Fehr and Schmidt, 1999, 2001; Cappelen et al., 2013). Inequality aversion has proved to be relevant in a variety of settings, such as taxation and public good provisions (Fehr and Schmidt, 2001; Luttmer and Singhal, 2014; Aronsson and Johansson-Stenman, 2018; Aronsson et al., 2016; Andreoni et al., 1998; Charness and Rabin, 2002; Clark and D'Ambrosio, 2015), externalities and public policy objectives (Fleurbaey and Maniquet, 2018; Alesina and Giuliano, 2011; Frank, 2005), effects of compensation structures in organizations (Card et al., 2012; Cullen and Perez-Truglia, 2018; Breza et al., 2017) and support for redistributive policies both within and between societies (Georgiadis and Manning, 2012; Piketty et al., 2014; Alesina et al., 2001; Alesina and Giuliano, 2015; Piketty, 1995; Benabou and Ok, 2001; Alesina and Angeletos, 2005).

Previous literature distinguishes between two broad notions in order to define individual inequality aversion: the comparative approach and the normative approach (Clark and D'Ambrosio, 2015; Charness and Rabin, 2002). According to the first approach, inequality-averse preferences are essentially self-centered as they depend on individual's income (or position) relative to others. This has been explained through different mechanisms, such as envy, altruism, compassion or pride, positional concern, competitiveness, fairness; risk aversion; and loss aversion (Harsanyi, 1955; Fehr and Schmidt, 1999, 2001; Amiel and Cowell, 1999; Hopkins, 2008; Heffetz and Frank, 2011; Charité and Kuziemko, 2015; Clark and D'Ambrosio, 2015). By contrast, a normative approach assumes that an individual values global inequality in a society, irrespective of their personal income (or position). People may be negatively affected by inequality if that inequality deviates from an optimal or desired level, due to fairness or instrumental reasons (Clark and D'Ambrosio, 2015; Fehr and Schmidt, 2001). For instance, inequality may be perceived as "bad" because it produces negative externalities in terms of social well-being, investment in human capital, the quality of institutions or levels of crime and violence in society. At the same time, income inequality could produce positive externalities if it improves individual incentives and allocative efficiency (Alesina and Giuliano, 2011). These

micro-foundations provide alternative mechanisms to explain why most individuals are not indifferent to income inequality. Furthermore, they suggest that the magnitude of inequality aversion could vary between individuals who have different perceptions of fairness, varying ideas about the social returns of inequality, or the risks associated with income disparities (Rawls, 1971; Cowell and Schokkaert, 2001; Harsanyi, 1955; Bolton and Ockenfels, 2000; Clark and D'Ambrosio, 2015; Alesina and Giuliano, 2011; McCoy and Major, 2007). However, these competing mechanisms have rarely been investigated under a unified empirical framework.

This paper aims to fill this gap by providing evidence about the main drivers of inequality aversion. We use an experimental design inspired by Amiel and Cowell (1992) and Carlsson et al. (2005). Our experiment was performed on the universe of 2018 and 2019 cohorts of first-year undergraduate students in economics and business enrolled at the largest university in Uruguay (Universidad de la Republica).

The experiment works as follows. Individuals are shown nine pairs of societies. Each pair is comprised by a baseline society (A) and an alternative society (B_z) selected from the set $\{B_1, B_2, ..., B_9\}$. Alternative societies B_z differ from the baseline society A in level of inequality. Within the set of societies B, each B_z has a different level of income. We ask participants to choose which society they prefer for their hypothetical grandchild to live in 60 years from the present. The key goal of the experiment is to elicit an individual's willingness to pay to live in a society with lower inequality. From each individual's set of choices, and under the assumption of a specific but sufficiently general utility function, we recover the implied distribution of the inequality aversion parameter.

We use priming techniques from experimental psychology to understand the roots of inequality aversion (Cohn and Maréchal, 2016; McCoy and Major, 2007). Specifically, we randomly divide the sample into four groups and introduce a series of information treatments. The first group is the *control* group. Participants in this group do not receive any additional information beyond the baseline set of instructions. As a result, they decide based on their preferences and prior beliefs. The second group is the *effort-message* group. Here, participants are told that the position in the income distribution is the result of effort. The third group is the *luck-message* group. Participants selected in this group are exposed to a message saying that the level of inequality in the hypothetical society is the result of luck. These two treatments are designed to analyze if individual preferences are consistent with a meritocratic view (Roemer and Trannoy, 2016; Ramos and Van de gaer, 2016). The fourth group is the *mobility-message* group. In this treatment we do not include any reference to effort or luck, but we explicitly mention that the hypothetical grandchild has the possibility of moving upwards or downwards. Related to this treatment, there are two competing channels. On the one hand, income mobility creates a better environment for equality of opportunity and

may reduce inequality aversion (Jäntti and Jenkins, 2015; Amiel and Cowell, 1999). On the other hand, higher income mobility could lead to greater inequality aversion due to risk aversion (Harsanyi, 1955). We ask all participants to repeat the task in three different scenarios that change the position of the grandchild in the income distribution: at the mean, at the minimum and at the maximum. With these variations we are able to test if inequality aversion depends on the relative level of deprivation. This allows us to explore if the effects of information treatments are sensitive to the position in the distribution.[1]

We document four main findings. First, most individuals in our sample made choices consistent with the presence of inequality-averse preferences. This is remarkable considering that experiments with students usually provide a lower bound for prosocial behavior (Cappelen et al., 2015; Henrich et al., 2010; Fehr et al., 2006). Our preferred estimation of the inequality aversion parameter for the baseline control group is 0.214. This means that on average individuals are willing to sacrifice 2% of their income to reduce inequality in society by 10%, holding the level of utility constant. This magnitude falls within the range of previous estimates (Carlsson et al., 2005; Amiel and Cowell, 1999). Importantly, our measure of inequality aversion correlates in the expected direction with self-reported views about the consequences of inequality, redistributive policies, and the role of government. Second, we find that inequality aversion is sensitive to the individual's position in the income distribution. As to the roots of income inequality, we find that inequality aversion is very sensitive to the notion of fairness. In particular, we find a strong difference when we compare *effort-message* and *luck-message* groups. Our results suggest that inequality aversion is much larger when inequality comes from luck. This meritocratic view dominates regardless of individuals' position. Finally, the effect of *mobility-message* treatment is very sensitive to the individual's position. Risk aversion dominates preferences for social mobility when participants are located in the upper tail of the income distribution. However, when the individuals are located at the bottom end of the distribution, where risk considerations play no role, the prospect of social mobility reduces inequality aversion.

Our paper contributes to three strands of literature. First, It contributes to the literature on social preferences (Clark and D'Ambrosio, 2015; Charness and Rabin, 2002; Fehr and Schmidt, 2001). We depart from existing studies in two distinct ways. First, it is common to estimate inequality aversion using games in which the relevant society is formed only by a limited number of participants. This creates a less anonymous environment in which others' income are more salient than in a scenario in which participants think of inequality in a more general way. This marks a distinction between inequality aversion and other social preferences such as envy or altruism that are more likely to arise when you can "put a face" on others. Second, the few papers that analyze inequality at a more general level do not use experimental strategies and

[1] A pre-analysis plan is available on the AEA RCT registry. It is worth noting here that the *position-treatment* is at the individual level, while the previous information treatments are between groups.

instead estimate inequality aversion from regressions that use subjective variables and self-reported beliefs, such as Kroll and Davidovitz (2003); Schwarze and Härpfer (2007); Brennan et al. (2008). In this paper we address these two issues by combining the best of both worlds. On the one hand, we use an experimental design in which the inequality aversion parameter is derived from actual choices and not from self-reported beliefs. On the other hand, our experimental survey establishes social choice conditions that are general and anonymous and proposes a clear trade-off between individual outcomes and income inequality for a general representation of a society. This allows for a more direct interpretation of our results as inequality aversion.

Second, we provide new evidence about the micro-foundations of inequality aversion based on an online experimental survey (Pirttilä and Uusitalo, 2010; Carlsson et al., 2005; Amiel and Cowell, 1999; Amiel and Dardanoni, 2015). We use a unified experimental approach to elicit inequality aversion and implement random information treatments to test for various long-standing hypotheses about why people believe that inequality is a "good" or a "bad." One important driver of inequality aversion is associated with the notion of fairness, i.e. whether inequality is the result of effort or luck (Alesina and Giuliano, 2011). Recent papers studying fairness motives rely on field experiments or surveys of representative samples (Cappelen et al., 2019; Almås et al., 2020; Karadja et al., 2015; Fong, 2001; Alesina et al., 2018). However, they usually analyze preferences for redistribution (or other self-reported measures of attitudes to inequality) rather than an experimentally-elicited inequality aversion parameter. Our paper provides original evidence about how much individuals change their distaste for inequality when faced with two alternative scenarios regarding the sources of inequality: luck vs. effort. Moreover, we also show that the meritocratic view holds regardless of individuals' position in the income distribution.

A second driver is the individual's position in the income distribution. Previous research suggests different foundations for this mechanism: self-centered interest, such as envy, pride or altruism (Clark and D'Ambrosio, 2015; Charness and Rabin, 2002); risk perceptions of inequality Cowell and Schokkaert (2001); reference points (Thaler, 2016; Charité and Kuziemko, 2015; Kuziemko et al., 2014; Carlsson et al., 2007, 2009) and positional concerns Heffetz and Frank (2011). However, previous studies that measure inequality aversion parameter based on experimental surveys assume that it is insensitive to individuals' position. We contribute to this literature by demonstrating that the inequality aversion parameter is very sensitive to one's standing in the distribution. A third important driver of inequality aversion is risk aversion. For instance, Carlsson et al. (2005) and Johansson-Stenman et al. (2002a) find evidence confirming that individual's aversion to inequality or higher risk aversion can increase their willingness to pay to live in a more equal society. Kroll and Davidovitz (2003) implement a lab experiment in which they separated inequality and risk aversion, confirming the relevance of this distinction. Ferrer-i Carbonell and Ramos

(2010) find that inequality aversion is larger in individuals that report to be more risk averse. In addition, Amiel and Dardanoni (2015) find that a weak equality-mobility trade-off arises when inequality is required for greater mobility. In their study, respondents value both mobility and equality positively, but equality appears to be their main welfare objective. These papers explore the role of either of these channels -risk aversion or mobility- in inequality aversion but they do not consider the potential trade-off between them, when taken together. By varying individual's position in the income distribution, our paper provides novel evidence about the inequality aversion response when preferences for income mobility compete with risk considerations. We find that the effect of preferences for mobility on inequality aversion dominates when participants are at the bottom, while the risk aversion effect dominates when they are at the top.

Finally, this paper also contributes to the discussion on the appropriate methods to measure distributional preferences and study their malleability in large samples. Our online experimental survey has proved to be a very flexible tool to elicit the parameter of interest on a large sample of individuals, test its sensitivity to alternative assumptions about the utility function and information treatments and implement a wide range of attention and comprehension checks. We also show that the online nature of the experiment does not introduce significant biases, as our main findings were replicated for a sample of students in a conventional in-site classroom experiment.

The rest of the paper is organized as follows, section 2 presents a brief summary of the theoretical mechanisms that could explain individual inequality aversion. Section 3 explains the main details of our experimental design. Section 4 discusses how the experiment was implemented and the type of information collected in the survey questionnaire. Section 5 describes the econometric specifications used to test our hypotheses and, most importantly, reports the main results from our experiment. Section 6 discusses the validity of our results and presents a battery of robustness checks. In Section 7 we analyze if our estimates are correlated with a wide set of variables associated with preferences for equality and redistribution. Finally, Section 8 offers conclusions.

2 Foundations of Inequality Aversion: an organizing framework

The existence of inequality-averse preferences is consistent with several theoretical explanations, which makes difficult to identify (and to interpret) the roots of inequality aversion. It is helpful to keep in mind four general arguments that explain individual attitudes regarding societal income distribution. The first argument is "disinterested evaluation of inequality," which is related to a normative foundation. Disinterested evaluation of inequality suggests that the degree of global equity in a society has intrinsic value and the valuation of inequality depends on whether the resulting distribution is ethically justifiable. A second

argument is "self-interested inequality aversion." In this case, individuals care about relative income: that is, individuals' attitudes towards inequality depends on their position in the income distribution. The third and fourth foundations of inequality aversion are more instrumental. The third centers on the idea that a greater dispersion is associated with greater risks (Harsanyi, 1955; Jäntti and Jenkins, 2015) Finally, a fourth foundation states that a greater equality produces positive externalities (related with the level of accumulation of human capital, the quality of the institutions and the presence of criminal behavior). But if equality induces a reduction in the individual's effort, inequality could produce a positive externality. Depending on the magnitude of this effect, people may value inequality as a good because it is useful in order to increase social efficiency (Alesina and Giuliano, 2011). To estimate the inequality aversion parameter we use a modified version of the model in Carlsson et al. (2005). In the basic model, individual i derives utility both from her own income and the level of income inequality of the society in which she lives. The general formulation of this utility function is as follows:

$$u_{i,j} = h(x_i \Phi_j^{-\gamma}) \tag{1}$$

where h is any monotonically increasing transformation, x_i is the level of income corresponding to individual i, Φ_j is a measure of income inequality for society j and γ is a parameter of individual inequality aversion. Under this specification, γ can be interpreted as a constant inequality elasticity and represents the percentage increase in income required to hold the level of utility constant when inequality increases by 1%. In the extreme case in which $\gamma = 0$, individuals do not care about inequality at all. When $\gamma < 0$, individuals are in favor of inequality, i.e. inequality increases the individual's utility. When $\gamma > 0$, individuals are said to be inequality averse; they dislike inequality.

If we assume that $h(.)$ is the identity function and use an indifference condition modeled after Carlsson et al. (2005), we derive the critical value of γ that makes an individual indifferent between two societies A and B:

$$\gamma_{A,B} = \frac{ln(x_{i,A}/x_{i,B})}{ln(\Phi_A/\Phi_B)} \tag{2}$$

Equation (2) shows the trade-off between individual income and the overall level of inequality. This means that an increase in inequality may be compensated by some additional income, such that the overall level of utility remains constant. The degree of substitution between income and inequality is given by γ.

The way in which the level of inequality of a society j enters the utility function of individual i in Carlsson et al. (2005) has three underlying assumptions. First, the only thing that matters for individual utility is the level of global inequality, not the reasons for it. Second, inequality will affect each individual

in the same way, i.e. inequality aversion is homogeneous across individuals. Third, it does not address the comparative notion of inequality aversion. Although convenient, these assumptions are restrictive and may oversimplify the relationship between inequality and individual well-being. In this paper we go one step further and we test three additional mechanisms that may affect how inequality affects individual well-being. First, we investigate the role of fairness. In particular, we analyze if individuals have a different perception of inequality when it is the result from effort as opposed to luck. Second, we analyze if an individual's prospects of mobility along the income distribution affects their perception of inequality. Third, we test whether inequality aversion is heterogeneous according to one's position in the income distribution. Fourth, we explore whether the effect of fairness and prospects of mobility on inequality aversion depends on one's position in the income distribution. Finally, we incorporate a more flexible model than the one described by equation (1) to address the relevance of the comparative notion of inequality aversion.

Next, we describe with more detail the theoretical foundations for each of this mechanisms.

Fairness

The distinction between morally acceptable and unacceptable income inequality is one of the main contribution of philosophical egalitarianism (Rawls, 1971; Roemer and Trannoy, 2016). These ideas were modeled at the micro-economic level by Alesina and Giuliano (2011), who suggest that individuals care not only about the overall level of income inequality but also about its composition in terms of fair and unfair inequality. In particular, they assume that preferences are mediated by a sense of fairness and that individuals might be affected differently when inequality comes from "luck" rather than as a result of "effort." These "different" inequalities are anchored on two fundamental principles of equality of opportunity: compensation and reward (Roemer and Trannoy, 2016; Ramos and Van de gaer, 2016). The principle of compensation proposes that inequality that arises from circumstances beyond individual control is ethically unjustifiable. The principle of reward argues that inequality could be ethically legitimate when it comes from differences in effort.

The utility function suggested by Alesina and Giuliano (2011) recognizes that inequality aversion may differ between individuals. They assume that the costs of inequality are mediated by a sense of fairness and that individuals dislike deviations from their ideal or desired levels of income inequality (unobservable). Additionally, overall income inequality stems from two elements: income inequality generated by individual effort and inequality determined by differences in circumstances. Depending on their perception of what is just, people might tolerate higher levels of inequality when differences in income arise from effort rather than luck. In terms of the utility function described by equation (1), the Alesina and Guliano model suggests two

sources of heterogeneity in the inequality aversion parameter across individuals: a) individuals may differ in their perception of an ideal society (Φ_i^{ideal}); b) individuals might put different weights on deviations from desired levels according the origin of inequality $\gamma_i^{effort} \neq \gamma_i^{luck}$.

Despite the differences in the formalization of the idea, the mechanism is essentially the same: individuals may be affected differently depending on the source of income inequality [2] In our case we could write:

$$\gamma_{ij} = g(e_j) \text{ where } e_j = \frac{\Phi_{ij}^l}{\Phi_{ij}^e} \tag{3}$$

where g is any increasing function, Φ_j^e is the observed level of inequality in society j that comes from effort, while Φ_j^l is the observed level of inequality in society j that comes from luck. Note that the fact that g is an increasing function of e_j is derived directly from the principles of compensation and reward: an increase in the ratio $\frac{\Phi_{ij}^l}{\Phi_{ij}^e}$ reduces the tolerance for inequality in society j.

Mobility

Individuals' willingness to accept income inequality may also be affected by the degree of mobility in the income distribution. In this case, the relationship between mobility and inequality aversion is associated with two competing channels. The first mechanism implies a negative relation between income mobility and inequality aversion. The key idea is that income inequality may be perceived as a less serious problem since societies where there is a greater chance of moving through the income distribution tend to be more egalitarian in the long-run (Shorrocks, 1978; Jäntti and Jenkins, 2015). This could help reduce inequality aversion in the short-run because it is more likely to be corrected in the future. Moreover, since income mobility could also be related to the notion of equality of opportunity (Jäntti and Jenkins, 2015; Amiel and Dardanoni, 2015), if people consider income mobility as compensating at least partially the existing levels of income inequality, more opportunities for social mobility would imply less inequality aversion.

However, when individuals can move along the income distribution, income dispersion also represents the range of incomes that an individual could potentially achieve. This includes movements towards the upper tail of income distribution but also towards the bottom. In other words, the chance of mobility incorporates uncertainty. In this case, individuals might be willing to sacrifice part of their expected income in order to reduce uncertainty, given by the dispersion of the income distribution (Harsanyi, 1955). Hence, a less dispersed - more equal - income distribution reduces the risk of ending up in a low position in the income distribution. The key point here is that under the classic assumption of concave utility functions,

[2] It is worth noting that Alesina and Giuliano introduce deviations from the optimal level of inequality by source directly in the utility function, while we include them as an argument of the inequality aversion parameter.

potential losses have a larger effect on the level of utility than potential gains of the same magnitude. Hence, if individuals are risk averse, mobility increases inequality aversion.

Since these two potential mechanisms go in opposite directions, the theoretical prediction about the effect of mobility on inequality aversion is ambiguous; it is an empirical matter. To account for income mobility, we augment our expression in equation (3) for γ_j as follows:

$$\gamma_j = g(e_j, m_j) \tag{4}$$

where m_j represents the degree of mobility in the income distribution for society j. Higher m_j reflects that the individuals perceive higher chances of moving along the income distribution in society j. It is worth noting that in this case, the overall effect of m_j over γ depends on the magnitude of the two competing channels.

Position

Finally, inequality aversion may also vary according to the position of the individual in the income distribution. An initial argument that supports this hypothesis is that individuals may have preferences for a relative position in the income distribution Heffetz and Frank (2011); Alpizar et al. (2001). The individual's degree of positionality in regards to relative income may change the marginal utility of absolute income when the individual's ranking changes, which in turn affects the trade-off between income and income inequality. As the probability of falling to the bottom of the income distribution decreases with income, anxiety about relative position would be less of a concern for middle- and upper-class individuals. In this sense, a last-place aversion effect leads to a situation in which positional concern could be most acute at the bottom of the distribution, and thus that utility may be convex with respect to relative position(Kuziemko et al., 2014).[3]

An even more general aspect is that people may have different notions about what is meant by inequality, which would have very relevant implications for measuring inequality aversion and understanding its foundations. For instance, previous studies confirm the relevance of a self-centered notion of inequality aversion. In this case, an individual's willingness to pay to reduce self-centered inequality is based on their situation relative to others (Fehr and Schmidt (1999, 2001); Bolton and Ockenfels (2000) As a result, an individual's position in the income distribution matters, when self-centered and non-self-centered inequality aversion are considered.

[3]The position in the income distribution could be also relevant when it affects the expected returns of the redistribution (Benabou and Ok, 2001; Piketty, 1995; Hirschman and Rothschild, 1973). However, our experimental design establishes a set of choices in a static world where this type of dynamic effect should not be at work.

Since these potential mechanisms could go in opposing directions, the theoretical prediction about the effect of position on inequality aversion is ambiguous and empirical. Therefore, we could postulate a hypothesis that inequality aversion is a normal good (inferior): i.e. inequality aversion increases (decreases) with income and persons in the upper end of the spectrum are more likely to have a higher degree of inequality aversion. Equation (4) can be augmented now as:

$$\gamma_{i,j} = g(e_j, m_j, p_{ij}) \tag{5}$$

Note that under this specification γ may vary not only between societies but also between individuals in the same society (if their position changes).

Comparative and normative approach

Assuming that the inequality aversion parameter depends on the position of the individual in the income distribution implies a comparative (self-centered) notion of inequality aversion. However, based on equations (1) and (2), we mainly focus on a type of non-self-centered inequality aversion. In order to discuss the implications of this alternative comparative approach, and inspired in the inequality aversion model proposed by (Fehr and Schmidt (1999), we parametrize the self-centered notion of inequality aversion. In this case, individual's utility function depends on the difference between an individual's i income and the income of all other individuals in society j. It also introduces different weights depending on the sign of the difference. This allows us to isolate the role of the position and to focus on non-self-centered inequality aversion. We rewrite (1) and consider a self-centered inequality notion as:

$$U_{ij}(x_{ij}, \Phi_j, \hat{\gamma}_{ij}, \hat{\beta}_{ij}, \hat{\alpha}_{ij}) = (x_{ij})[RD]^{-\hat{\alpha}}[RA]^{-\hat{\beta}}(\Phi_j)^{-\hat{\gamma}} \tag{6}$$

where

$$\text{RD}=\begin{cases} \left[\frac{\int_{x_{ij}}^{x_{jmax}}(x-x_{ji})f(x_j))dx}{x_{ij}}\right] & if \quad x_{ij} < x_{jmax} \\ 1 & if \quad x_{ij} = x_{jmax} \end{cases}$$

$$RA = \begin{cases} \left[\frac{\int_{x_{jmin}}^{x_{ij}}(x_{ij}-x)f(x_j)dx}{x_{ij}}\right] & if \quad x_{ij} > x_{jmin} \\ 1 & if \quad x_{ij} = x_{jmin} \end{cases}$$

where $f(x_j)$ represents the density function of income in society j, $x_{j,max}$ and $x_{j,min}$ represent its maximum and minimum income levels; RA and RD stand for relative affluence and relative deprivation, respectively.

From equation (6), the condition of indifference for individual i between two alternative societies A and B can be written as:

$$\gamma_{i,A,B}^{non-self-centered} = \frac{\ln(\frac{x_{i,A}}{x_{i,B}}) - (\alpha+\beta)\Big[\ln(\frac{x_{max,B}-x_{i,B}}{x_{i,B}} / \frac{x_{max,A}-x_{i,A}}{x_{i,A}})\Big]}{\Phi_B/\Phi_A} \tag{7}$$

Because (6) is assumed, the individual's utility function incorporates the aggregated distance between the individual and the income of others separately.[4]. Note that α represents the weight applied to the average differences of income with those who are above individual i in the income distribution (RA), while β represents the weight applied to the differences of i with those who are below (RD). We can observe that when equations 1 and 2 assume that α and β are zero, then the individual's inequality aversion parameter varies according to its position in the income distribution. This reaffirms that inequality aversion depends on one's position. Too, this relationship seems to contradict a non-self-centered aversion notion. We discuss the role of assuming $\alpha = 0$ and $\beta = 0$ and propose an alternative estimation using a non-self-centered version of γ in Section 6.

3 Experimental Design

In order to estimate the magnitude of inequality aversion and its foundations, we implemented an experimental survey on undergraduate students of the largest public university in Uruguay: "*Universidad de la Republica*."The survey was implemented using an on-line survey platform, targeting the universe of first year economcis and business students enrolled at the major university in Uruguay. Invitations were sent by email, participation was voluntary and there was no economic incentive to answer the survey. The invitation emails contained information about the institutional affiliation of the researchers.[5] We explicitly mention that the information is confidential and will be used for academic purposes only. We also mention the approximated duration of the survey, which is about 10-15 minutes. Finally, we asked participants if they were willing to participate in the experiment.

To estimate γ we use a survey design based on Amiel and Cowell (1992) and Carlsson et al. (2005). To analyze the role of the mechanisms described in section 2, we introduce four original information treatments. The experimental survey also includes attention and comprehension checks, a set of questions about individuals' backgrounds and socio-economic status and a final module that collects information on individual

[4] Fehr and Schmidt (1999) considers the distribution of payoffs between two players in the experimental game. Following Hopkins (2008) we use a utility function that considers multiple individuals

[5] In Online Annex C.1, we include the translated introductory message to the survey. The message includes the logos of the University and the Economics Department.

attitudes and preferences, political beliefs and preferences for redistribution.

3.1 Eliciting Inequality Aversion

Our first goal is to reveal individual willingness to pay to reduce inequality and to derive the implicit value of γ. Since utility is defined as a function of income and inequality, we need to define a measure for inequality. To make our results comparable with the existing literature, we use the coefficient of variation: $\Phi_j = \frac{\sigma}{\bar{x}}$. [6]

In this experimental design, participants face pair-wise choices between hypothetical societies. The hypothetical societies are characterized by two dimensions that correspond to the arguments of the utility function in equation (1): income ($x_{i,j}$) and income inequality (Φ_j). To make the information easier to understand we describe each society by using figures that represent the characteristics of each society, we represent the income distribution using an image of a building. Figure A.1 depicts the image showed to the respondents. Each building has ten floors. The ten floors represent the deciles of the income distribution. Inside each floor, we include a different number of coins that represent the amount of income appropriated by the decile. Each building also indicates the mean, minimum and maximum incomes in that particular society. A message with detailed instructions indicates how to interpret the images. Instructions note that there are "no right answers," thus allowing us to measure individual attitudes (Amiel and Cowell, 1992).

Instead of asking individuals to choose directly which society they prefer, we ask them to choose which society they would choose for their hypothetical grandchild, sixty years from now (Carlsson et al., 2005, 2007). This is a common practice in the literature (Johansson-Stenman et al., 2002b). The idea behind this formulation is to abstract participants from their own personal circumstances or their own environment at the time of making decisions Amiel and Cowell (1992); Johansson-Stenman et al. (2002b). As participants are not old enough to have grandchildren of their own at the time of the survey, a necessary assumption is that participants use their own preferences when deciding which society they would choose for their grandchildren. Moreover, we also need to assume that individuals internalize that the society is completely hypothetical and has nothing to do with the society in which they actually live.

An additional methodological concern is that the respondents might provide strategic responses [7] Beshears et al. (2008) argue that real behavior can also be driven by signalling motives, so this result is not an un-

[6] The reasons usually mentioned for using this index as a measure of inequality are 1) symmetry, 2) scale-invariance and 3) it satisfies the principle of transfers (Lambert, 1992). Note that our design allows us to use the percentile ratio (p90/p10) as a measure of income inequality. Our results do not change qualitatively if we use that strategy.

[7] This could be motivated by 'moral satisfaction' ((Kahneman and Knetsch, 1992)), the desire to make a good impression on the experimenter (Rust, 2012))), or to reinforce certain characteristic of their identity, a 'self-image motive' ((Akerlof and Kranton, 2000)).

expected consequence. However, to mitigate the effect of that behavior we use the hypothetical society in which the grandchild lives, thus, making the questions unrelated to the Uruguayan context. Furthermore, as the survey is on-line and anonymous, there is no interaction with an interviewer. [8].

The instructions explicitly mention that in the hypothetical societies all individuals can cover their basic needs. This aims to rule out poverty aversion or lexicographic strategies. Participants were also told that in the hypothetical societies there is no welfare state and that choices are static. Finally, we mention that all societies had the same availability of goods and services as well as the same prices and quality. The transcribed instructions can be found in Figure C.2 in Online Annex C.1.

We define a baseline society A and nine alternative societies B_z. Table A.1 describes each of the societies in terms of their minimum, average and maximum income as well as the coefficient of variation. Society A is characterized by a mean income of \$30,000 and a coefficient of variation of 0.385. Each one of the type B societies had a coefficient of variation of 0.1925, which is exactly half of the coefficient reported for society A. The only difference among type B societies is the income that an individual would receive in case of choosing B_z over A. By changing income and holding constant the coefficient of variation, we can estimate bounds for the inequality aversion parameter for each respondent.

The following example illustrates how we identify the lower and upper bounds for γ. Individuals have to choose nine times between pairs of societies: A or B_z $\forall z \in \{1, ..., 9\}$. Let a set of choices be for instance $\{B_1, B_2, B_3, A, A, A, A, A, A\}$. This implies that $B_3 \succeq A$ and $A \succeq B_z$ $\forall z > 3$. From the preference relation $B_3 \succeq A$ and the indifference condition in equation (2), we know that: $\gamma \geq 0.05$. [9] Analogously, by $A \succeq B_z$ and equation (2) we know that $\gamma \leq 0.09$. The intervals for γ associated with each possible (and consistent) set of choices is reported in Table A.1, column (6) . It is worth noting that if individual i chooses A over B_1, she is choosing to resign part of her income to live in a more unequal society. We call this type of individuals "inequality lovers." In any other case, individuals can be defined as inequality-neutral or inequality averse.

Finally, it bears mentioning that each participant is told what her grandchild's level of income and income distribution position would be for each of the two societies in the pair[10]. This is depicted in Figure A.1 by the red square that is drawn in between the buildings representing societies A and B. As we explain

[8] As a robustness check, we replicate the experiment with students in a standard in-site classroom setting. We did not find a significant difference between the online and in-site version of the experiment.

[9] From equation (2), the value of γ that makes an individual indifferent between society A and society B is $\gamma_{A,B} = \frac{ln(x_{i,a}/x_{i,B})}{ln(\Phi_a/\Phi_b)}$. By substituting the values of the example for societies A and B_3 and using the preference relation derived from the set of choices: $\gamma_{A,B} \geq \frac{ln(30000/28950)}{ln(0.385/0.1925)} = 0.05$

[10] Instructions explicitly rules out dynamic effects as there is no uncertainty regarding individuals' future income. We introduce uncertainty in a separate treatment (mobility treatment)

in Section 3.2, each individual chooses between A and B_z in three different positions; the first choice is made at the mean. This means that individuals are told both that they are going to be at the mean of the income distribution and also the total amount of money that they would earn with certainty. All the examples presented thus far are based on an individual making a choice at the mean of the income distribution.

3.2 Information Treatments

The study is also aimed at understanding the foundations of inequality aversion. Apart from uncovering the inequality aversion parameter, we assess the role of effort, luck, mobility and position in determining how inequality averse individuals are. In order to answer this question, we introduce four information treatments that allow us to go one step beyond the simple estimation of the inequality aversion parameter.

Baseline group

The first group of participants is the *control* group; it represents the baseline comparison group for most of our analysis. This group only receives the information described in Section 3.1. A sample of the message is provided in Figure C.2 in Online Annex C.1. All individuals (both in treatment and control groups) receive this baseline message as the second screen of the survey. The control group does not receive any information about the roots of inequality and the role of mobility. These participants make decisions based on their own beliefs about inequality and a just world. The difference between treatment and control groups are thus additional pieces of information, which are detailed in the next section.

Effort and Luck Treatments

For the second and third groups we include an additional piece of information regarding the sources of inequality. These two treatments - *effort-message* and *luck-message* - are based on the idea that inequality aversion is sensitive to a notion of fairness. This message is shown to the participants immediately after the baseline instructions and just before the first pair-wise choice between A and B_1. We should recall that, together with these instructions, participants are shown an image of a building with ten floors; the building's multiple levels represent deciles of the income distribution; they are shown which floor their grandchild lives on as a representation of a specific location in that distribution. The *effort-* and *luck-* messages are as follows:

> ***Effort-message:***
>
> "*Next, we report some relevant information about each pair of the hypothetical societies. Please remember that both societies are identical, except for their income distribution (how income is*

*distributed between floors) and in your grandchild's income. In this case, your grandchild's income is exactly the same as the average income. This means that your grandchild will be in the middle of the building.**Important**: Your grandchild's income and his/her place in the society corresponds to his/her lifelong effort relative to the others.* "

Luck-message:

"*Next, we report some relevant information about each pair of the hypothetical societies. Please remember that both are identical, except for their income distribution (how income is distributed between floors) and in your grandchild's income. In this case, your grandchild's income is exactly the same as the average income. This means that your grandchild will be in the middle of the building.**Important**: Your grandchild's income and his/her place in the society is not related to your grandchild's individual merits but is the result of luck.* "

The goal of these treatments is to introduce differences in the source of inequality in order to test how inequality aversion and fairness relate to each other.[11] Our leading hypothesis for these two treatment arms is:

$$\gamma^e \leq \gamma^c \leq \gamma^l \tag{H1}$$

where γ^e, γ^c and γ^l represent the value of the inequality aversion parameter estimated for the *effort-message*, *control* and *luck-message* groups respectively. This hypothesis reflects both compensation and reward principles that motivate fairness reasoning and suggest that individuals are more likely to accept inequality when it comes from differential effort while they are more reluctant when it comes from circumstances that are beyond individual control.

Mobility Treatment

A fourth group receives the baseline instructions and an additional message regarding the chances of mobility in that specific society. We call this group the *mobility-message* group. The idea of this treatment is to focus on the role of mobility in determining inequality aversion. This treatment arm is based on the idea that individuals can be more or less reluctant to accept inequality if there are chances of social mobility, as discussed in section 2. The *mobility-message* is as follows:

[11] It is also worth noting that for a sub-sample of students we also performed the fairness treatment scenarios sequentially for the same individual as a robustness check. In this case, the same students make three series of choices, first without additional information (control) and then they received the two fairness informational treatment in random order. The details of this strategy are described in Section 6.1.

Mobility Message:

"*Next, we report some relevant information about each pair of the hypothetical societies. Please remember that both are identical, except for their income distribution (how income is distributed between floors) and in your grandchild's income.* ***Important****: in both societies there exists social mobility. This means that there is a chance for your grandchild to move up (higher level of income) or down (lower level of income)* "

By explicitly mentioning the chances of moving upwards or downward in the income distribution we seek to analyze if individuals actually change their degree of inequality aversion compared to the *control* group. In this case, we do not have a unique hypothesis for the effect of this treatment because there are two competing channels. The chance of mobility creates uncertainty; one's attitude toward risk might affect one's decisions. While risk aversion implies a re-enforcing relationship between mobility and inequality aversion, mobility also creates the possibility of a more equal society in the long run and this has the opposite effect on inequality aversion. We will call this second mechanism "preferences for mobility" since it reflects a negative relationship between mobility and inequality aversion. There are two alternative hypotheses depending on the relative importance of each of the channels:

$$\gamma^m \geq \gamma^c \textit{ if risk aversion dominates} \tag{H2.A}$$

$$\gamma^m \leq \gamma^c \textit{ if preferences for mobility dominates} \tag{H2.B}$$

where γ^m is the inequality aversion parameter estimated on the *mobility* group.

Position Treatment

Regardless of whether an individual is part of the *effort, luck, mobility* or *control* groups, we replicate the experiment under three alternative scenarios. The three scenarios are: 1) grandchild is at the mean of the income distribution, 2) grandchild is at the bottom of the income distribution and 3) grandchild is at the top of the income distribution. Note that unlike the previous treatment arms that are designed to compare only treatment and control groups, in this case, since all individuals are exposed to the three scenarios, we also can compare the effect of position by treatment arm.

The aim of the *position* treatment is to test whether individuals' inequality aversion changes with their position in the income distribution. Intuitively, because in all scenarios the individual expected income gains and the chance of a reduction of income inequality is relatively low in all scenarios, we expect that an individual's willingness to pay to reduce inequality is higher when their income is relatively low. The leading hypothesis is therefore:

$$\gamma_{min} \leq \gamma_{mean} \leq \gamma_{max} \tag{H3}$$

where $\gamma_{min}, \gamma_{mean}$ and γ_{max} are the inequality aversion parameters estimated at the bottom at the mean, and at the top of the distribution, respectively.

Tables A.2 and A.3 report the parameters (income, coefficient of variation and implied γ) used for the new scenarios (choice at the minimum and at the maximum). Note that in order to preserve the same range for γ, the alternative levels of income reported for societies B_z are different between the three treatment arms. In Panels a. and b. in Figure A.1 we can find an sample drawing that participants saw for the two new scenarios.

Table 1: Summary: Treatments and strategy of identification

	Participants choice at			
	Minimum	Mean	Maximum	Identification
Baseline (Control)	γ^c_{min}	γ^c_{mean}	γ^c_{max}	
Effort treatment	γ^e_{min}	γ^e_{mean}	γ^e_{max}	Effect of position
Luck treatment	γ^l_{min}	γ^l_{mean}	γ^l_{max}	within individuals
Mobility treatment	γ^m_{min}	γ^m_{mean}	γ^m_{max}	
Identification	Effect between groups			

Note: The elicitation of γ^z_x is based on equation 2.

Table 1 summarizes all information treatments. First, our experimental design permits us to estimate the inequality aversion parameter for an individual's willingness to pay for lower income inequality based on their prior beliefs (baseline). Second, to analyze whether inequality aversion is related to the individual's notion of fairness we distinguish between two different scenarios where inequality is caused either by luck or effort. Third, we explore the role of income mobility in terms of its interaction with income inequality aversion: because the baseline and the three treatment arms have identical income distributions we isolate the potential channel of efficiency. Fourth, it also allows us to explore whether inequality aversion is related to individuals' position in the income distribution (comparison between columns of Table 1). Finally, it is possible to explore whether the effect of fairness and mobility treatments are sensitive to the individual's position (comparison between columns and rows of Table 1).

3.3 Econometric Specification

Our baseline specification captures the effect of each message on our outcome of interest: inequality aversion. This specification allows us to test hypotheses H1 (effort and luck) and H2 (mobility) and it essentially estimates the effect of each treatment as compared to the control group. Since the only difference between treatment and control groups is the additional message read by the treatment group, our results can be interpreted as the effect of the additional message on inequality aversion.

Consider the sample of individuals assigned to the *control* group or one of the treatment groups, indexed by j: *luck, effort* or *mobility*. The main specification is given by the following regression:

$$\gamma_i = \alpha + \beta D_i^j + X_i\delta + \varepsilon_i \tag{8}$$

The outcome variable (γ_i) represents the inequality aversion parameter recovered from the set of choices of societies A and B_z made by the individuals. D_i^j is a dummy variable indicating if individual i was assigned to treatment$j$. Finally, X_i is a set of controls used to increase the precision of our estimates.

In this regression, β is the coefficient of interest. It represents the effect of the message associated with treatment j on inequality aversion. In the case of the *effort-message* group, β can be interpreted as the effect of knowing that inequality is mostly associated with a differential lifelong effort. Analogously, β for the *luck-message* group reflects the effect of being aware that inequality is the result of idiosyncratic shocks rather than associated with individual merits. In both cases, the comparison is against a baseline scenario where participants only received a common set of instructions. Finally, β associated with the *mobility-message* group can be interpreted as the effect of allowing income mobility as compared to an alternative scenario in which the position in the income distribution is known with certainty.

Unlike H1 and H2, our test for H3 (position) does not consist of comparing treatment and control groups. In this case, since all individuals make the same set of choices, we simply compare them at different positions. For this treatment arm, j indexes choices at the minimum, mean and maximum. The regression specification is as follows:

$$\gamma_i = \alpha + \beta P_i^j + \lambda I_j + X_i\delta + \varepsilon_i \tag{9}$$

As in equation (8) the outcome variable (γ_i) represents the inequality aversion parameter recovered from the set of choices of societies A and B_z made by the individuals. P_i^j is a dummy variable indicating if the choice of individual i was was made at the mean, minimum or maximum. In this case, we also introduce treatment fixed effects in order to account for the differences that may be induced by *effort, luck* and *mobility* treatment arms. Finally, X_i is a set of controls used to increase the precision of our estimates.

For the analysis of the effect of position on (γ), our baseline estimate consists of comparing choices at the minimum or maximum versus choice at the mean. β is the coefficient of interest; it can be interpreted as the difference in the inequality aversion parameter induced by a change in position (either to the minimum or maximum) as compared to inequality aversion when individuals choose at the mean. As a complementary strategy, we also report the estimates of directly comparing choices at the maximum versus at the minimum.

Since our empirical strategy only allows us to recover a range for the implied γ, our outcome variable cannot be treated as a continuous variable and a regression analysis requires making further assumptions about its distribution within each interval. Our preferred model estimates equations (8) and (9) with interval regressions. The assumption in these models is that γ is distributed normally within each interval and these regressions are estimated using maximum likelihood. We also present two alternative specifications. First, we report the results of an OLS regression. By using an OLS, we are assuming that γ is uniformly distributed within each interval instead of normally as with the interval regressions. [12]. However, OLS estimates may be failing to capture the real treatment effect since the extreme intervals are of infinite length. Hence, we also estimate the treatment effects using quintile regressions at the 50th percentile. This specification estimates the effect of the treatment on the median of the γ distribution instead of the effect on the mean as interval and OLS regressions. Compared to the OLS estimate, a regression on the median has the advantage of not being affected by the specific values of γ at the extremes of the distribution.

In addition, at the beginning of each section we report graphical evidence of the estimated distribution of γ as well as a comparison of treatment and control groups. This illustrates the treatment effects on γ in a more direct way. The graphical evidence is complemented with non-parametric tests of equality of distributions.

4 Data and Implementation

4.1 Data

The survey is organized in two parts. The first part is the experimental module. It is designed to collect all the information required to estimate inequality aversion. The randomization is automatically performed by the on-line survey platform and we define a uniform probability of being selected for each of the treatment arms ($p = 0.25$).

[12] For participants who choose society A over B_1 we can only say that $-\infty < \gamma \leq -0.09$. Analogously, for participants who choose B_9 over A, $-\infty > \gamma \geq 0.78$. In order to estimate an OLS model we need to compute a mean value for these groups. For the first group we use $\gamma = 0.09$ which corresponds to the upper bound of the interval. For the second group we use the sum of the lower bound (0.78) and the length of the widest interval ($0.27 = 0.78 - 0.51$)

The second part contains a set of modules that include additional information that will be useful for the interpretation of our results and discussion. We collect data about socioeconomic and demographic characteristics and we include a set of questions regarding participants' opinions, attitudes and preferences. This information is also useful for analyzing the validity of our estimates and also helps us interpret our results. We ask about participants' characteristics as well as their household background. Regarding individual characteristics, we collect information about age, gender and working status (not working, working part-time or working full-time). Regarding household background we inquired about the number of individuals living in the household, their mother's and father's level of education and household income.

In the final module of the survey we collect information about individuals' attitudes and preferences towards inequality. We first ask if participants believe that income level and position in the income distribution is usually the result of personal effort or luck. Then, we asked if they think that income inequality is a problem in Uruguay. The options ranged from "*not an issue*" to "*a very serious issue*." We also asked participants to select their level of agreement with some statements about why inequality is good or bad. In particular, we included: 1) "*Inequality is bad when it comes from luck rather than effort*," 2) "*inequality is bad because it reduces opportunities for younger people*," 3) "*inequality is bad because it increases violence*," 4) "*inequality is bad because it reduces the quality and quantity of public goods supplied*" and 5) "*inequality is good because it increases competitiveness between individuals*." Finally, we also asked whether or to what degree they trusted the government.

4.2 Subject Pool and Randomization

We sent invitations to participate in the survey to 6082 incoming undergraduate students enrolled in the first semester of the 2018 and 2019 sessions.[13] Some students declined participate and others left the survey incomplete. These cases were discarded. The final number of completed surveys was 1576 in the main experiment.[14] Table C.1 in the Online Annex C.1 provides detailed information about the distribution process.

It is worth noting that the way in which we elicit individuals' willingness to pay to reduce inequality

[13] We also sent second semester students enrolled in 2018 and 2019 an invitation to participate in a slightly different experiment for robustness (explained later) where 343 students started the survey, with 36 rejection, which sums 275 complete answers more. Considering this participants total number of completed answers in both experiments (within and between) ascends to 1815, and audience size in total ascends to 7379.

[14] A total of 2,089 accepted the invitation to participate in the survey.[15] Since at this point students had not received any information related to the treatment, these rejections cannot be correlated with the result of the randomization. On average, students took between 25 and 30 minutes to complete the whole survey, including time dedicated to the experimental module and time dedicated to the modules that collected additional information. The sample size increases to 1815 students, when we consider the complementary sample in which individual treatment experiment was applied.

implies that, if individuals are rational, once they stop choosing B and start choosing A, they should not go back to B ever again. Hence, an additional restriction that we use to define our final sample is to eliminate the observations in which answers were inconsistent. We define an inconsistent answer in the most restrictive way: we exclude participants that make inconsistent choices in at least one of the three replications of the experiment (choices at minimum, mean and maximum).[16]

Column (1) in Table B.2 in Appendix reports the results of a regression of a dummy indicating inconsistency over all observable characteristics collected in the survey. The regression shows that most of the variables were not statistically significant. However, there was one exception. Female participants were on average about 6 p.p. more likely to be inconsistent as compared to male participants. Column (2) also includes a set of dummies for the treatment variable. Although participants assigned to the *mobility-message* treatment were equally likely to be inconsistent as compared to the control group, both *effort-message* and *luck-message* groups were more likely to be inconsistent compared to the control group (coefficients of 0.136 and 0.133 respectively and $pvalue<0.001$ in both cases). Note however, that there are no statistically significant differences when comparing *effort-message* and *luck-message* groups to each other. Finally, Column (3) reports the result of including the comprehension check and the attention questions. In both cases, the coefficient associated with each variable is not statistically different from zero.[17]

We eliminate 531 cases due to inconsistent responses. This means that after considering all filters, our final experimental sample is made up of 954 students that completed the entire survey in a consistent way. [18].

After eliminating inconsistent and incomplete answers, we test whether randomization was performed correctly. Table A.4 allows us to compare the balance in the characteristics between participants assigned to different groups. The variables included in the table correspond to the information collected in the second part of the survey. Columns (1) to (4) report the mean and standard error (in parentheses) of different variables for *control*, *effort-message*, *luck-message* and *mobility-message* groups. Column (5) reports the p-value of the test of the null hypothesis, illustrating that the average for these characteristics is the same across all groups. As expected, there is no evidence of statistically significant differences between groups for any of the variables collected in the survey.

[16] In subsection 6.1, we describe the comprehension and attention checks included as part of the survey and show that our main results are robust to alternative ways of handling inconsistent responses.

[17] To present more direct evidence, Table B.2 in the Appendix reports the distribution of the inconsistency variable by treatment arm. Furthermore, to address the potential bias associated with this problem we implemented sequential treatments of information on individuals on an alternative sub-sample of students. The analysis will be presented in subsection 6.1 in the section 6.1.

[18] More precisely, 954 students were consistent in every scenario, 401 were consistent in 2 out of 3, 106 in 1 out of 3 and 24 in none of the scenarios

4.3 Summary Statistics

The final sample can be characterized as follows. Individuals were on average 23.8 years old and mostly female (62%). The average number of people living at their household was about 3.46. As to labor market participation, half of the individuals (48%) had not worked in the last week. Of the remaining 50%, 30% were part-time workers and 20% were full-time workers.[19] Parents' education was equally distributed between those who had not completed high-school and those who had completed high-school or more. Finally, around 25% of the students lived in a household with less than USD 12,000 annual income, around 39% live in a household with earnings between USD 12,000 and USD 24,0000 and the remaining 36% live in household with more than USD 24,000 annually. As a reference, the average household income per-capita for the whole country was USD 9,200 by the end of 2018 and the minimum wage was set around 5,640 USD annually.

5 Main results

5.1 Baseline Estimate for Inequality Aversion

In this section we report the baseline estimates for the inequality aversion parameter (γ). It was elicited based on equation (1), using same assumptions as Carlsson et al. (2005) (i.e: $\Phi = \frac{\sigma}{|\bar{x}|} = \frac{\sqrt{Var(x)}}{|\bar{x}|}$ and $h(.)$ is simply the identify function). It refers to choices made by participants assigned to the control group when they are at the mean, using only consistent answers (252 cases). In every cases, the mean is calculated using the lower range value.

Figure A.2 shows the distribution of γ estimated using the control group and the choice at the mean of the income distribution. In the *x-axis* we report the implied value of γ associated with different alternative choices of A and B_z. On the *y-axis* we report the frequency of γ associated with each choice. The dashed line indicates our estimate for the median γ while the dot-dashed line represents our estimate for the mean using interval regression of γ over a constant.

The distribution of γ for the control group reveals several findings. First, most individuals are inequality averse: the inequality aversion parameter for the median individual belongs to the interval $[0.09, 0.15)$. To calculate the average inequality aversion we regress the implied γ over a constant using interval regressions. The result shows that inequality aversion is, on average, 0.214. This means that, on average, individuals should be compensated with an increase of 0.214% of their personal income in order to have the same level

[19] It is worth noting that being a full-time employee and a part-time student is not uncommon in Uruguay. Many of the classes taught in the University are between 7 and 11pm, hours when working students are able to attend class

of utility after a 1% increase in the society's income inequality.

Second, it is also worth noting that about 20% of individuals in the control group can be categorized as 'inequality lovers' as they are willing to pay a positive amount of money to live in a more unequal society. One possible reason that could explain the existence of inequality lovers is that they prefer efficiency over equally-distributed income. In this case, individuals will be willing to resign part of their income in order to live in a more wealthy society. This is in accordance with previous studies suggesting that efficiency concerns are more frequent among undergraduate Economics and Business students (Fehr et al., 2006; Engelmann and Strobel, 2004). Alternatively, individuals could be interpreting a wider income range as offering the possibility of greater income in the future, ignoring our premise of considering their grandchild's position in the income distribution as fixed. However, as we will show in section 5.3, this interpretation seems implausible since at the mean of the income distribution, individuals are, by in large, unresponsive to prospects of mobility.

Finally, about 23% of the individuals fall in the category of inequality neutral: $\gamma \in [-0.09, 0.09]$ and 15% of the individuals can be defined as extremely inequality averse. For the former, the interpretation of the result is that their overall level of utility does not change very much when inequality increases/decreases. This segment is slightly smaller than the one comprised of inequality lovers.

These results are in line with the findings in previous literature. For instance, Carlsson et al. (2005) estimate an average inequality aversion of 0.30 using an in-class experiment conducted at Karlstad University in Sweden. Amiel and Cowell (1999) found that inequality aversion ranges between 0.1 and 0.22 for a sample of students from the University of Melbourne (Australia) and Ruppin Institute (Israel). Finally, our results are also consistent with one of the treatments in Pirttilä and Uusitalo (2010) which found an inequality aversion below 0.5. It is also interesting to note that our estimates show a large fraction of extreme respondents. Specifically, the share of participants categorized as extremely inequality averse and as 'inequality lovers' are two times larger than the those found by Carlsson et al. (2005).

5.2 Treatment Effects: Effort vs. Luck

Panel a. in Figure A.3 shows the distribution of γ for the *effort-message* and control groups. Solid bars represent the frequency for each interval of γ in the control group, while unfilled bars represent the same for the treatment group. The dashed lines represent the median of each distribution. The exact p-value from the Kolmogorov Smirnov test for identity among both distributions is presented in the explanatory notes accompanying the graph. Two results displayed in the graph are worth mentioning. First, the median of the distribution of γ for the treatment group lies in $[0, 0.05)$ which is slightly smaller than the median for the

control group ($\in [0.09, 0.15)$). Second, if we compare the frequencies of both distributions we observe that while for $\gamma > 0.09$ the frequency is larger in the control group, for $\gamma < 0.09$ the opposite is true. At 10% confidence the Kolmogorov Smirnov Test of identity between both distributions is rejected.

Table A.5 reports the results of our parametric estimates.Columns (1) and (2) report the result of the OLS estimates, column (3) reports the result of a quantile regression at the median, and columns (4) and (5) report the estimates in our preferred specification based on interval regressions. Columns (1) and (4) report the results without including any control variables; columns (2) (3) and (5) report the results when including a set of control variables. The conclusions drawn from the graph also hold with the regression estimates. First, the effect of the *effort-message* is consistently negative across the different specifications, but imprecisely estimated. Second, the magnitude of the effect is similar when comparing OLS and interval regression. [20] Finally, the effects is never statistically significant, which is likely due to the imprecision of our estimates.

Overall, the effect of the *effort-message* is clear: the *effort-message* treatment shifted the distribution of γ to the left. Intuitively, when individuals receive a message suggesting that inequality is the result of individual effort, they make choices that show a smaller degree of inequality aversion.

The evidence that results from comparing *luck-message* and control groups is similar to the one that results from the *effort-message* analysis but in the opposite direction. Panel b. in Figure A.3 reports the distribution of γ for *luck-message* and control groups. In this case, the unfilled bars represent the distribution of γ for the *luck-message* group. The estimated median for treated participants lies in $[0.21, 0.34)$ which is slightly larger than the median for the control group. In this case, evidence from K-S test does not allow us to make conclusions regarding the differences between both distributions. Table A.5 reports the results of the parametric estimates. As with the *effort-message* treatment, the sign and magnitude of the effects are consistent across the different specifications used, showing a greater degree of inequality aversion when individuals receive a message, suggesting that inequality is due to luck (circumstances).

One alternative way of analyzing the role of effort and luck is to compare directly the *effort-message* and *luck-message*. Panel c. in Figure A.3 reports the γ distribution for *luck* and *effort* treatments. This representation allows for a cleaner comparison of inequality aversion between the two treatment arms. The differences here are striking: for all γ intervals until $[0.05, 0.09)$ the frequency of participants from the *effort-message* group is larger than for the *luck-message*. However for each interval whose $\gamma > 0.09$, the relation is the opposite: the frequency of each interval for the *luck-message* group is always larger than the frequency of each interval for the *effort-message* group. In this case, K-S test rejects the null hypothesis

[20] Note that magnitudes reported in column (3) are not comparable with estimates on columns (1), (2), (4) and (5) because it is an estimation of the treatment effect on the median while for the remaining columns the effect is estimated for the mean.

at 2,5% significance. Table A.5 reports the regression results. Unlike the comparisons against the control group, these differences are statistically significant in all specifications at a 1% level. The magnitude of the difference ranges between 0.14 and 0.18. The interpretation of these results is that the income required to compensate an 1% increase in the inequality level of a particular society is 0.18% when the source of inequality is luck rather than effort. The magnitude is relevant if we consider that the average elasticity ranges between 0.121 and 0.208.

Overall, our results are consistent with H1 that suggested that $\gamma^e \leq \gamma^c \leq \gamma^l$. This suggests that inequality aversion may be based on a notion of fairness and individuals penalize inequality more when it comes from circumstances that are out of their control. This is also consistent with a meritocratic view in which individuals are more likely to accept a differential reward when the root of the prize is associated with individual merits.

5.3 Treatment Effects: Mobility

Panel d. in Figure A.3 depicts the distribution of γ both for the *mobility-message* and control groups. At a first glance, the effects of the *mobility-message* do not appear to be as clear as in the case of the *effort-message* or *luck-message*. First, while the median of the control group belongs to $[0.09, 0.15)$, the median for the *mobility* treatment group is $[0.15, 0.21)$, which is the interval that immediately follows. When analyzing the frequency of each interval there seems to be a slight shift towards the right, but the evidence is mixed overall. The results from the graphical evidence are confirmed by the regression estimates. Both for OLS and interval regressions, the coefficient associated with the treatment variable is smaller than 0.02 which is less than 50% of the treatment effect associated with the *effort-message* and *luck-message* (See Table A.5).

The fact that we do not find any statistically significant effect from this treatment is in line with the theoretical predictions represented in the hypotheses H2A and H2B. Behind the effect of mobility on inequality aversion there are two competing channels that may be operating simultaneously: risk aversion and preferences for mobility. One possible interpretation for this null effect is that both effects are of the same magnitude and they cancel each other out. Alternatively, if the effect of the *mobility-message* depends on the position of the individual in the income distribution, the null effect may be hiding heterogeneous effects. We will come back to this in section 5.4 where we discuss heterogeneous treatment effects depending on position.

5.4 Treatment Effects: Position

Individuals' inequality aversion may also depend on their position in the income distribution. Since every participant in the sample chooses between alternative societies at the minimum, mean and maximum, the effect of position may be analyzed using all participants at the same time. Panels a and b in Figure A.4 compare the distribution of γ (pooled sample) when choices are made at the minimum (maximum) to choices made at the mean. The results reported in panel a are very strong: changing the position of the individual from the mean to the minimum noticeably shifts the distribution of inequality aversion towards the left. First, when choices are at the minimum, the median γ belongs to the lowest interval, i.e. $(-\infty, -0.09)]$. This means that by changing the position from the mean to the minimum, the typical individual stops being inequality averse and starts being an inequality lover. This finding is also confirmed by comparing the frequencies of each distribution. For all eight intervals where $\gamma > 0$, choosing at the minimum implies a shift towards the first two intervals where $\gamma \leq 0$ compared with choices at the mean. In terms of the statistical significance of the result, the p-value of the test of equality of distributions rejects that both distributions are equal at a 5% level.[21] We find a trade-off between the Rawlsian maximin motive and inequity aversion when comparing the implied γ from choices at the mean with those implied by choices at the minimum. These results are in line with the results obtained by Engelmann and Strobel (2004) using incentivized experiments in a sample of undergraduate students studying economics and business administration.

Analogously, when comparing the implied γ from choices at the maximum with those implied by choices at the mean, there is a shift towards the right in the distribution of the inequality aversion parameter. However, this shift does not seem to be as large as the one observed in the comparison of choices at the minimum with choices at the mean. In this case, the median for γ at the maximum lies in $[0.15, 0.2)$, which is the interval immediately above the median γ at the mean. The results in terms of statistical significance are also weaker. The p-value test suggests that the null hypothesis cannot be rejected at 5% confidence.

[21] These results suggest that participants perceive themselves as relatively poor with respect to other individuals and reduce their willingness to pay for lower income inequality. Regarding the well-established negative relationship between an individual's preferences for redistribution and their own income, this result seems contradictory as low-income individuals may have higher incentives to support redistributive policies. However, we elicit inequality aversion, which is related with preferences for redistribution but is not the same. Furthermore, in our context, each participant knows the level of income (and the position) that her grandchild would have if she was to choose either one of the two societies in a pair, and also knows that both are fixed (there are no dynamic effects). As a result, even if inequality was lower, participants would not expect any improvement in their grandchild's individual status. Finally, a Rawlsian motive for helping the least well-off is more important in this context. Unlike when participants make their choices at the mean and at the maximum, when they place their grandchild at the minimum of the income distribution, the minimum income is lower for those societies B_i with $i > 3$. Furthermore, there is likely more salience of the lowest income when choices are made at the minimum (see Table A.2).

Figure A.4 depicts the distribution of γ for the pooled sample of participants; i.e. regardless of their assignment to treatment. However, in order to conclude that this is actually a position effect we need to rule out whether the effect is driven by each of the treatment arms individually. Figures B.1 and B.2 in the Appendix show the distribution of γ for choices at the minimum and maximum compared to the distribution of γ at the mean for each one of the treatment arms and the control group. Panels a through d for each of these figures allow us to rule out that the position effect is driven by *control, effort, luck* or *mobility* groups individually. [22] Note that they have low incentives to reduce inequality because a lower inequality does not directly imply a better position or a higher absolute income.

Overall, these results are in line with hypothesis H3 by which $\gamma_{min} \leq \gamma_{mean} \leq \gamma_{max}$.

Alternatively, instead of analyzing the effect of position by treatment arm, one could look for heterogeneous effects of each treatment arm by the position of the individual in the income distribution. Figure A.5 reports a summary of this heterogeneity analysis. We report the coefficient of interest estimated using the specification of column (5) in Table A.5. Each dot represents the point estimate of β while bars represent the 95% confidence interval. [23]. From the analysis of these estimates two interesting conclusions can be drawn. First, when analyzing the effects of *effort* and *luck* messages on the position of the individual in the income distribution there are no variations. In both cases, the effects have the same sign and are of the similar magnitude. The meritocratic view (effort vs. luck) dominates in all cases, even when participants make their decision at the minimum, a point when the Rawlsian motive is expected to take effect.

Second, when we analyze the heterogeneity in the effect of the *mobility* treatment, we do not only observe differences in the magnitude of the effect, but also differences in direction. While we observe a null effect when the choice is made at the mean (this is the result presented in Section 5.3), the effect is negative and statistically significant when the choice is at the minimum, and positive and also statistically significant when the choice at the maximum. Our interpretation of this result is that at the mean, the null effect of the *mobility-message* can be explained by two opposite effects that cancel each other out. However, analyzing the effect of *mobility-message* in the extremes of the income distribution unveils how each mechanism operates in isolation.

At the minimum, mobility does not pose higher chances of losing income because individuals are already at the bottom of the income distribution. Hence, the risk aversion channel plays no role–mobility increases the chances of moving, but movement can only happen upwards. In this scenario, mobility reduces inequality aversion. By contrast, when choices are made at the maximum there is no expectation of

[22] An alternative explanation could be that when participants are at the minimum they aim to maximize the absolute income of those individuals that are in the bottom of the distribution.

[23] Figures B.3, B.4 and B.5 in Appendix depict the γ distribution for each treatment by each position.

moving upwards. In this case, mobility could only mean losing income. Risk aversion is the only relevant channel and the effect of mobility on inequality aversion is positive. This means that at the top of the income distribution, mobility increases inequality aversion. Overall, these results suggest that the preferences for the mobility effect dominates when participants are at the top, while the risk aversion effect dominates when they are at the bottom. This confirms the advantages of our design to discriminate between alternatives drivers of inequality aversion.

6 Sensitivity analysis and robustness checks

6.1 Robustness Checks

Comprehension Checks. One potential critique of our experiment is that participants may not fully understand our proposal and that their choices may not be what we interpret them to be. In this regard, since the experiment was carried out with undergraduate college students, we believe that our participants were better equipped to understand the game's instructions than the general population. [24]

In order to address this concern more formally, our experimental questionnaire included two specific questions that aimed to analyze how accurate and trustworthy participants' responses were. First, we introduced a comprehension check. This question presented the participants with two (new) alternative societies; they were asked to select the society with a more unequally distributed income. With this question we want to test if participants understood the way in which information was displayed. Second, we also introduced an attention check question. In this case, we asked the respondent to be completely honest about whether they paid enough attention to the questions. To induce honest responses we argue that knowing how attentive they were while answering the questionnaire was essential for our project. One potential critique to this question is that students will avoid answering that they were not paying attention. However, we find that 10% of them self-reported that they did not pay attention to their answers.

Tables B.1 and B.2 in Appendix B.1 replicate our main estimates using three different samples (Panel A and B report OLS and intervals regressions respectively). In each case, column (1) reports the baseline result of Table A.5 again for easier comparison. Column (2) restricts the sample to those who self-reported as having paid attention when answering the survey. Column (3) reports the result of restricting the sample to those who answered the comprehension question correctly. Column (4) uses the intersection of columns (2) and (3) and restricts the sample to those who paid attention and answered the comprehension check

[24] In addition, as we will show in section 7, our estimates of γ are consistent with individual views about inequality. Specifically, we find that inequality aversion is larger for those who see inequality as a "bad" while it is smaller for those who see inequality as a "good." This suggests that participants actually understood the game and gives more credibility to our results.

correctly. Two conclusions can be drawn from these tables. First, restricting the sample to those who reported having paid attention does not change the estimates of the treatment effect for any of the treatment arms neither in magnitude, direction or statistical significance. Second, when we restrict the sample to those who answered our comprehension check correctly and compare this group to the full sample, the magnitude of the reported effects is larger for all treatments except the position treatment. However, the differences are not economically relevant. Moreover, despite the differences, the main conclusion from this robustness test is that the results are robust across samples and conclusions remain essentially the same.

An expanded sample of consistent responses. The results presented in the previous section are based on the sample of participants who responded consistently to three experimental surveys: at the mean, at the minimum and at the maximum. This implies a very demanding criteria because it drops the responses of participants that are consistent in two positions but were inconsistent in a third. In order to assess the robustness of our results and the potential biases associated with inconsistent responses, we use an expanded sample in this subsection that incorporates all consistent responses in each position (regardless of whether the participant was consistent in the series of responses in the other positions). This strategy allows us for a clean comparison of inequality aversion between the three treatment arms (effort, luck and mobility), but it is not possible to apply in the case of position treatment (because the number of observations becomes unbalanced). This strategy allows us to retrieve at least 100 responses for each of the treatments (see Table B.5 in the Online Annex C.1. Furthermore, we incorporate a dummy variable, which identifies those individuals that provided inconsistent responses when they make a series of choices in another position. Tables B.7, B.8 and B.9 in Appendix B.4 report the results of the main treatments for the described samples (these estimates replicate the specification presented in Table A.5.

Two conclusions can be drawn from these tables. First, expanding the sample to include those who made inconsistent responses does not change the estimates of the treatment effect for any of the treatment arms in magnitude, direction or statistical significance. Second, the results confirm the same pattern in the three positions and the asymmetric response to the mobility treatment when the position varies. Finally, the coefficients of the dummy variable that identifies those participants that provide inconsistent responses in the alternative series are not statistically significant in any case.

As an alternative, we also use a more flexible definition of consistent responses, which allows an additional expansion of our baseline sample. As we have described in section 4.2 some respondents make inconsistent responses in the experimental survey. However, we identify different degrees of inconsistency. We incorporate a simple assumption to recover some responses. Table XXX presents the criteria used to recover these cases (basically we recover the participants who perform a single inconsistency) and Table

B.5 describes the number of responses recovered (between 142 and 70 cases, depending on the position in the sequence of choices). Furthermore, we incorporate a dummy variable, which identifies those individuals whose responses were adjusted in order to obtain consistency.

Our results are presented in Tables C.3 and C.4 in the Appendix C.3. First, compared with the results of our main specification (Table A.5, does not change the estimates of the treatment effect for any of the treatment arms in magnitude, direction or statistical significance. In fact, in the case of the effort message, the comparisons against the control group, are statistically significant at a 10 % level. There results are consistent with H1 that suggested that $\gamma^e < \gamma^c < \gamma^l$. Second, this robustness check also confirms the results with respect to positional treatment. Again the coefficients and their statistical significance do not change with respect to those presented in Table A.6. We find a small difference when comparing the implied γ from choices at the maximum with those implied by choices at the mean, in which there is a slight decline in the coefficient compared with the baseline result, but it maintains its significance. Third, in general, the dummy variables that identify inconsistent responses are not statistically significant.

Treatment effort vs. luck: within-subject design. In order to test the robustness of our results, we replicated the experiment with a different sample of students selected from the same universe. This time, we introduced exogenous variation at the individual level. Since this replication was conceived as a robustness check only, we created a restricted version of the experiment with choices being made only at the mean and with two treatment groups - *effort* and *luck* - and a control group. Specifically, instead of asking participants to make repeated choices when the position changed, we ask the same individual to make a choice in different scenarios but with a change in the causes of inequality: first we ask them to choose with no additional information, then, in random order, we use the *effort-message* and finally the *luck-message*.

Table C.1 describes the process of data collection for this sample, Tables C.7 and C.8 in the Annex C.4 respectively summarize the consistency of responses and presents an analysis of consistency over observable variables. Results are similar to the between treatment experiment. An advantage of this strategy compared with the between treatment is that it avoids the problems of imbalance by treatment arm.

In this case, although the sample of individuals is considerably smaller, the results remain qualitatively the same. First, Panel a in Figure B.6 of the Appendix shows the distribution of γ for the control group, which is comparable with our baseline estimate from the full experiment. For this sample the number of 'equality lovers' is slightly higher. As a result the summary statistics rise to higher levels of aversion (0.306 vs 0.202 and 0.339 vs 0.208 in the case of the mean and median respectively).

Second, the effect of the treatment of information on the median and on the distribution is also consistent with the results from the main experiment.

In Figure B.6 Panel B, C and D in the Appendix (C.4) reports respectively the distribution of γ for luck-message vs control group, effort-message vs control group and effort-message vs luck-message groups. Overall these results are consistent with our baseline results, which are presented in section 5 and the distributions of γ shift in the expected direction. When we replicate the specification of the Table A.5 using this sample, we find that the magnitude and directions of the effects are unchanged (Table C.5). The effect of the luck-message vs control group is still negative, but unlike the baseline estimates, in this case it shows a statistically significant incidence and a coefficient of greater magnitude (-0.165 vs -0.065 for the OLS estimates). While for the effort-message the magnitude of the coefficient is almost identical with baseline results, it is not statistically significant. Finally, when we directly compare the effect of effort-message and luck-message the differences are statistically significant in all specifications at a 1% level. The magnitude of the differences is between -0.225 and -0.298, which is slightly higher than the difference that we find in the baseline estimates presented in Table A.5 (-0.142 and -0.185). Finally, Table C.6 replicates our main estimates using the same three samples presented in Table B.1 in the Appendix. They restrict the sample to those who self-reported having paid attention, those who answered the comprehension question correct and those who did both of the above. The conclusions remain unchanged.

In sum, when we carried out an additional strategy based on three fairness treatment at individual level in this additional sample we confirm $\gamma_l > \gamma_c > \gamma_e$, which is also consistent with H1 and H2 as the results from the main experiment.

Online vs. in-site experiments. Compared to previous literature, e.g. Carlsson et al. (2005); Amiel and Cowell (1999), our experiment differs in that we use an online experimental survey. In order to address whether our online survey generates a bias in the inequality aversion parameter regarding when participants answered the experimental questionnaire in site, we replicate our baseline experiment with a sub-sample of students in the classroom[25]. [26] Specifically, we replicated the parts of the experiment that are needed to calculate the inequality aversion parameter in the control group at the mean, minimum and maximum. In terms of the value of the parameter γ, the results are essentially the same for the experiment at mean and maximum. We summarize these results in Figure C.3 in the Appendix, comparing this results to those from the sub-sample of students who took part in the online experiment assigned to the control group. As

[25] Final number of consistent answers in the in classroom experiment ascends to 191

[26] Arechar et al. (2018) investigate this issue by replicating public goods experiment online and in-site and conclude that online data quality is adequate and reliable compared to in-site, despite cooperation levels in their online sample being substantially higher than in the laboratory. Holbrook et al. (2003) studied how the method of survey data collection generates biases, particularly in regards to face-to-face interviewing and telephone interviewing. Telephone respondents indicated a lower level of satisfaction with the interview, and greater suspicion. Furthermore they are more likely to present themselves in a more socially desirable image than were face-to-face respondents.

can be observed, despite minor differences in the distribution, there is no evidence of significant differences between the answers at the mean or at the maximum, no matter if the experiment took place online or in-site[27].

Nevertheless, we found a significant difference for the experiment at the minimum. In this case, γ is significantly higher when students took the experiment in-site. This difference is due to a greater proportion of students who always chose Society B in the in-site experiment. [28] Despite this result, which seems to be a particularity of the experiment at the minimum, results do not seem to be affected in general. The information treatments effect in particular seems to be unaffected.

An Alternative Utility Function: A non-self-centered analysis of inequality aversion

So far we have assumed that the effect of an individual's position in the income distribution on individual well-being enters in the utility function through γ. Alternatively, one could consider that position enters directly in the utility function and that γ is position invariant. Aronsson et al. (2016) discuss the difference between these two approaches and refer to inequality aversion that is position dependent as "self-centered" inequality aversion. On the other hand, when inequality aversion is independent of the individual's position in the income distribution, it is referred to as "not-self-centered" inequality aversion.

If instead of a "self-centered" inequality aversion our individuals respond to a "not-self-centered" version of inequality aversion, our previous estimates of the effect of position on γ could be capturing the effect of position in the overall level of utility and not an actual relation between position and γ. In order to address this concern we replicate our results using an alternative utility function (previously discussed in equation 6) where position enters directly as one of its arguments.

In this case, γ is unique for each individual. Because each individual makes a series of choices three times (one time in each position), we have a system with three unknowns and three equations. With some additional assumptions, we can recover the parameter $\hat{\gamma}_{i,j}(e_j, M_j, \hat{\beta}, \hat{\alpha})$. Appendix B.6 discusses this strategy in detail. This strategy estimates γ values in an almost continuous support, which is an advantage compared to the process utilized for our baseline estimate. For this reason, in this case estimates are based on OLS regressions.

Figure B.7 replicates the estimate of γ distribution in a not-self-centered version of the individual utility

[27] We present p-value for mean test at the bottom of the graphics. We also developed a Kolmogorov Smirnov test and obtain the same conclusions

[28] The fact that this difference was observed only for the set of choices at the minimum could mean that this extreme behavior may be related to self-image motives, which seems to occur more strongly at the minimum when questionnaires are implemented in-site. The difference might be explained by a learning effect and that in the case of in-site participants can see the subsequent choices (which is not possible in the online experiment).

function[29]. The key result is that inequality aversion is slightly higher than in the self-centered case. However, the overall conclusion remains the same: the average individual is inequality averse although there are some individuals that remain at low or even negative values for γ. Table B.10 reports the replicated estimates of our main results. Again, although the magnitude of the effects is slightly larger, the overall conclusions remain the same.

A simple comparison between these results and those presented in Table A.5 show that the Mobility Treatment is extremely affected by position, but when bias due to position is controlled, aversion to inequality is the greatest for the mobility treatment. These results show the importance of position in individuals' willingness to sacrifice income for equality. Another result from these comparisons is noteworthy. Effort treatments significantly reduce aversion to inequality, and this difference is significant when the effect of effort is compared against any of the other treatments or against the control group.

7 Correlates of inequality aversion: interpreting gamma

In order to assess the validity of gamma as a measure of inequality aversion, we analyze if our estimates are correlated with a wide set of variables associated with preferences for equality and redistribution. With this aim, we used information about attitudes and beliefs collected in the last module of the survey. We use the coefficient of correlation and explore the direction and statistical significance of that relationship (see Figure C.4 in the Online Annex C.5.

First, it is expected that people with lower inequality aversion present lower preferences for redistribution, a relationship that is partially confirmed in our data. Those with higher γ prefer a more active government and are less market oriented (p-value$<$0.01). However, γ is not significantly correlated with preferences for minimum wage policies. Furthermore, the inequality aversion parameter is not correlated with self-perception about the position in the income distribution, which in general is negatively correlated with preferences for redistribution.

Second, we find that γ is significantly larger for those who believe that inequality is a relevant issue. To assess this we use two questions. The first one asks directly if inequality is an issue specifically in Uruguay while the second asks whether inequality is an issue for some social groups or all of society. As Figure C.4 shows, in both cases we find a positive and significant correlation between our estimates of γ and those who consider inequality to be an important issue.

Third, we explore the correlation between the magnitude of inequality aversion and some beliefs about

[29] As this utility function assumed the support of Gamma as almost continuous, we prefer to present Kernel Density Estimations rather than discrete histograms

the consequences of inequality. On one hand, we explore alternative mechanisms related to negative externalities such as public services, violence and crime, and the generation of opportunities. On the other hand, we explore some potential positive externalities related with the incentive effect of inequality. In all cases the correlation coefficients are significant (p-value$<$0.01), and the signs are consistent with our interpretation of γ since people that tend to consider inequality as a "bad" are usually the more inequality averse, while individuals that consider inequality as a "good" usually demonstrate lower levels of inequality aversion. (See Figure C.4).

Finally, we also analyze the correlation between our estimates of γ and individuals' perceptions about the role of luck and effort. We find that those who believe that inequality is usually the result of circumstances beyond one's control rather than individuals' responsibility are more inequality averse. Also, those who had higher trust in the government and who self-declare as left-wing, present a positive and significant correlation with the inequality aversion parameter.

We also carry out a multiple regression analyses to explore the correlation of our estimates of inequality aversion with information about attitudes and beliefs collected in the last module of the survey. The aim is to explore whether the magnitude of inequality aversion is associated with fairness and instrumental rationale. The first mechanism is related to our information treatments but also we consider some additional variables. The second mechanism is related to beliefs about positive (or negative) externalities of inequality with potential gains (or loses) in term of aggregate level of social well-being.

Table C.9 in the Annex C.5 reports the estimates based on interval regressions using as dependent variable γ [30]. All regressions are based on our main sample, including the elicited γ for the three series of choices (607 participants with three observation for each). Our preferred specification is reported in column I and the magnitude of our coefficients of interest and their significance are reported in the Figure A.6. This figure includes the following control variables: individuals characteristics (sex and age), socioeconomic background (hours worked, household size, household income and parental educational achievement). To consider household income we use the perceptions of participants about their household position in the distribution of income (10 deciles). In all cases, estimates include dummy variables identifying the experimental treatment (effort, luck, mobility, minimum and maximum) and a dummy variable that identifies the year of the experimental survey.

On the one hand, we confirm the direction and significance of our information treatments. Furthermore, we confirm that inequality aversion is strongly correlated to individual beliefs about the role of luck and effort (p-value$<$0.01). In general, those who believe that inequality is usually the result of unmanageable

[30] Estimates based on OLS and quantile regression produce analogous results but are not shown for reasons of space

circumstances rather than individual merits are more inequality averse. This is true for every treatment arm and every position. This finding is consistent with our results from the *effort-message* and *luck-message* where we find a positive (negative) relation between inequality aversion and luck (effort).

On the other hand, the main result of this section is that we confirm the relation between inequality aversion and some beliefs about the consequences of inequality. Some people believe that inequality is "bad" due to negative externalities related to the quality of public services (+0.05; p-value$<$0.1) and social violence (+1.22; p-value $<$0.01). Those people are more inequality averse. On other hand, some individuals believe that inequality yields positive externalities due to the competition and incentive effect (-2.13; p-value$<$0.01).

Finally γ is significantly larger in those who believe that inequality is a relevant issue in society. As Figure A.6 shows, we find a positive correlation between our estimates of γ and persons who consider inequality an issue. Furthermore, even though we cannot rule out that the magnitude of the effect is the same across categories, there is a positive gradient in the point estimates between our estimates of γ and how severe the individual thinks that the problem of inequality is [31]. We also find that a greater trust in government is related to less aversion to inequality.

With regard to individual characteristics, most of the variables are not statistically significant. We find that age is positively correlated with γ. Furthermore, individuals with more educated parents and who perceive themselves as in a higher position in the income distribution are more likely to demonstrate a lower inequality aversion. We also consider individuals' self-reported ideology on a left-right scale (Column 2 and 3 in Table C.9 in the Online Annex) and household income reported within ranges (Column 3). As expected, we find that γ tends to be lower for participants identified with moderate to right-wing ideology.

Finally, household income is not statistically significant, but the perceived position in the income distribution remains significant.

When we drop all of the individual control variables, the main results remain unchanged (Column 4 in Table C.9), which suggest the robustness of our result. Finally, we replicate the same specification using an additional sample in which we carried out the fairness treatment at individual level. In general, we confirm our main results: the magnitude and direction of coefficients are consistent but the statistical significance is weaker, which surely is related with the smaller sample size (see Figure C.5 in the Annex).

Overall, the evidence reported in this section suggests that our strategy correctly captures individuals' inequality aversion. Finally, the roots of inequality aversion is related to both fairness and instrumental rationale.

[31] The result remains unchanged whether we use the alternative question: "inequality is an issue for some social groups..."

8 Conclusions

We elicited individuals' inequality aversion on a sample of first-year undergraduate students in economics and business enrolled at the largest university in Uruguay. We implemented a questionnaire-experimental study in which we asked participants to make a sequence of choices between hypothetical societies characterized by varying levels of their grandchild' income and income inequality. We also analyse the determinants of inequality aversion by using information treatments in which we randomly varied the sources of inequality (luck vs. effort), the availability of opportunities for social mobility and the position of participants in the income distribution.

Most individuals in our sample exhibited inequality-averse preferences. The inequality aversion parameter resulted to be higher among respondents who consider inequality is a problem because it is unfair or because it generates crime, violence or other negative externalities. We also found that inequality aversion is sensitive to the individual's position in the income distribution and very elastic to the notion of fairness. Inequality aversion is greater when income disparities in society emerges by luck rather than by effort, suggesting that individuals in our sample evaluate inequality through the lens of a meritocratic view. This effect is found regardless of the hypothetical grandchild's position in the income distribution. Preferences for mobility reduces inequality aversion, but only in the case of individuals positioned at the bottom end of the distribution, where risk aversion plays no role.

Similarly to other questionnaire-based studies, a potential limitation of our paper is that we relied on hypothetical questions and did not provide financial incentives for individuals to respond truthfully.Rust (2012) notice that this problem is more relevant if the purpose of the empirical research is to predict behavior, which reflects a mixture of self-interest, norms, and signaling motives. Furthermore, Amiel and Dardanoni (2015) and Rust (2012) argue that experimental surveys focus on individuals' opinions and ethical preferences and, hence it is unclear how and which financial incentives may be relevant to obtain more reliable responses. Moreover, real-world incentives are very different from the incentives in a questionnaire environment, so they would not be enough to predict individual's behavior.

Our findings on the foundations of inequality aversion have important policy implications. By triggering deeply held notions of fairness among individuals, the design, framing and public communication of redistributive policies may be important to understand the dynamics of political support (or opposition) towards these policies and the ability to build strong and stable pro-redistribution coalitions. At the micro level, the fact that we found heterogeneous effects in both the extent and degree of malleability of inequality-averse preferences may help to understand individuals' behavioural responses to taxation, social transfers and contributions to public goods. From a macro perspective, inequality aversion is a critical parameter in social

utility functions commonly used to assess the welfare implications of public policies.

The paper also has implications for future research in this area. It contributes to the discussion on the appropriate methods to measure distributional preferences and study their malleability in large samples. Our online experimental survey proved to be a very flexible tool to elicit the parameter of interest on a large sample of individuals, test its sensitivity to alternative assumptions about the utility function and information treatments and implement a wide range of attention and comprehension checks. We also showed that the online nature of the experiment does not introduce significant biases, as our main findings were replicated in a conventional in-site classroom experiment. Future research could analyze how individuals' willingness to reduce inequality vary depending on how inequality is measured (e.g. Gini index, p90/p10, top income shares) and consider other dimensions of inequality beyond income, such as health and education. Moreover, it would be interesting to test the malleability of inequality-averse preferences to different "luck" conditions (inheritance of wealth, parental education, belonging to a disadvantaged racial group, genetic endowment, etc).

A Tables and Figures

A.1 Tables

Table A.1: Experimental Parameters - at the Mean

Society	Min	Mean	Max	Inequality	γ: Break point	Set of Choices
A	10000	30000	50000	0.385	$(-\infty, -0.09)$	$\{A, A, A, A, A, A, A, A, A\}$
B1	21300	31950	42600	0.1925	$[-0.09, 0)$	$\{B_1, A, A, A, A, A, A, A, A\}$
B2	20000	30000	40000	0.1925	$[0, 0.05)$	$\{B_1, B_2, A, A, A, A, A, A, A\}$
B3	19300	28950	38600	0.1925	$[0.05, 0.09)$	$\{B_1, B_2, B_3, A, A, A, A, A, A\}$
B4	18800	28200	37600	0.1925	$[0.09, 0.15)$	$\{B_1, B_2, B_3, B_4, A, A, A, A, A\}$
B5	18000	27000	36000	0.1925	$[0.15, 0.21)$	$\{B_1, B_2, B_3, B_4, B_5, A, A, A, A\}$
B6	17200	25800	34400	0.1925	$[0.21, 0.34)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, A, A, A\}$
B7	15800	23700	31600	0.1925	$[0.34, 0.51)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, B_7, A, A\}$
B8	14000	21000	28000	0.1925	$[0.51, 0.78)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, A\}$
B9	11600	17400	23200	0.1925	$[0.78, +\infty)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, B_9\}$

Notes: First four columns present information about income distribution implied in each society. Fifth column presents the implied inequality aversion parameter assumed if the society represented in the row is chosen. Column six presents the implied range of inequality aversion. Last column presents the implied sequence of choices.

Table A.2: Experimental Parameters - Choice at the Minimum

Society	Min	Mean	Max	Inequality	γ: Break point	Set of Choices
A	10000	30000	50000	0.385	$(-\infty, -0.09)$	$\{A, A, A, A, A, A, A, A, A\}$
B1	10650	15975	21300	0.1925	$[-0.09, 0)$	$\{B_1, A, A, A, A, A, A, A, A\}$
B2	10000	15000	20000	0.1925	$[0, 0.05)$	$\{B_1, B_2, A, A, A, A, A, A, A\}$
B3	9650	14475	19300	0.1925	$[0.05, 0.09)$	$\{B_1, B_2, B_3, A, A, A, A, A, A\}$
B4	9400	14100	18800	0.1925	$[0.09, 0.15)$	$\{B_1, B_2, B_3, B_4, A, A, A, A, A\}$
B5	9000	13500	18000	0.1925	$[0.15, 0.21)$	$\{B_1, B_2, B_3, B_4, B_5, A, A, A, A\}$
B6	8600	12900	17200	0.1925	$[0.21, 0.34)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, A, A, A\}$
B7	7900	11850	15800	0.1925	$[0.34, 0.51)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, B_7, A, A\}$
B8	7000	10500	14000	0.1925	$[0.51, 0.78)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, A\}$
B9	5800	8700	11600	0.1925	$[0.78, +\infty)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, B_9\}$

Notes: First four columns present information about income distribution implied in each society. Fifth column presents the implied inequality aversion parameter assumed if the society represented in the row is chosen. Column six presents the implied range of inequality aversion. Last column presents the implied sequence of choices.

Table A.3: Experimental Parameters - Choice at the Maximum

Society	**Min**	**Mean**	**Max**	**Inequality**	γ**: Break point**	Set of Choices
A	10000	30000	50000	0.385	$(-\infty, -0.09)$	$\{A, A, A, A, A, A, A, A, A\}$
B1	26625	39938	53250	0.1925	$[-0.09, 0)$	$\{B_1, A, A, A, A, A, A, A, A\}$
B2	25000	37500	50000	0.1925	$[0, 0.05)$	$\{B_1, B_2, A, A, A, A, A, A, A\}$
B3	24125	36188	48250	0.1925	$[0.05, 0.09)$	$\{B_1, B_2, B_3, A, A, A, A, A, A\}$
B4	23500	35250	47000	0.1925	$[0.09, 0.15)$	$\{B_1, B_2, B_3, B_4, A, A, A, A, A\}$
B5	22500	33750	45000	0.1925	$[0.15, 0.21)$	$\{B_1, B_2, B_3, B_4, B_5, A, A, A, A\}$
B6	21500	32250	43000	0.1925	$[0.21, 0.34)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, A, A, A\}$
B7	19750	29625	39500	0.1925	$[0.34, 0.51)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, B_7, A, A\}$
B8	17500	26250	35000	0.1925	$[0.51, 0.78)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, A\}$
B9	14500	21750	29000	0.1925	$[0.78, +\infty)$	$\{B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, B_9\}$

Notes: First four columns present information about income distribution implied in each society. Fifth column presents the implied inequality aversion parameter assumed if the society represented in the row is chosen. Column six presents the implied range of inequality aversion. Last column presents the implied sequence of choices.

Table A.4: Balance of Individual Characteristics Across Treatment Groups

	Control (1)	Effort (2)	Luck (3)	Mobility (4)	p-value test (5)
Age of the respondent	24.12	24.16	23.85	23.32	0.35
	(0.28)	(0.27)	(0.26)	(0.22)	(.)
Dummy: 1=female	0.61	0.66	0.59	0.64	0.52
	(0.02)	(0.02)	(0.02)	(0.01)	(.)
Number of people in the Household	3.36	3.33	3.64	3.53	0.55
	(0.05)	(0.05)	(0.06)	(0.05)	(.)
Dummy work condition: 1=Does not work	0.49	0.45	0.49	0.50	0.53
	(0.02)	(0.02)	(0.02)	(0.02)	(.)
Dummy work condition: 1=Works part-time	0.32	0.32	0.32	0.30	0.46
	(0.02)	(0.02)	(0.02)	(0.01)	(.)
Dummy work condition: 1=Works Full-Time	0.19	0.23	0.20	0.20	0.13
	(0.01)	(0.01)	(0.01)	(0.01)	(.)
Dummy father education: 1=Incomp. High-School or less	0.49	0.50	0.52	0.57	0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(.)
Dummy father education: 1=High School and others	0.39	0.40	0.34	0.31	0.09
	(0.02)	(0.02)	(0.02)	(0.01)	(.)
Dummy father education: 1=Comp. College or more	0.11	0.10	0.14	0.11	0.43
	(0.01)	(0.01)	(0.01)	(0.01)	(.)
Dummy mother education: 1=Incomp. High-School or less	0.47	0.50	0.58	0.50	0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(.)
Dummy mother education: 1=High School and others	0.38	0.35	0.30	0.34	0.09
	(0.02)	(0.02)	(0.02)	(0.01)	(.)
Dummy mother education: 1=Comp. College or more	0.15	0.15	0.12	0.16	0.78
	(0.01)	(0.01)	(0.01)	(0.01)	(.)
Dummy household income: 1= $<$ 1000 Month.	0.24	0.25	0.23	0.30	0.26
	(0.02)	(0.02)	(0.02)	(0.02)	(.)
Dummy household income: 1=Between 1000-2000 Month.	0.39	0.35	0.40	0.37	0.78
	(0.02)	(0.02)	(0.02)	(0.02)	(.)
Dummy household income: 1= $>$ 2000 Month.	0.37	0.39	0.37	0.33	0.15
	(0.02)	(0.02)	(0.02)	(0.02)	(.)
N	933	906	885	1,083	-

Notes: Information about balance in observable characteristics of the sample of participants assigned to each treatment is presented in this table. Mean for each treatment is presented in each row. Standard errors in parenthesis. P-value for mean test is presented in the last column.

Table A.5: Treatment Effect - Choice at the Mean, Different Specifications

	OLS		Quant. Reg.	Interval Reg.	
	(1)	(2)	(3)	(4)	(5)
Effort vs Control	-0.065	-0.067	-0.071	-0.078	-0.081
	(0.042)	(0.041)	(0.051)	(0.052)	(0.052)
N	464	464	464	464	464
Luck vs Control	0.077*	0.076*	0.065	0.095*	0.093*
	(0.042)	(0.042)	(0.050)	(0.051)	(0.051)
N	455	455	455	455	455
Effort vs Luck	-0.142***	-0.151***	-0.116**	-0.175***	-0.185***
	(0.043)	(0.043)	(0.054)	(0.055)	(0.054)
N	421	421	421	421	421
Mobility	0.020	0.016	0.062	0.016	0.010
	(0.037)	(0.037)	(0.050)	(0.041)	(0.041)
N	523	523	523	523	523
Controls		X	X		X
Dummy for missing		X	X		X
Median/Mean	0.202	0.202	0.121	0.208	0.208

Notes: analysis for the treatments effects at the mean is presented in this Table. Columns (1) and (2) report the result of the OLS estimates, column (3) reports the result of a quantile regression at the median, and columns (4) and (5) report the estimates in our preferred specification based on interval regressions. Columns (1) and (4) report the results without including any control variables; columns (2) (3) and (5) report the results when including a set of control variables.

Table A.6: Treatment Effect - Position - Alternative Specifications

	OLS		Quant. Reg.	Interval Reg.	
	(1)	(2)	(3)	(4)	(5)
Min vs Mean	-0.237***	-0.265***	-0.418***	-0.334***	-0.375***
	(0.020)	(0.024)	(0.036)	(0.029)	(0.035)
Max vs. Mean	0.157***	0.154***	0.138***	0.178***	0.175***
	(0.019)	(0.022)	(0.031)	(0.023)	(0.026)
Max vs. Min	0.394***	0.419***	0.560***	0.523***	0.564***
	(0.020)	(0.023)	(0.037)	(0.029)	(0.035)
Controls		X	X		X
Treatment FE	X	X	X	X	X
Median/Mean at Mean	0.211	0.211	0.121	0.221	0.221
Median/Mean at Min.	-0.026	-0.026	-0.362	-0.194	-0.194
N	1,348	1,348	1,348	1,348	1,348

Notes: Regression analysis for the position effects is presented in this Table using the pooled sample of consistent answers. Columns (1) and (2) report the result of the OLS estimates, column (3) reports the result of a quantile regression at the median, and columns (4) and (5) report the estimates in our preferred specification based on interval regressions. Columns (1) and (4) report the results without including any control variables; columns (2) (3) and (5) report the results when including a set of control variables.

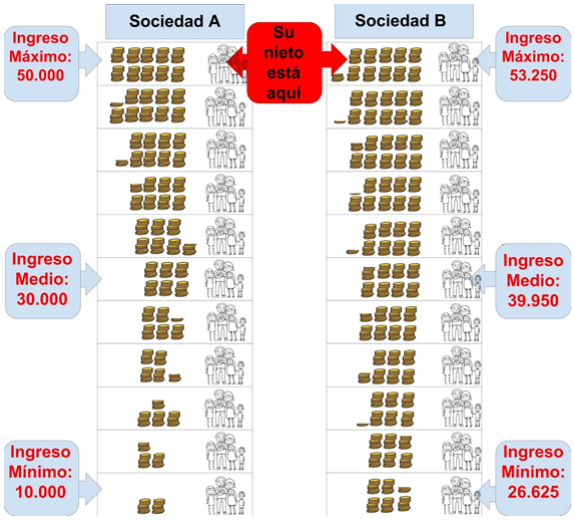
A.2 Figures

Figure A.1: Information Report

a. Choice at the Mean

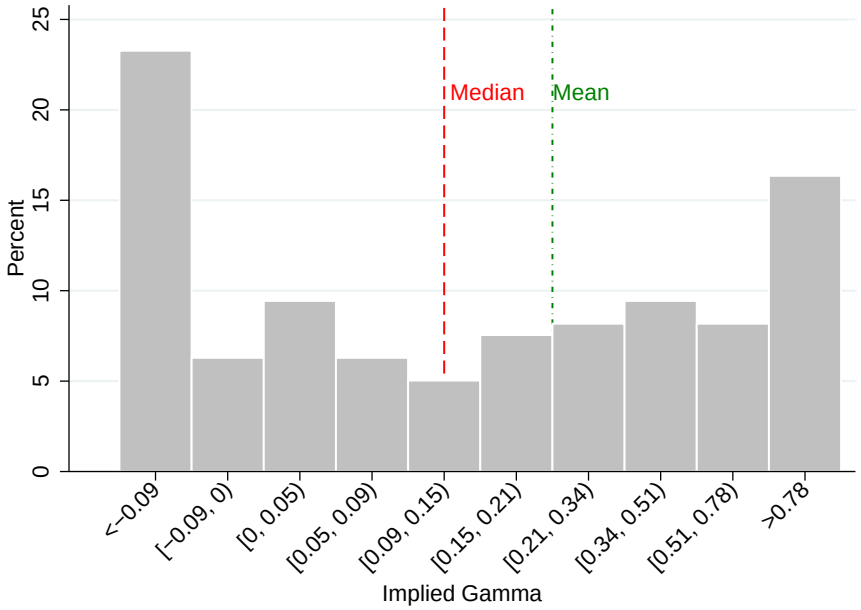
b. Choice at the Minimum

c. Choice at the Maximum



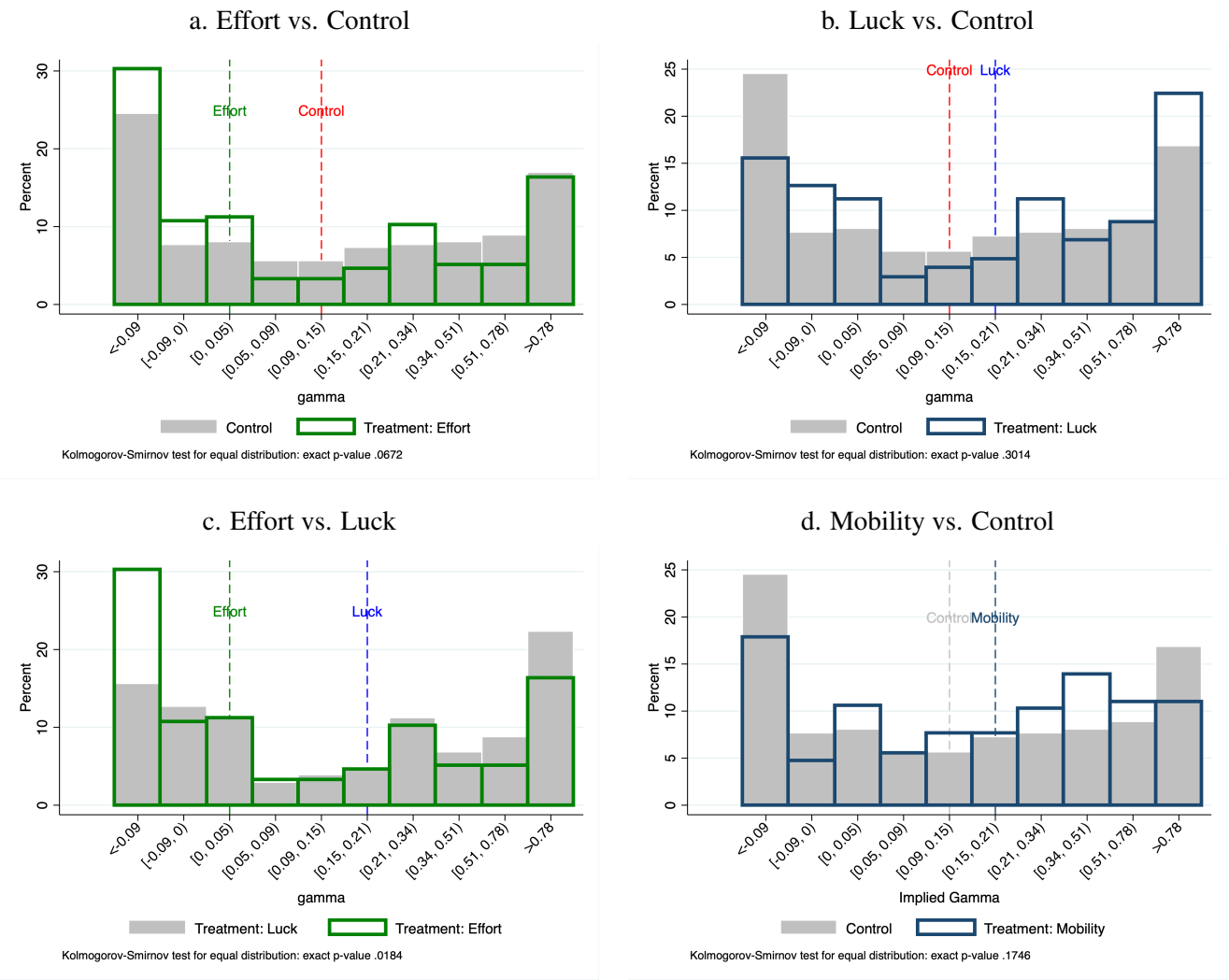
Notes: Example of the first image presented to participants in each set of choices

Figure A.2: Aversion to Inequality Distribution - Choice at the Mean, Control Group



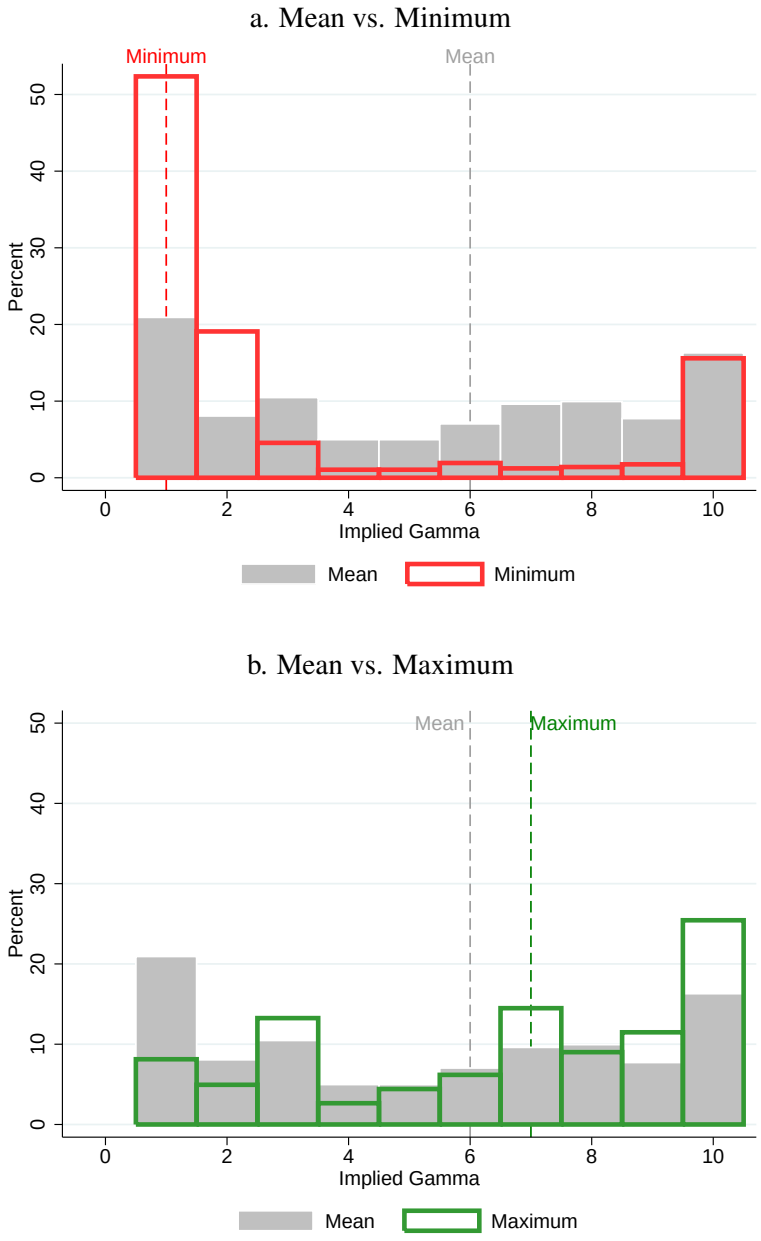
Notes: This image presents the distribution of γ estimated using the control group and the choice at the mean of the income distribution. In the *x-axis* we report the implied value of γ associated with different alternative choices of A and B_z. On the *y-axis* we report the frequency of γ associated with each choice. The dashed line indicates our estimate for the median γ while the dot-dashed line represents our estimate for the mean using interval regression of γ over a constant.

Figure A.3: Aversion to Inequality Distribution - Choice at the Mean



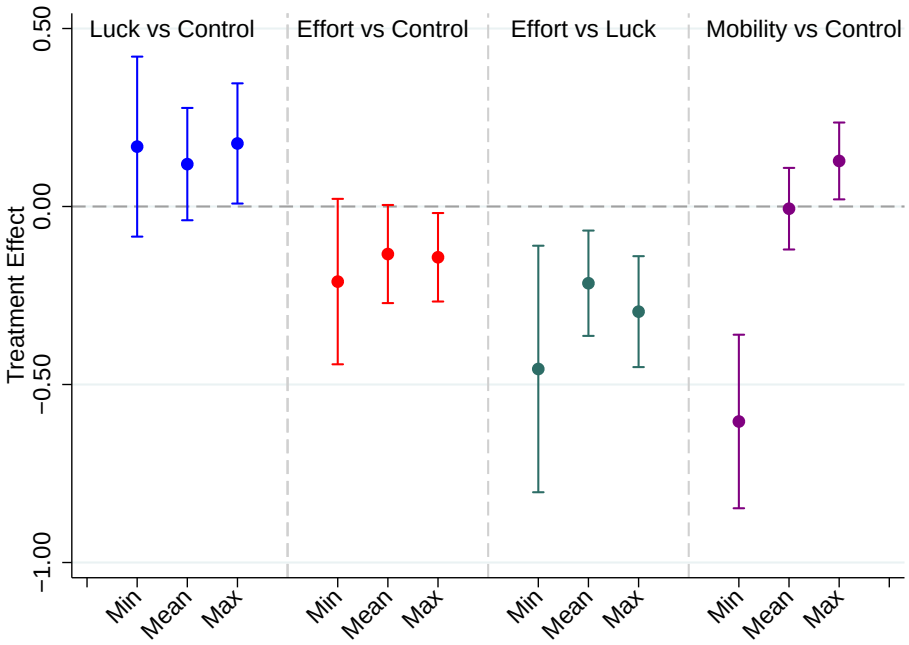
Notes: This image presents the distribution of γ estimated using the control and treatment groups indicated in each panel and the choice at the mean of the income distribution. In the *x-axis* we report the implied value of γ associated with different alternative choices of A and B_z. On the *y-axis* we report the frequency of γ associated with each choice. The dashed line indicates our estimate for the median γ while the dot-dashed line represents our estimate for the mean using interval regression of γ over a constant.

Figure A.4: Aversion to Inequality Distribution - By Position in Income Distribution



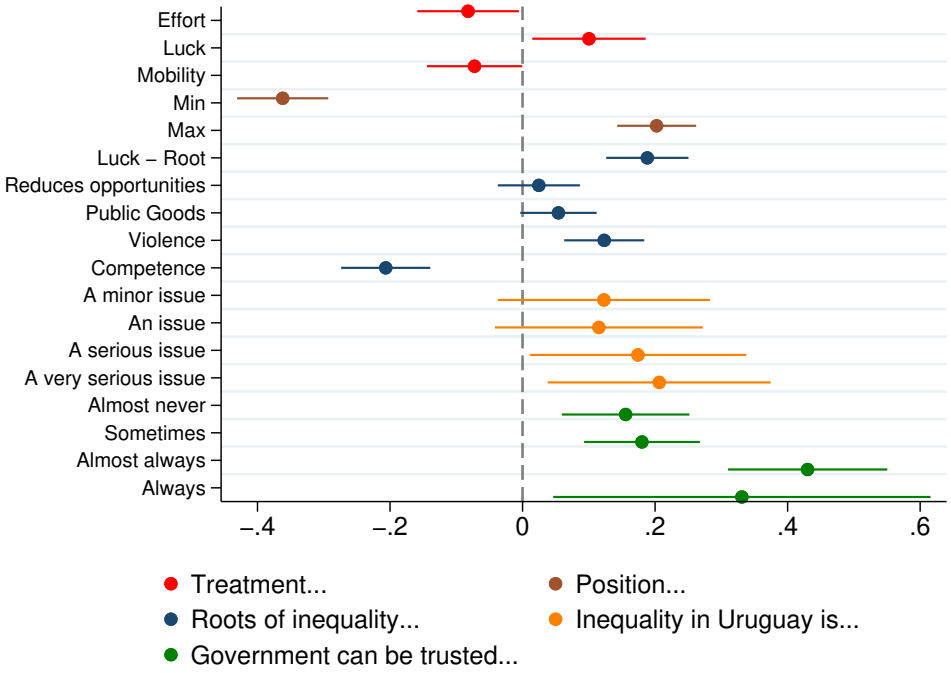
Notes: This image presents the distribution of γ estimated using the pooled sample, comparing the results for the set of choices at the mean with those of obtained for the pooled sample using the set of choices at the minimum (Panel a) and Maximum (Panel b). In the *x-axis* we report the implied value of γ associated with different alternative choices of A and B_z. On the *y-axis* we report the frequency of γ associated with each choice. The dashed line indicates our estimate for the median γ in each position.

Figure A.5: Treatment Effect - By Position in Income Distribution



Notes: In this figure we report the coefficient of interest estimated using the specification of column (5) in Table A.5 for each treatment and position. Each dot represents the point estimate while bars represent the 95% confidence interval.

Figure A.6: Interpreting Gamma - Intervals regression



Note: In this image we present interval regression (our preferred specification) estimates where the dependent variable is γ. The full estimates are reported in specification I of Table C.9 in the Annex. All regressions are based on our main sample, including the elicited γ for the three series of choices (607 participants with three observation for each). This figure includes the following control variables: individuals characteristics (sex and age), socioeconomic background (hours worked, household size, household income and parental educational achievement). To consider household income we use the perceptions of participants about their household position in the distribution of income (10 deciles). In all cases, estimates include dummy variables identifying the experimental treatment (effort, luck, mobility, minimum and maximum) and a dummy variable that identifies the year of the experimental survey.

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B Appendix

B.1 Understanding and Comprehension Checks

Table B.1: Robustness Checks: Paid Attention and Understood the Experiment

Panel A: OLS regression

	Full Sample	Serious	Understood	Both
	(1)	(2)	(3)	(4)
Effort vs Control	-0.066	-0.064	-0.057	-0.082
	(0.041)	(0.046)	(0.047)	(0.052)
N	464	383	357	312
Luck vs Control	0.083*	0.086*	0.114**	0.106**
	(0.043)	(0.046)	(0.045)	(0.047)
N	455	394	344	312
Effort vs Luck	-0.159***	-0.162***	-0.176***	-0.203***
	(0.044)	(0.048)	(0.050)	(0.053)
N	421	341	303	258
Mobility	0.015	0.027	0.009	0.012
	(0.037)	(0.039)	(0.040)	(0.042)
N	523	465	394	363
Controls	X	X	X	X
Median/Mean	0.202	0.218	0.197	0.220

Notes: continues in next page.

Panel B: Interval regression

	Full Sample	Serious	Understood	Both
	(1)	(2)	(3)	(4)
Effort vs Control	-0.081	-0.077	-0.066	-0.093
	(0.051)	(0.057)	(0.058)	(0.061)
N	464	383	357	312
Luck vs Control	0.103**	0.102*	0.126**	0.113**
	(0.051)	(0.054)	(0.051)	(0.053)
N	455	394	344	312
Effort vs Luck	-0.194***	-0.190***	-0.204***	-0.222***
	(0.054)	(0.058)	(0.059)	(0.060)
N	421	341	303	258
Mobility	0.010	0.022	0.002	0.005
	(0.041)	(0.043)	(0.042)	(0.044)
N	523	465	394	363
Controls	X	X	X	X
Median/Mean	0.208	0.228	0.203	0.231

Notes: Panel A and B presents regression analysis by OLS and Interval Regression for the treatments effects at the mean using different samples of individuals according to the criteria indicated in the heading of the columns. Serious refer to those participants who answered that they responded seriously to the questionnaire. Understood only includes those who answer correctly our question to check if they understood which society is more unequal. Both refers to the sample restricted to those who at the same time answered that they answered seriously and they correctly completed our chock of understanding the task.

Table B.2: Robustness Checks: Paid Attention and Understood the Experiment − Position

Panel A: OLS regression

	Full Sample	Serious	Understood	Both
	(1)	(2)	(3)	(4)
Min vs Mean	-0.265***	-0.266***	-0.269***	-0.269***
	(0.024)	(0.025)	(0.027)	(0.027)
N	1,348	1,284	1,016	968
Max vs. Mean	0.154***	0.156***	0.141***	0.142***
	(0.022)	(0.023)	(0.024)	(0.025)
N	1,348	1,284	1,016	968
Max vs. Min	0.419***	0.422***	0.409***	0.411***
	(0.023)	(0.024)	(0.026)	(0.027)
N	1,348	1,284	1,016	968
Controls	X	X	X	X
Treatment FE	X	X	X	X
Median/Mean at Mean	0.202	0.218	0.205	0.231
Median/Mean at Min.	-0.026	-0.016	-0.030	-0.023

Notes: continues in next page.

Panel B: interval regression

	Full Sample	Serious	Understood	Both
	(1)	(2)	(3)	(4)
Min vs Mean	-0.375***	-0.379***	-0.356***	-0.359***
	(0.035)	(0.036)	(0.036)	(0.038)
N	1,348	1,284	1,016	968
Max vs. Mean	0.175***	0.179***	0.152***	0.154***
	(0.026)	(0.027)	(0.027)	(0.028)
N	1,348	1,284	1,016	968
Max vs. Min	0.564***	0.571***	0.514***	0.520***
	(0.035)	(0.036)	(0.035)	(0.037)
N	1,348	1,284	1,016	968
Controls	X	X	X	X
Treatment FE	X	X	X	X
Median/Mean at Mean	0.219	0.248	0.214	0.242
Median/Mean at Min.	-0.194	-0.189	-0.174	-0.163

Notes: Panel A and B presents regression analysis by OLS and Interval Regression for the position treatments using different samples of individuals according to the criteria indicated in the heading of the columns. Serious refer to those participants who answered that they responded seriously to the questionnaire. Understood only includes those who answer correctly our question to check if they understood which society is more unequal. Both refers to the sample restricted to those who at the same time answered that they answered seriously and they correctly completed our chock of understanding the task.

B.2 Analysis for consistency of responses

Table B.3: Distribution of Inconsistent Answers - By Treatment Arm (Main experiment)

Treatment	Consistent	Inconsistent	% Inconsistent
Control	252	109	30.19
Effort	219	155	41.44
Luck	208	140	40.23
Mobility	277	125	31.09

Notes: Details of consistent and inconsistent answers by treatment arm.

Table B.4: Regression of Consistency over Observable Variables

	Dep. Var: Dummy for Consistency		
	(3)	(2)	(1)
Age of the respondent	-0.003	-0.003***	-0.004*
	(0.002)	(0.001)	(0.002)
Dummy: 1=female	0.068**	0.067***	0.064**
	(0.031)	(0.018)	(0.031)
Number of people in the Household	-0.001	-0.001	0.000
	(0.010)	(0.005)	(0.010)
Dummy work condition: 1=Works part-time	-0.005	-0.005	-0.004
	(0.037)	(0.021)	(0.037)
Dummy work condition: 1=Works Full-Time	-0.050	-0.051**	-0.046
	(0.042)	(0.025)	(0.043)
Dummy father education: 1=Incomp. High-School or less	0.010	0.011	0.019
	(0.034)	(0.020)	(0.035)
Dummy father education: 1=Comp. College or more	0.002	0.006	0.025
	(0.057)	(0.033)	(0.058)
Dummy mother education: 1=High School and others	-0.026	-0.027	-0.040
	(0.035)	(0.020)	(0.036)
Dummy mother education: 1=Comp. College or more	-0.082	-0.083***	-0.103*
	(0.054)	(0.032)	(0.055)
Dummy household income: 1=Between 1000-2000 Month.	-0.012	-0.013	-0.010
	(0.039)	(0.022)	(0.040)
Dummy household income: 1= $>$ 2000 Month	-0.040	-0.043*	-0.038
	(0.041)	(0.024)	(0.042)
Dummy for treatment: 1=Effort	0.133***	0.136***	
	(0.042)	(0.024)	
Dummy for treatment: 1=Luck	0.135***	0.133***	
	(0.042)	(0.025)	
Dummy for treatment: 1=Mobility	0.005	0.004	
	(0.039)	(0.023)	
Understands	-0.019		
	(0.034)		
Attention	0.107		
	(0.068)		
Year 2019	-0.043	-0.033*	-0.031
	(0.030)	(0.017)	(0.030)
Constant	0.284***	0.376***	0.440***
	(0.107)	(0.043)	(0.070)
N	1014	1014	1016

Notes: In the three specifications the dependent variable is a dummy to indicate consistency in the questionnaire. The different columns differ in the regresors included in the model as indicated by the rows. Omitted category (all dummies = 0) corresponds to: does not work, father education high school or less, mother education high school or less, household income less than USD 1000 monthly and assigned to control group.

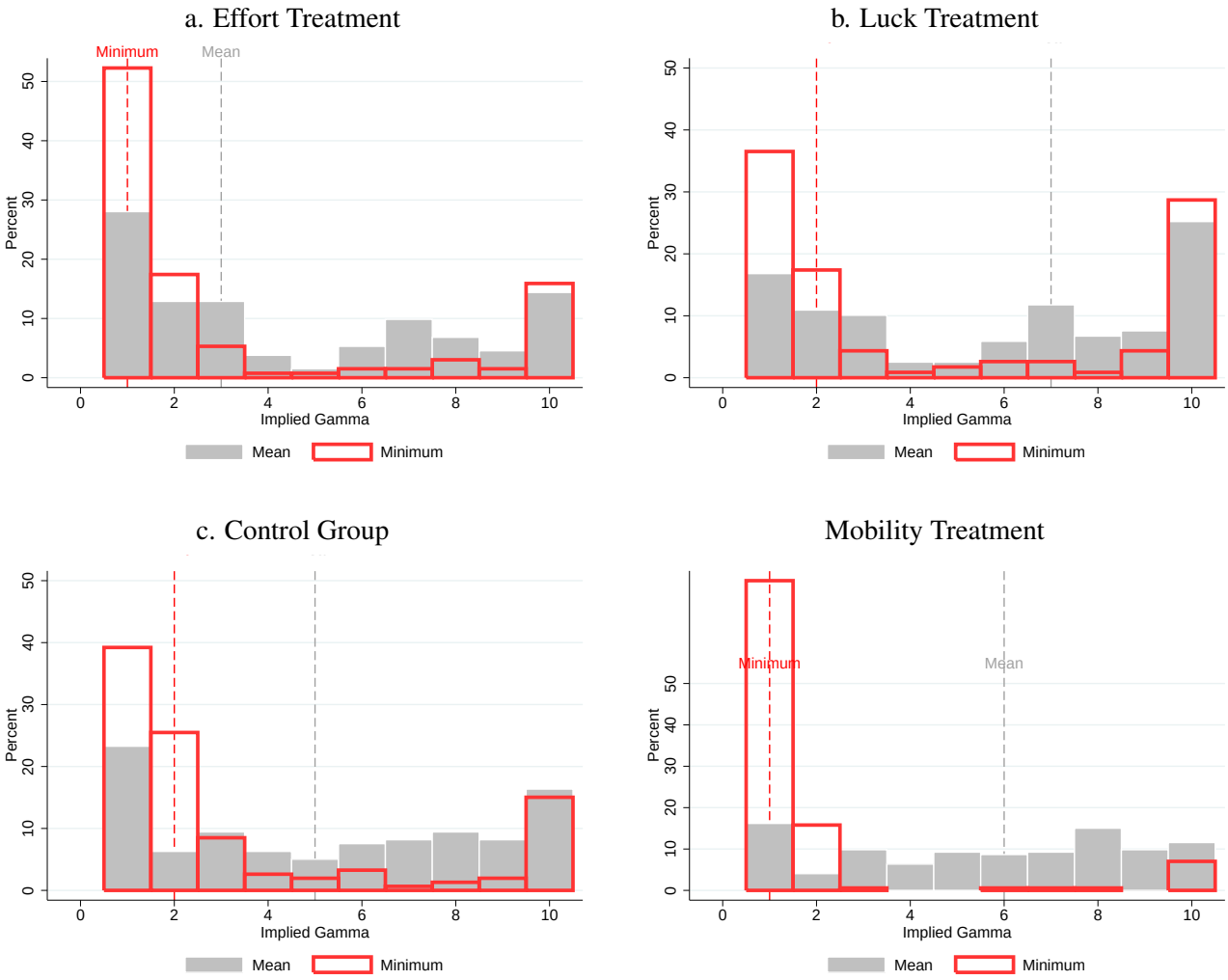
Table B.5: Samples sizes according to the alternatives criteria to define consistent responses

Start the experiment Position	Consisistency (Total participants)	Always (I)	Only in this position (II)	Sample II (I+II)	Adjusted consistent (III)	Sample III (I+II+III)
At the mean	1,480	906	135	1,041	143	1,184
At the minimum	1,444	906	104	1,010	70	1,080
At the maximum	1,422	906	222	1,128	72	1,200

Notes: In this table we present detailed information about the number of consistent responses varying the definition of consistency. In C.3 in the on-line Appendix we describe the criteria used to define adjusted consistent responses.

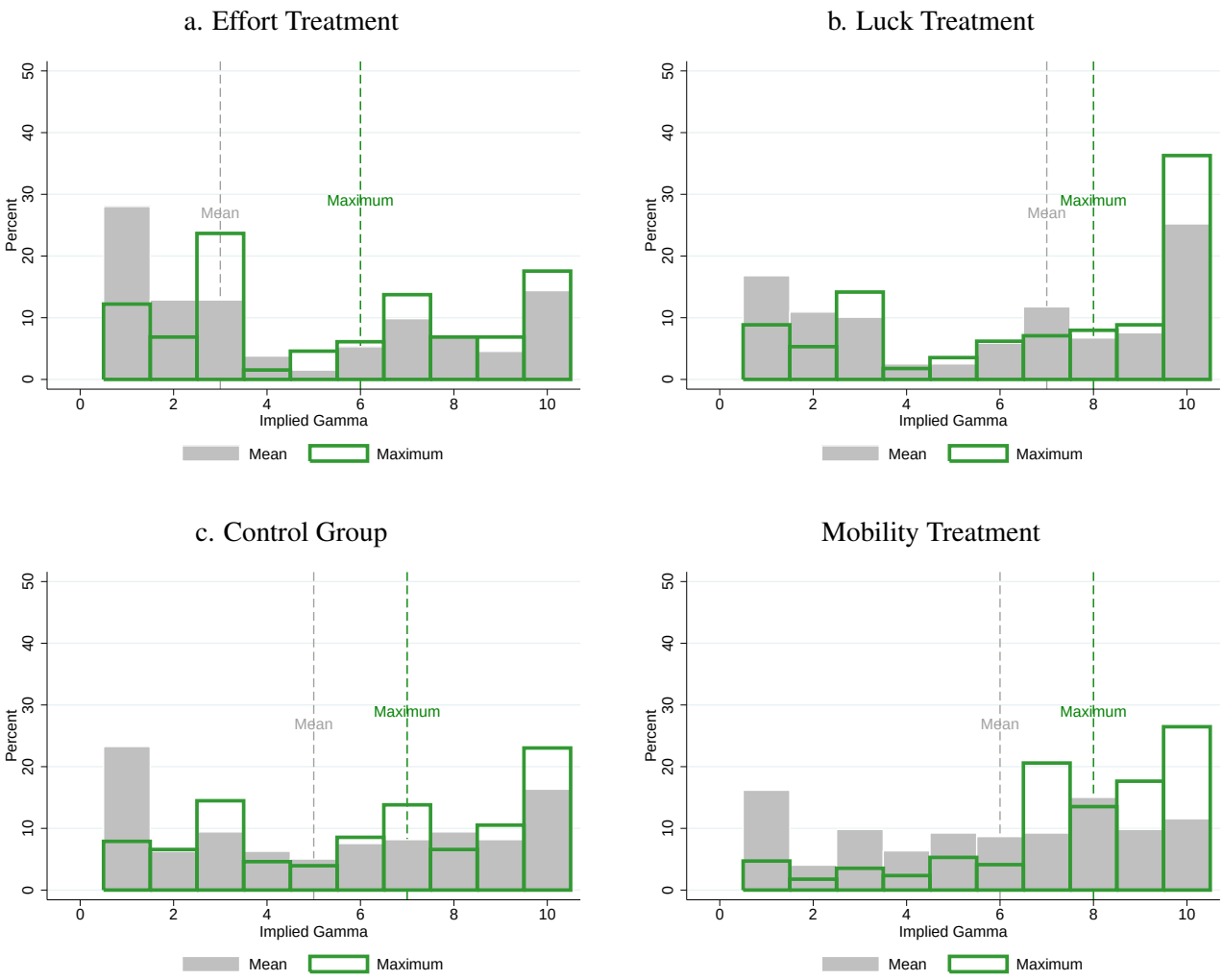
B.3 Heterogeneous Distribution of Aversion to Inequality by Position in Income Distribution

Figure B.1: Heterogeneous Responses by Position, Minimum vs. Mean by Treatment Arm



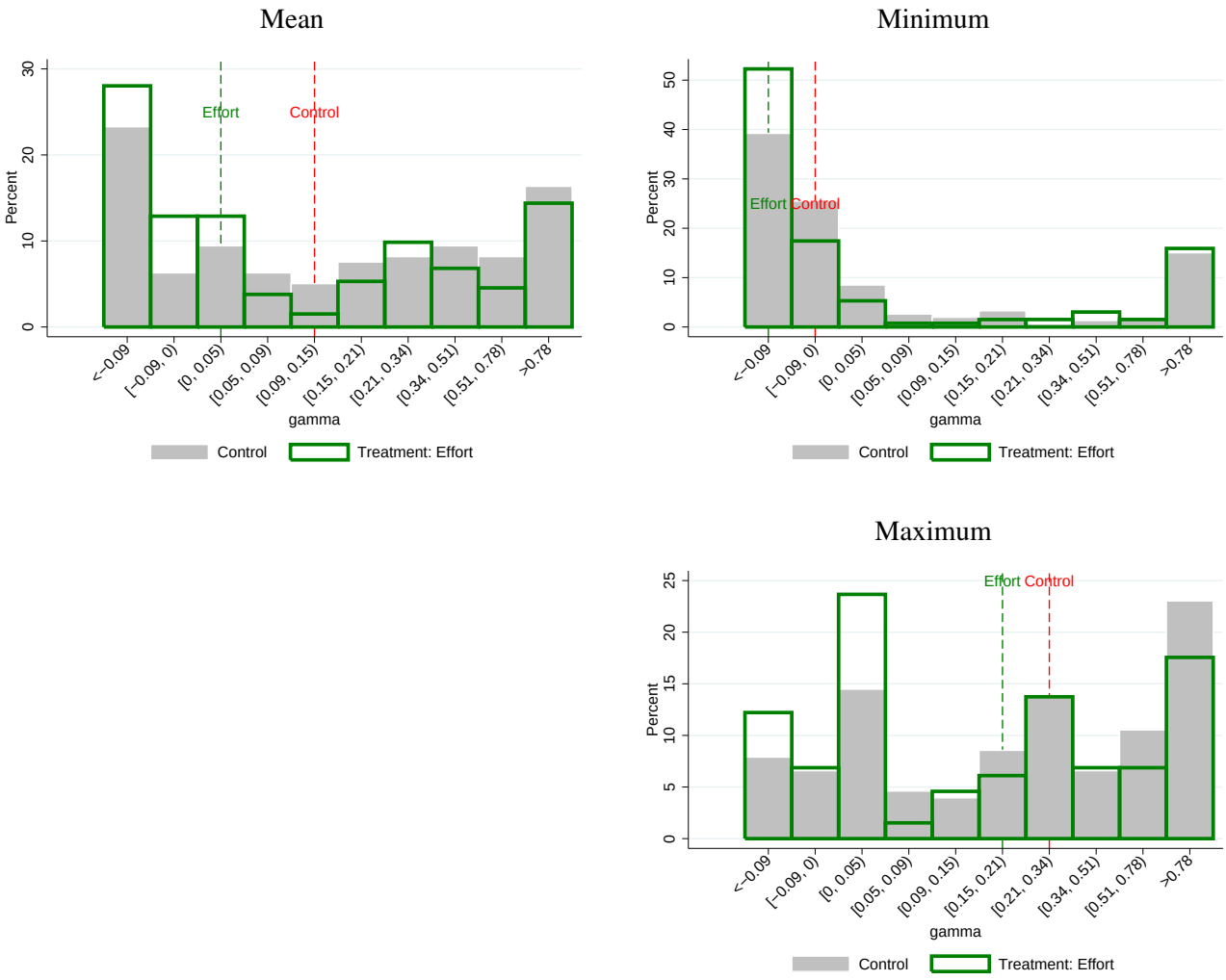
Notes: This image presents the distribution of γ estimated using the main sample, comparing the results for the set of choices at the mean with those of obtained using the set of choices at the minimum. Inequality aversion parameter is based on equation 2. It presents the comparison for the four treatment arm: Effort (Panel a), Luck (Panel b), Control (Panel c) and Mobility (Panel d. In the *x-axis* we report the implied value of γ associated with different alternative choices of A and B_z. On the *y-axis* we report the frequency of γ associated with each choice. The grey line indicates the distribution of γ when participants choose at the mean while the red line represents the distribution of γ when participants choose at the minimum.

Figure B.2: Heterogeneous Responses by Position, Maximum vs. Mean by Treatment Arm



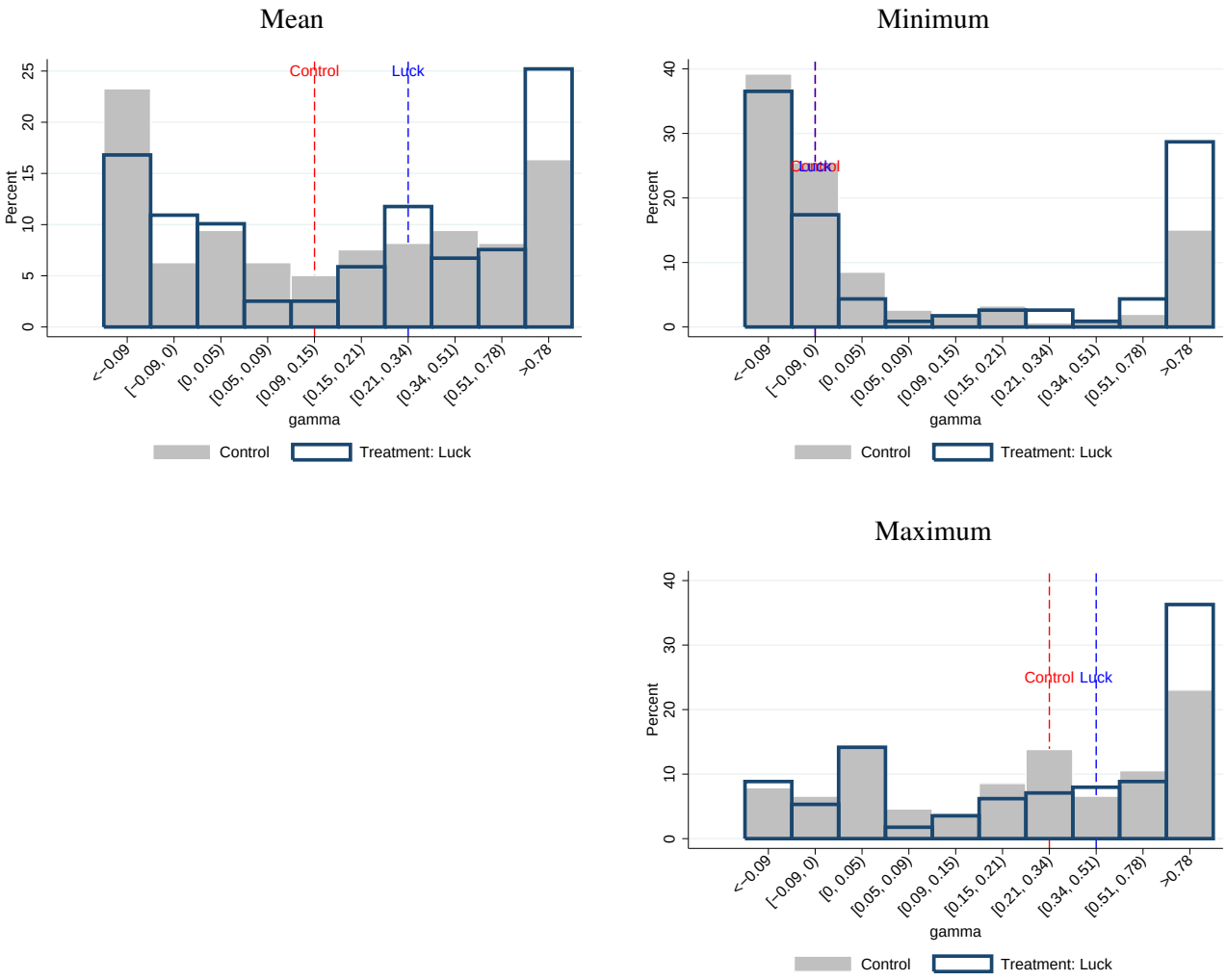
Notes: This image presents the distribution of γ estimated using the main sample, comparing the results for the set of choices at the mean with those of obtained using the set of choices at the maximum. Inequality aversion parameter is based on equation 2. It presents the comparison for the four treatment arm: Effort (Panel a), Luck (Panel b), Control (Panel c) and Mobility (Panel d. In the *x-axis* we report the implied value of γ associated with different alternative choices of A and B_z. On the *y-axis* we report the frequency of γ associated with each choice. The grey line indicates the distribution of γ when participants choose at the mean while the green line represents the distribution of γ when participants choose at the maximum. The dashed line indicates our estimate for the median γ.

Figure B.3: Treatment Effect by Position - Effort vs Control



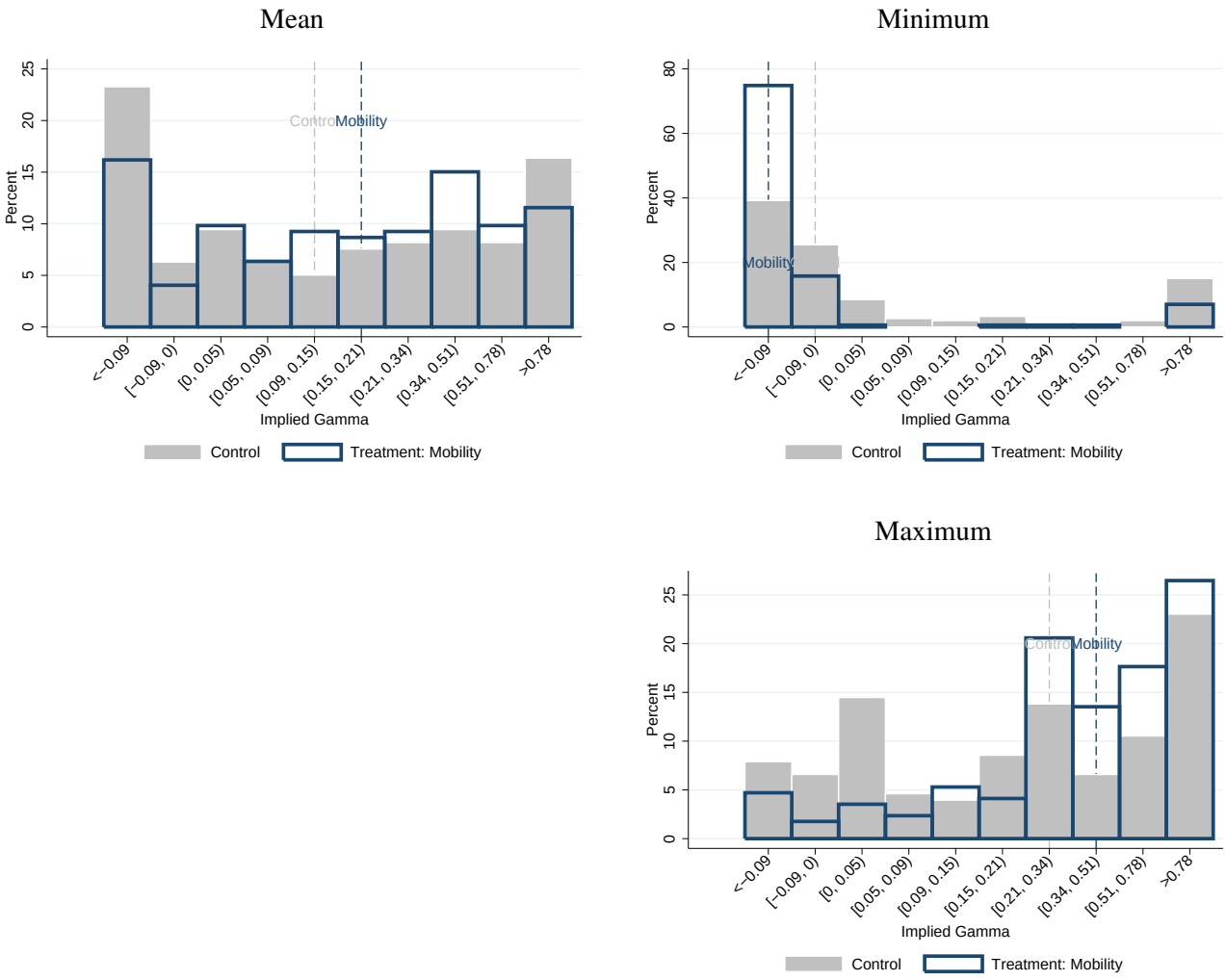
Notes: This image presents the distribution of γ estimated using the main sample, comparing the results based on effort treatment with those of obtained using the control group. Inequality aversion parameter is based on equation 2. It presents the comparison for the three position arm: Mean (Panel a), Minimum (Panel b) and Maximum (Panel c). In the *x-axis* we report the implied value of γ associated with different alternative choices of A and B_z. On the *y-axis* we report the frequency of γ associated with each choice. The green line indicates the distribution of γ for the effort treatment while the grey line represents the distribution of γ for the control group. The dashed line indicates our estimate for the median γ.

Figure B.4: Treatment Effect by Position - Luck vs Control



Notes: This image presents the distribution of γ estimated using the main sample, comparing the results based on luck treatment with those of obtained using the control group. Inequality aversion parameter is based on equation 2. It presents the comparison for the three position arm: Mean (Panel a), Minimum (Panel b) and Maximum (Panel c). In the *x-axis* we report the implied value of γ associated with different alternative choices of A and B_z. On the *y-axis* we report the frequency of γ associated with each choice. The blue line indicates the distribution of γ for the effort treatment while the grey line represents the distribution of γ for the control group. The dashed line indicates our estimate for the median γ.

Figure B.5: Treatment Effect by Position - Mobility vs Control



Notes: This image presents the distribution of γ estimated using the main sample, comparing the results based on mobility treatment with those of obtained using the control group. Inequality aversion parameter is based on equation 2. It presents the comparison for the three position arm: Mean (Panel a), Minimum (Panel b) and Maximum (Panel c). In the *x-axis* we report the implied value of γ associated with different alternative choices of A and B_z. On the *y-axis* we report the frequency of γ associated with each choice. The blue line indicates the distribution of γ for the effort treatment while the grey line represents the distribution of γ for the control group. The dashed red line indicates our estimate for the median γ.

Table B.6: Treatment Effect - Position - By Treatment Arm

	Control	Effort	Luck	Mobility
	(1)	(2)	(3)	(4)
Min vs Mean	-0.253***	-0.301***	-0.241***	-0.592***
	(0.067)	(0.077)	(0.080)	(0.052)
N	356	290	284	418
Max vs. Mean	0.191***	0.105**	0.123**	0.241***
	(0.056)	(0.053)	(0.061)	(0.038)
N	356	290	284	418
Max vs. Min	0.447***	0.385***	0.395***	0.879***
	(0.063)	(0.065)	(0.087)	(0.059)
N	356	290	284	418
Controls	X	X	X	X
Treatment FE	X	X	X	X
Median/Mean at Mean	0.208	0.130	0.304	0.235
Median/Mean at Min.	-0.050	-0.179	0.096	-0.627

B.4 Robustness Test: an Expanded Sample of Consistent Responses

Table B.7: Treatment Effect - Between individuals experiment when making choices at the mean (all consistent responses)

	OLS	Quant. Reg.	Interval Reg.
Effort vs Control	-0.051	-0.065*	-0.061
	(0.036)	(0.039)	(0.043)
If inconsistent in others	0.003	0.051	-0.005
	(0.041)	(0.050)	(0.048)
N	579	579	579
Luck vs Control	0.089**	0.064	0.095**
	(0.037)	(0.046)	(0.043)
If inconsistent in others	-0.004	0.036	-0.032
	(0.042)	(0.058)	(0.047)
N	562	562	562
Effort vs Luck	-0.151***	-0.129***	-0.157***
	(0.037)	(0.044)	(0.045)
If inconsistent in others	0.013	0.014	0.005
	(0.041)	(0.053)	(0.049)
N	533	533	533
Mobility	0.012	0.054	0.012
	(0.033)	(0.038)	(0.037)
If inconsistent in others	-0.038	-0.025	-0.051
	(0.042)	(0.052)	(0.047)
N	623	623	623
Controls	X	X	X
Dummy for missing	X	X	X
Median/Mean	0.202	0.121	0.208

Notes: Inequality aversion parameter is based on equation 2 and the sample of between treatment experiments. It includes participants that make consistent choices at the mean, but inconsistent choices in the other positions.

Table B.8: Treatment Effect - Between Individuals Experiment When Making Choices at the Minimum (All Consistent Responses)

	OLS	Quant. Reg.	Interval Reg.
Effort vs Control	-0.045	-0.059	-0.082
	(0.037)	(0.061)	(0.062)
If inconsistent in others	0.021	0.028	0.023
	(0.044)	(0.072)	(0.069)
N	596	596	596
Luck vs Control	0.095**	-0.000	0.138**
	(0.040)	(0.038)	(0.067)
If inconsistent in others	-0.030	-0.000	-0.078
	(0.046)	(0.044)	(0.076)
N	595	595	595
Effort vs Luck	-0.138***	-0.120**	-0.226***
	(0.040)	(0.060)	(0.071)
If inconsistent in others	-0.044	-0.023	-0.076
	(0.043)	(0.066)	(0.075)
N	575	575	575
Mobility	-0.216***	-0.317***	-0.489***
	(0.032)	(0.026)	(0.072)
If inconsistent in others	0.001	0.000	-0.050
	(0.038)	(0.032)	(0.080)
N	659	659	659
Controls	X	X	X
Dummy for missing	X	X	X
Median/Mean	0.202	0.121	0.208

Notes: Inequality aversion parameter is based on equation 2 and the sample of between treatment experiments. It includes participants that make consistent choices at the minimum, but inconsistent choices in other positions.

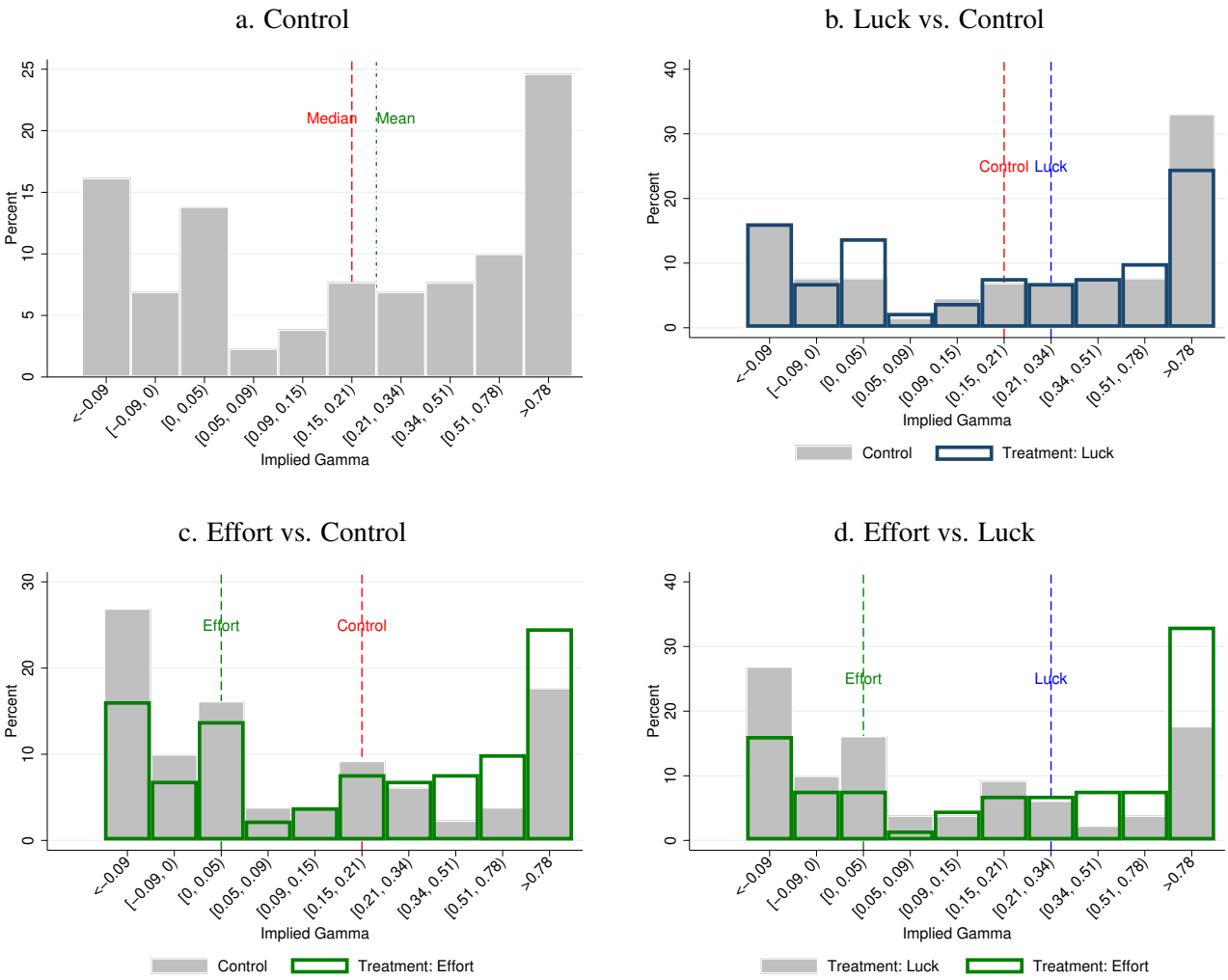
Table B.9: Treatment effect for informational treatments between groups when respondents make choices at the maximum (all consistent responses)

	OLS	Quant. Reg.	Interval Reg.
Effort vs Control	-0.142***	-0.155***	-0.150***
	(0.031)	(0.036)	(0.035)
If inconsistent in others	-0.025	0.004	-0.064*
	(0.035)	(0.042)	(0.037)
N	611	611	611
Luck vs Control	-0.001	-0.046	0.007
	(0.034)	(0.054)	(0.040)
If inconsistent in others	-0.003	0.025	-0.028
	(0.037)	(0.061)	(0.044)
N	598	598	598
Effort vs Luck	-0.153***	-0.118***	-0.163***
	(0.032)	(0.044)	(0.038)
If inconsistent in others	-0.039	0.000	-0.073*
	(0.034)	(0.046)	(0.038)
N	597	597	597
Mobility	0.085***	0.113**	0.100***
	(0.030)	(0.045)	(0.034)
If inconsistent in others	0.023	0.051	-0.009
	(0.035)	(0.054)	(0.039)
N	660	660	660
Controls	X	X	X
Dummy for missing	X	X	X
Median/Mean	0.202	0.121	0.208

Notes: Inequality aversion parameter is based on equation 2 and the sample of between treatment experiments. It includes participants that make consistent choices at the maximum, but inconsistent choices in other positions.

B.5 Within experiment results

Figure B.6: Aversion to Inequality Distribution - Effort vs luck treatment at individual level



Notes: Inequality aversion parameter is based on equation 2 and the sample of students in which we applied the fairness treatment at individual level. It excludes participants that make inconsistent choices in at least one of the three replications of the experiment (control, Effort, Luck). It includes the responses of 130 individuals and 390 observations of gamma. Panel a includes responses based on control group. Panel b includes responses based on control group and treatment luck. Panel c includes responses based on control group and treatment effort. Panel d includes responses based on treatments effort and luck.

B.6 Non-self-centered Inequality Aversion

We use the model and strategy proposed in Burone and Leites (2019) to estimate non-self-centered inequality aversion. In this section we briefly present the model and strategy.

The model is presented in equation 10.

$$U_{ij}(x_{ij}, \Phi_j, \hat{\gamma}_j, \hat{\beta}_{ij}, \hat{\alpha}_{ij}) = (x_{ij})[RD]^{-\hat{\alpha}}[RA]^{-\hat{\beta}}(\Phi_j)^{-\hat{\gamma}} \tag{10}$$

where

Where U_i is the utility of individual i, which depends on income of individuals 1 (x_1) to N (x_N). N is the number of individuals in society.

v_{x_i} is a function of an individual's i income. A and B in the model capture the effect of distance between an individual's income and rest of society's income, while the last component of equation 10 is the unbiased inequality aversion component as Φ is a measure of inequality in society which does not depend of position (we use the variation coefficient). $f(x)$ is the income distribution function.

Note that RA is the sum of income of all individuals in society that have more than individual i while RD is the sum of income of all individuals in society who have less than individual i.

In the model α is the parameter which captures the effect on utility of the distance between individual's income and the income of all individuals in society who have more. β captures the effect on utility of the distance between individual's income and the income of all who have less. So α and β capture the effect on aversion to inequality due to position while γ is the unbiased measure of inequality aversion.

If we know the choices made for individuals between societies A and B in three different positions, and if society's values (i.e: $f(x)$, x_{max} and x_{min}) are known (as we do in the context of the questionnaire made), solving for each position where individuals have to choose:

$$U_i^A = U_i^B$$

$$\hat{\hat{\gamma}}_{i,j}(e_j, M_j, \hat{\beta}, \hat{\alpha}) == \frac{\log\left(\overline{x_B}/\overline{x_A}\right) - \alpha \log\left(\frac{(x_{maxB} - \overline{x_B})/\overline{x_B}}{(x_{maxA} - \overline{x_A})/\overline{x_A}}\right) - \beta \log\left(x_{maxB}/x_{maxA}\right)}{\log\left(\Phi_B/\Phi_A\right)}$$

When $x_i = x_{min}$:

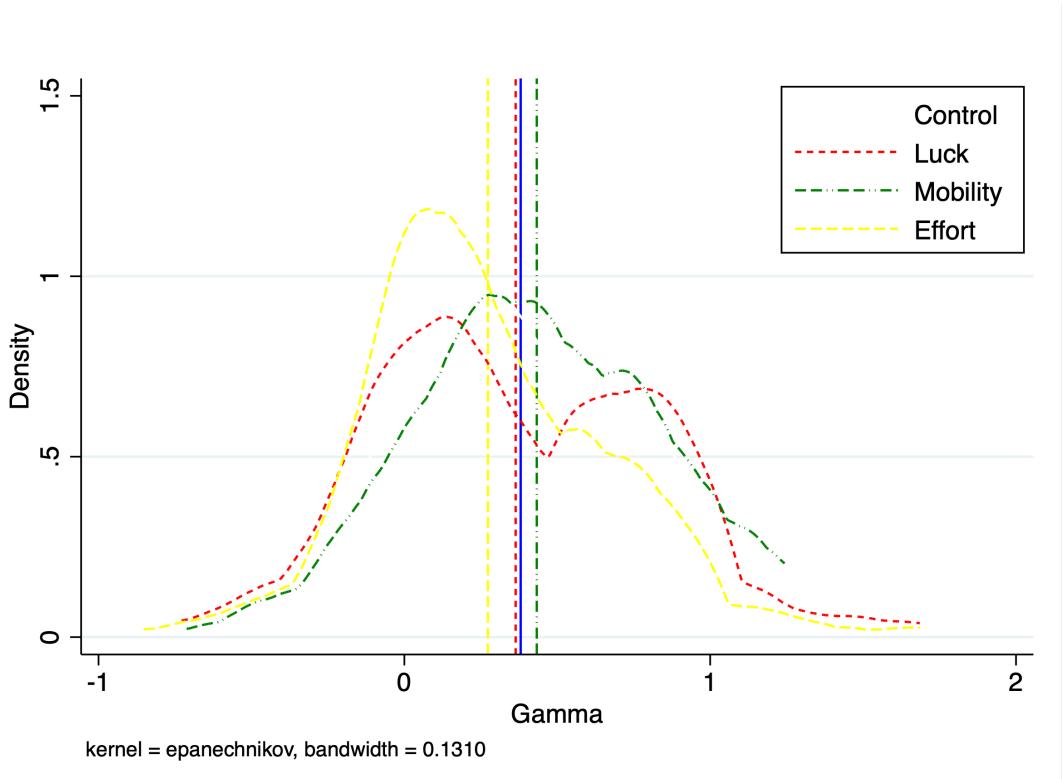
$$\hat{\hat{\gamma}}_{i,j}(e_j, M_j, \hat{\beta}, \hat{\alpha}) == \frac{\log\left(x_{minB}/x_{minA}\right) - \alpha \log\left(\frac{(x_{maxB} - x_{minB})/x_{minB}}{(x_{maxA} - x_{minA})/x_{minA}}\right) - \beta \log\left(x_{maxB}/x_{maxA}\right)}{\log\left(\Phi_B/\Phi_A\right)}$$

When $x_i = x_{max}$:

$$\hat{\tilde{\gamma}}_{i,j}(e_j, M_j, \hat{\beta}, \hat{\alpha}) == \frac{\log\left(x_{maxB}/x_{maxA}\right) - \beta \log\left(x_{maxB}/x_{maxA}\right)}{\log\left(\Phi_B/\Phi_A\right)}$$

We obtain three equations which represent the indifference preferences between society A and B_j for the three positions. We get a system of non-linear equations that can be solved. Doing this, we get $\gamma_{i,j}(e_j, M_j, \hat{\beta}, \hat{\alpha})$ for each individual, a parameter that captures unbiased inequality aversion, taking into account position and combining all choices made for participants. The system allows us to identify the values of $\hat{\tilde{\gamma}}$, $\hat{\beta}$, and $\hat{\alpha}$ that are compatible with the preferences of individuals. The parameters are estimated based on a situation of indifference among the societies A and B_j, which implies an assumption. However Burone and Leites (2019) discusses the implication of this assumption and used simulations to demonstrate that this strategy provides an accurate measure of $\hat{\tilde{\gamma}}$, $\hat{\beta}$, and $\hat{\alpha}$.

Figure B.7: Kernel Density Estimation. Treatment Effect for Non Self-Centered Inequality Aversion



Notes: Kolmogorov Smirnov Test for equal distribution was carried for each treatment one to one. The null hypothesis of equal distribution was rejected with 97,5% confidence for all treatments except: Control vs Luck and Control vs Mobility.

Table B.10: Treatment Effect - Not Self Centered Inequality Aversion

	OLS	
	(1)	(2)
Effort vs Control	-0.107***	-0.117***
	(0.040)	(0.039)
N	441	441
Luck vs Control	-0.016	-0.023
	(0.043)	(0.045)
N	435	435
Effort vs Luck	-0.091**	-0.093**
	(0.043)	(0.042)
N	400	400
Mobility	0.053	0.056
	(0.037)	(0.038)
N	506	506
Controls		X
Dummy for missing		X

Notes: Regression analysis by OLS for the treatments effects is presented in this Table using an alternative definition of inequality aversion which accounts for self centred and non self centered inequality aversion as explained in this section (i.e: according to equation (10))

C Online Appendix

C.1 Details of the Experimental Survey

Figure C.1: Screenshot of Introductory Message

Research about preferences for redistribution (FCEA - UdelaR)

The information collected in this survey has exclusively an academic purpose and will be treated as confidential.

Filling the survey takes between 10 and 15 minutes. The questionnaire is comprised by two parts. The first one collects a series of choices under alternative scenarios. The second part contains a brief set of background question.

We appreciate the time you will dedicate to complete the survey. Your participation allow us to carry out this research project. From all our team, we truly thank you and we hope you enjoy being part of this research.

- I want to participate in the survey and I am older than 18 years old
- I do not want to participate in the survey
- I want to participate in the survey but I am younger than 18 years old

Figure C.2: Screenshot of Baseline Instructions

Instructions

- Next, we ask you to make a series of choices

- Imagine that 60 years have passed, you are no longer alive, and you have the chance to choose in which society your only grandchild will live

- In these societies, the public sector does not provide any goods or services like education, health or housing. These are exclusively supplied by the private sector. All goods and services are of the same quality and the same quantity of goods is available in each one of the societies.

- Income distribution in each society is represented by a building. This means that people living in the highest floor are the ones who have more income and people living in the lowest floor are the ones who have less income. In addition, the level of income of an individual increases proportionally when moving upwards. In each floor there is the same number of people, and therefore any individual (except your grandchild) has the same chance of locating in any of the floors and reaching the corresponding level of income.

- Each choice is independent of previous or following choices

- There are no wrong or right answers. We ask you to carefully think in each case which is your preferred alternative

Table C.1: Detail process of data collection and distribution of the survey

Experiment	Main Experiment	Main Experiment	Within Experiment	Within Experiment
Audience Size	2956	3126	638	659
Date	28/05/2018	29/08/2019	16/10/2018	12/11/2019
Reminder	15/06/2018 20/08/2018	16/09/2019	04/12/2018	05/12/2019 23/12/2019
Surveys started	1486	816	126	217
Surveys Finished	1052	737	67	208
Rejections	191	22	16	20
Response Rate	82%	97%	76%	90%
Rejection Rate	18%	3%	24%	10%
Details	1st Gen 2018	1st Gen 2019	2nd Gen 2018	2nd Gen 2019

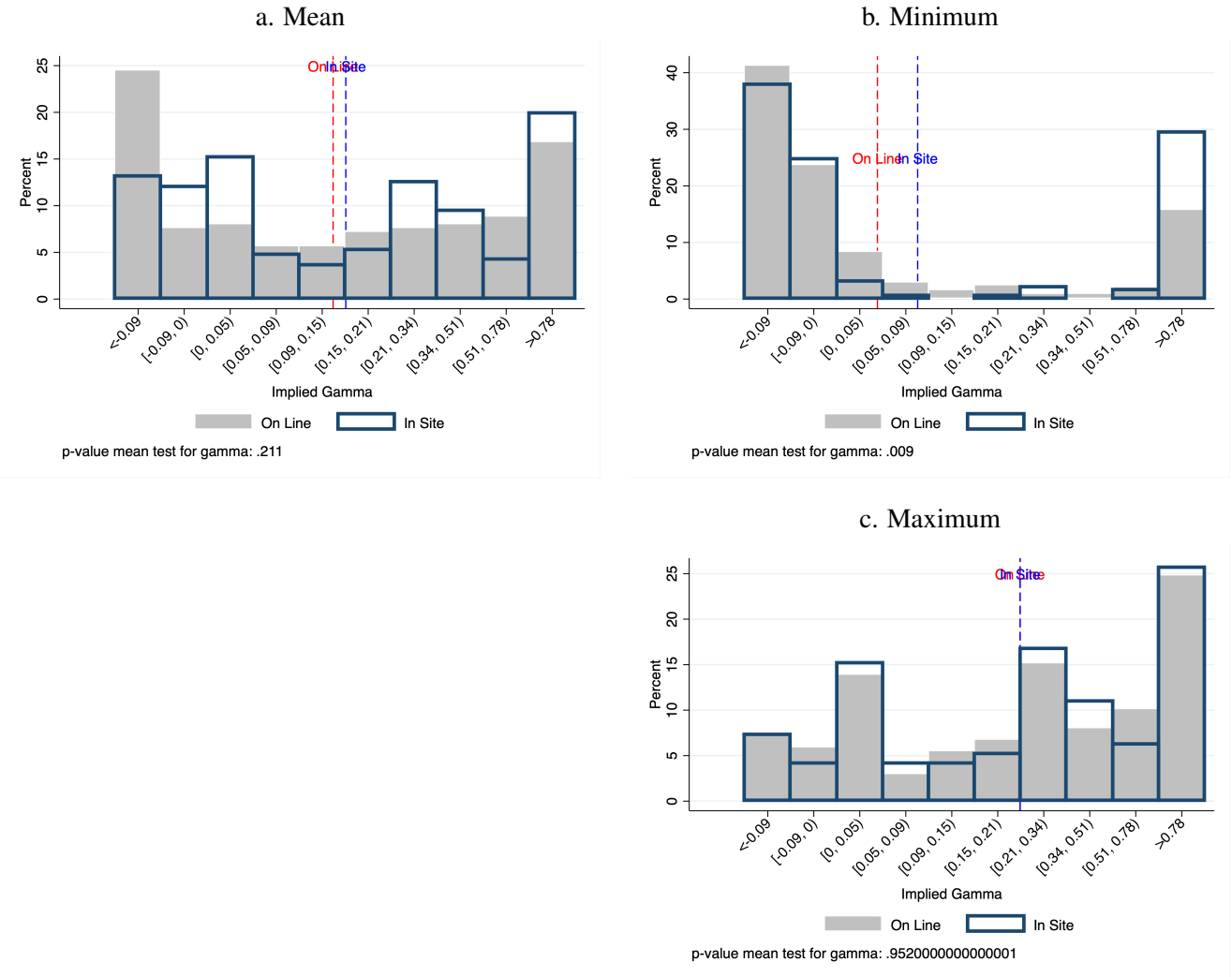
Notes: Details of number of participants, reminder, dates, rate of response/rejection and number of surveys started and finished in each wave of the survey .

C.2 Additional Robustness checks

C.2.1 Results Online vs In-site Experiment

[H]

Figure C.3: Aversion to Inequality Distribution - Online vs In-Site experiment



This image presents the distribution of γ, comparing the results for our online experiment with the in site experiment previoulsy carried by Burone and Leites (2019) using the set of choices at the mean (Panel a), minimum (Panel b) and Maximum (Panel c). In the *x-axis* we report the implied value of γ associated with different alternative choices of A and B_z. On the *y-axis* we report the frequency of γ associated with each choice. The dashed line indicates our estimate for the median γ. On footnote the p-value of a mean test for each sample is presented.

C.3 Adjusting for Consistent Responses

Table C.2: Criteria used to identify γ among inconsistent responses

Assigned γ	Set of Choices (only inconsistent responses)
$(-\infty, -0.09)$	$\{A, A, B_3, A, A, A, A, A, A\}$
	$\{A, A, A, B_4, A, A, A, A, A\}$
	$\{A, A, A, A, B_5, A, A, A, A\}$
	$\{A, A, A, A, a, B_6, A, A, A\}$
	$\{A, A, A, A, A, A, B_7, A, A\}$
	$\{A, A, A, A, A, A, A, B_8, A\}$
	$\{A, A, A, A, A, A, A, A, B_9\}$
[0,0.05)	$\{A, B_2, A, A, A, A, A, A, A\}$
$[0.05, 0.09)$	$\{A, B_2, B_3, A, A, A, A, A, A\}$
	$\{B_1, A, B_3, A, A, A, A, A, A\}$
$[0.09, 0.15)$	$\{A, B_2, B_3, B_4, A, A, A, A, A\}$
	$\{B_1, B_2, A, B_4, A, A, A, A, A\}$
$[0.15, 0.21)$	$\{A, B_2, B_3, B_4, B_5, A, A, A, A\}$
	$\{B_1, B_2, B_3, A, B_5, A, A, A, A\}$
$[0.21, 0.34)$	$\{A, B_2, B_3, B_4, B_5, B_6, A, A, A\}$
	$\{B_1, B_2, B_3, B_4, A, B_6, A, A, A\}$
$[0.34, 0.51)$	$\{A, B_2, B_3, B_4, B_5, B_6, B_7, A, A\}$
	$\{B_1, B_2, B_3, B_4, B_5, A, B_7, A, A\}$
$[0.51, 0.78)$	$\{A, B_2, B_3, B_4, B_5, B_6, B_7, B_8, A\}$
	$\{B_1, B_2, B_3, B_4, B_5, B_6, A, B_8, A\}$
$[0.78, +\infty)$	$\{A, B_2, B_3, B_4, B_5, B_6, B_7, B_8, B_9\}$
	$\{B_1, A, B_3, B_4, B_5, B_6, B_7, B_8, B_9\}$
	$\{B_1, B_2, A, B_4, B_5, B_6, B_7, B_8, B_9\}$

Notes: This criteria is used to define adjusted consistent responses in the sample III (see B.5). The consistent responses followed the presented values in Table A.1 . The rest of the responses were excluded.

Table C.3: Treatment Effect - Between individuals experiment when consistent responses are adjusted

	OLS		Quant. Reg.
Interval Reg.			
	(1)	(2)	(3)
Effort vs Control	-0.060*	-0.054*	-0.068*
	(0.035)	(0.030)	(0.040)
If adjusted response	-0.027	0.017	-0.029
	(0.056)	(0.052)	(0.064)
N	572	572	572
Luck vs Control	0.078**	0.075**	0.084**
	(0.036)	(0.037)	(0.040)
If adjusted response	-0.036	-0.031	-0.039
	(0.054)	(0.059)	(0.060)
N	568	568	568
Effort vs Luck	-0.143***	-0.123***	-0.154***
	(0.034)	(0.031)	(0.037)
If adjusted response	-0.057	-0.021	-0.064
	(0.040)	(0.042)	(0.044)
N	562	562	562
Mobility	0.018	0.082**	0.013
	(0.033)	(0.038)	(0.035)
If adjusted response	-0.034	-0.102	-0.036
	(0.056)	(0.067)	(0.060)
N	622	622	622
Controls	X	X	X
Median/Mean	0.192	0.121	0.199

Notes: Inequality aversion parameter is based on equation 2 and the sample of between treatment experiments. It includes participants that make inconsistent choices, whose responses are adjusted.

Table C.4: Treatment Effect Position - when consistent responses are adjusted

	OLS		Quant. Reg.	Interval Reg.	N
	(1)	(2)	(3)	(4)	
Min vs Mean	-0.236***	-0.234***	-0.229***	-0.243***	1,956
	(0.015)	(0.014)	(0.023)	(0.016)	
If adjusted response	0.009	0.083	-0.025	0.013	
	(0.018)	(0.303)	(0.025)	(0.019)	
Max vs. Mean	0.160***	0.161***	0.108***	0.146***	2,147
	(0.013)	(0.012)	(0.011)	(0.012)	
If adjusted response	-0.071***	-0.080	-0.064***	-0.063***	
	(0.015)	(0.106)	(0.013)	(0.014)	
Max vs. Min	0.331***	0.331***	0.305***	0.334***	
	(0.015)	(0.014)	(0.027)	(0.016)	1,953
If adjusted response	0.071***	0.194	0.019	0.081***	
	(0.022)	(0.138)	(0.033)	(0.023)	
Controls		X	X	X	
Treatment FE	X				
Median/Mean at Mean	0.150	0.150	0.070	0.098	
Median/Mean at Min.	-0.029	-0.029	-0.362	-0.226	

Notes: Inequality aversion parameter is based on equation 2 and the sample of between treatment experiments. It includes participants that make inconsistent choices, whose responses are adjusted.

C.4 Additional Analysis for the experiment within individual.

Table C.5: Treatment Effect - Effort vs luck treatment at individual level, different Specifications

	OLS		Quant. Reg.	Interval Reg.	
	(1)	(2)	(3)	(4)	(5)
Effort vs Control	-0.165***	-0.165***	-0.132*	-0.199***	-0.200***
	(0.027)	(0.052)	(0.072)	(0.070)	(0.063)
N	260	260	260	260	260
Luck vs Control	0.060	0.060	0.031	0.087	0.091
	(0.038)	(0.054)	(0.091)	(0.077)	(0.071)
N	260	260	260	260	260
Effort vs Luck	-0.225***	-0.225***	-0.195**	-0.295***	-0.298***
	(0.039)	(0.054)	(0.081)	(0.077)	(0.071)
N	260	260	260	260	260
Controls	FE	C	C		c
Median/Mean	0.306	0.306	0.185	0.339	0.339

Notes: Inequality aversion parameter is based on equation 2 and the sample of students in which we applied the fairness treatment at individual level. It excludes participants that make inconsistent choices in at least one of the three replications of the experiment (Control, Effort, Luck). It includes the responses of 130 individuals and 390 observations of gamma..

Table C.6: Robustness Checks: Paid Attention and Understood the Experiment (sample of within treatment experiment) Interval regressions

	Full Sample	Serious	Understood	Both
	(1)	(2)	(3)	(4)
Effort vs Control	-0.200***	-0.211***	-0.185***	-0.196***
	(0.063)	(0.067)	(0.068)	(0.073)
N	260	236	216	192
Luck vs Control	0.091	0.084	0.087	0.078
	(0.071)	(0.076)	(0.077)	(0.083)
N	260	236	216	192
Effort vs Luck	-0.298***	-0.303***	-0.277***	-0.281***
	(0.071)	(0.076)	(0.077)	(0.084)
N	260	236	216	192
Controls	X	X	X	X
Median/Mean	0.438	0.458	0.430	0.452

Notes: Inequality aversion parameter is based on equation 2 and sample of students in which we applied the fairness treatment at the individual level. It excludes participants that make inconsistent choices in at least one of the three replications of the experiment (Control, Effort, Luck).

Table C.7: Distribution of Inconsistent Answers - By Treatment Arm (within sample)

Treatment	Consistent	Inconsistent	% Inconsistent
Control	158	30	15.96
Effort	164	24	12.77
Luck	165	23	12.23

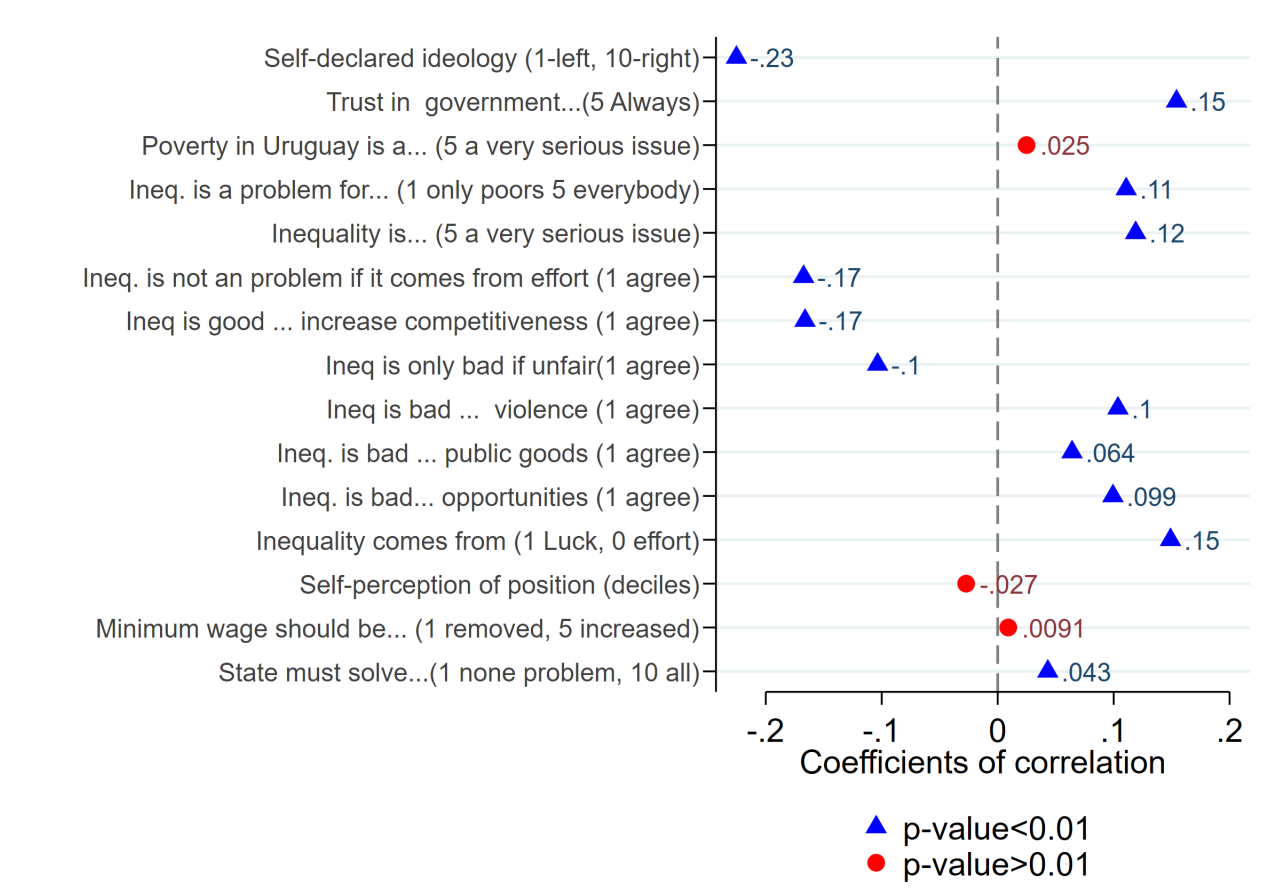
Table C.8: Effort vs luck treatment at individual level: Regression of Consistency over Observable Variables

	Dep. Var: Dummy for Consistency	
	(1)	(2)
Age of the respondent	0.004	0.002
	(0.004)	(0.003)
Missing Age	-0.079	0.103
	(0.156)	(0.151)
Female	0.106	0.096
	(0.072)	(0.072)
Number of HH members	-0.007	-0.006
	(0.024)	(0.024)
Missing number of HH members	0.303	-0.004
	(0.304)	(0.302)
Work: Part Time	-0.114	-0.089
	(0.089)	(0.089)
Work: Full Time	-0.248***	-0.218**
	(0.090)	(0.089)
Father: High School or other	0.085	0.077
	(0.074)	(0.075)
Father: College or more	0.017	0.028
	(0.118)	(0.120)
Mother: High School or other	-0.023	-0.018
	(0.074)	(0.072)
Mother: College or more	-0.079	-0.058
	(0.143)	(0.147)
USD 1000 - USD 2000	-0.131	-0.132
	(0.084)	(0.083)
More than USD 2000	0.019	0.042
	(0.089)	(0.088)
Understands		-0.039
		(0.092)
Attention		0.264**
		(0.107)
Constant	0.276*	0.052
	(0.148)	(0.213)
Observations	187	186

Notes: In the three specifications the dependent variable is a dummy to indicate consistency in the questionnaire. The different columns differ in the regresors included in the model as indicated by the rows. Omitted category (all dummies = 0) corresponds to: does not work, father education high school or less, mother education high school or less, household income less than USD 1000 monthly and assigned to control group.

C.5 Interpretation of Inequality Aversion Parameter (γ)

Figure C.4: Interpretation of γ: Correlation coefficients



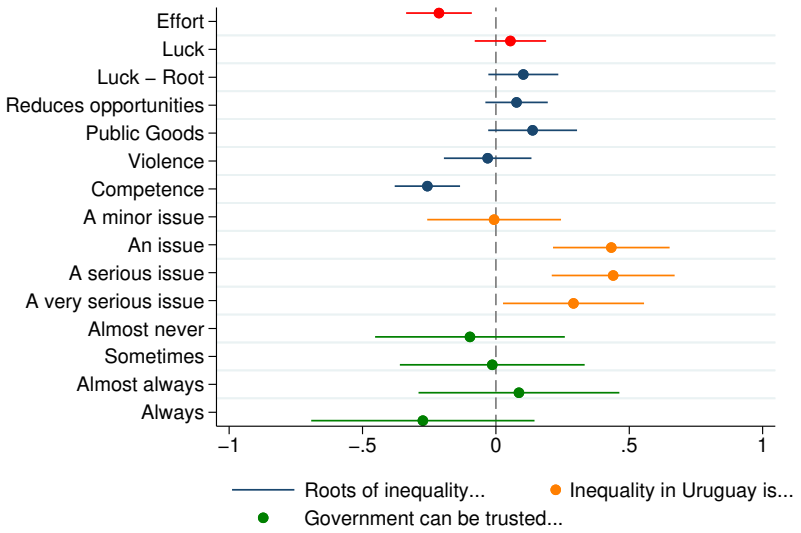
Notes: Inequality aversion parameter is based on equation 2. These coefficients were estimated using the baseline sample. Coefficients were estimated using interval regression.

Table C.9: Interpreting Gamma - Intervals regression. Estimates based on main sample (pooled data)

	(1)			(2)			(3)			(4)		
	coef		tstat	coef		tstat	coef		tstat	coef		tstat
hline Luck - Root	0.186	***	6.459	0.159	***	5.618	0.159	***	5.591	0.177	***	6.471
Reduces opportunities	0.007		0.233	-0.006		-0.199	-0.007		-0.258	-0.005		-0.164
Public Goods	0.050	*	1.858	0.051	*	1.915	0.050	*	1.877	0.067	**	2.556
Violence	0.122	***	4.385	0.112	***	4.117	0.113	***	4.162	0.126	***	4.693
Competence	-0.213	***	-6.681	-0.189	***	-6.019	-0.190	***	-6.059	-0.219	***	-7.239
Inequality is a minor issue	0.067		0.916	0.098		1.351	0.098		1.345	0.078		1.135
Inequality is an issue	0.080		1.104	0.100		1.385	0.097		1.340	0.095		1.410
Inequality is a serious issue	0.129	*	1.718	0.137	*	1.851	0.132	*	1.765	0.136	*	1.954
Inequality is a very serious issue	0.157	**	2.022	0.139	*	1.803	0.134	*	1.741	0.184	**	2.545
Trust in Govt: Almost never	0.146	***	3.445	0.120	***	2.931	0.120	***	2.941	0.161	***	3.928
Trust in Govt: Sometimes	0.197	***	5.013	0.132	***	3.404	0.130	***	3.335	0.221	***	5.921
Trust in Govt: Almost always	0.461	***	8.332	0.314	***	5.521	0.313	***	5.488	0.475	***	9.050
Trust in Govt: Always	0.359	**	2.546	0.191		1.298	0.184		1.238	0.334	**	2.261
Treatment: Effort	-0.076	**	-2.132	-0.081	**	-2.342	-0.079	**	-2.288	-0.071	**	-2.032
Treatment: Luck	0.110	***	2.785	0.095	**	2.473	0.097	**	2.484	0.092	**	2.425
Treatment: Mobility	-0.081	**	-2.429	-0.084	**	-2.523	-0.083	**	-2.506	-0.084	***	-2.640
Position: Minimum	-0.341	***	-10.678	-0.339	***	-10.776	-0.339	***	-10.777	-0.345	***	-11.022
Position: Maximum	0.204	***	7.317	0.203	***	7.428	0.203	***	7.437	0.199	***	7.292
Age of the respondent	0.003	*	1.822	0.004	**	2.246	0.004	**	2.224			
Dummy for female	-0.002		-0.087	-0.006		-0.221	-0.005		-0.190			
Number of people in the HH	-0.008		-1.001	-0.007		-0.860	-0.005		-0.693			
Hours Worked = 1, Works part-time	0.033		1.009	0.026		0.817	0.021		0.639			
Hours Worked = 2, Works Full-Time	0.053		1.417	0.038		1.025	0.035		0.930			
Father's Education = 2, High School and others	-0.006		-0.199	-0.013		-0.442	-0.010		-0.336			
Father's Education = 3, Completed College or more	-0.092	**	-2.079	-0.116	***	-2.672	-0.115	***	-2.630			
Mother's Education = 2, High School and others	0.053	*	1.737	0.056	*	1.898	0.058	*	1.927			
Mother's Education = 3, Completed College or more	0.062		1.438	0.074	*	1.748	0.082	*	1.895			
Perceived position (decil 4, 5 and 6)	-0.061		-1.475	-0.060		-1.513	-0.055		-1.359			
Perceived position (decil 7, 8, 9 and 10)	-0.107	**	-2.049	-0.101	**	-1.999	-0.095	*	-1.811			
Year of the survey	-0.038		-1.406	-0.039		-1.460	-0.040		-1.500	-0.017		-0.659
Ideology: Center (5)				-0.196	***	-5.245	-0.197	***	-5.241			
Ideology: right (¿ 5)				-0.247	***	-6.516	-0.247	***	-6.487			
Missing in ideology				-0.218	***	-5.494	-0.216	***	-5.381			
HH Income = 2, Between 1000 and 2000 USD Monthly							0.002		0.051			
HH Income = 3, More than 2000 Monthly							-0.012		-0.308			
Missing in HH Income							-0.047		-1.008			
Constant	-0.179	*	-1.745	0.040		0.382	0.045		0.427	-0.180	**	-2.341
Observations	1,821			1,821			1,821			1,929		

Notes: Inequality aversion parameter is based on equation 2 using the pooled main sample of consistent answers. Coefficients were estimated using interval regression. It excludes participants that make inconsistent choices in at least one of the three replications of the experiment (Control, Effort, Luck).

Figure C.5: Interpreting Gamma - Intervals regression. Estimates based on fairness treatment at individual level



Notes: These coefficients were estimated using interval regression and the within sample experiment. The full estimates are reported in specification I of the table C.10 in the Annex C.5.

Table C.10: Interpreting γ. Interval regression estimates based on fairness treatment at individual level.

	(I)			(II)			(III)			(IV)		
	coef		tstat	coef		tstat	coef		tstat	coef		tstat
Luck - Root	0.060		0.850	0.096		1.328	0.111		1.541	0.141	**	2.258
Reduces opportunities	0.061		0.986	0.068		1.097	0.090		1.507	0.073		1.179
Public Goods	0.145	*	1.750	0.121		1.430	0.135		1.587	0.185	**	2.395
Violence	-0.011		-0.127	0.025		0.303	0.015		0.175	-0.087		-1.033
Competence	-0.243	***	-3.550	-0.258	***	-3.740	-0.270	***	-4.102	-0.302	***	-4.326
Inequality is a minor issue	0.021		0.160	0.109		0.778	0.032		0.228	-0.044		-0.398
Inequality is an issue	0.379	***	3.247	0.453	***	3.841	0.493	***	4.129	0.260	***	2.830
Inequality is a serious issue	0.348	***	2.827	0.432	***	3.451	0.473	***	3.819	0.296	***	2.702
Inequality is a very serious issue	0.334	**	2.354	0.410	***	2.868	0.361	**	2.533	0.290	**	2.458
Trust in Govt: Almost never	-0.036		-0.194	-0.076		-0.389	-0.144		-0.769	-0.055		-0.289
Trust in Govt: Sometimes	0.036		0.191	0.044		0.226	0.006		0.031	-0.002		-0.010
Trust in Govt: Almost always	0.132		0.650	0.142		0.679	0.116		0.588	0.124		0.629
Trust in Govt: Always	-0.232		-1.116	-0.188		-0.845	-0.127		-0.587	-0.369	*	-1.694
Treatment: Effort	-0.212	***	-3.297	-0.212	***	-3.319	-0.213	***	-3.437	-0.213	***	-3.067
Treatment: Luck	0.056		0.796	0.054		0.780	0.051		0.766	0.052		0.710
Age of the respondent	-0.010	**	-2.298	-0.011	***	-2.657	-0.011	***	-2.653			
Dummy for female	-0.009		-0.108	0.021		0.254	0.040		0.494			
Number of people in the HH	0.058	**	2.478	0.072	***	2.998	0.052	**	2.133			
Hours Worked = 1, Works part-time	0.224	***	2.828	0.255	***	3.105	0.261	***	3.263			
Hours Worked = 2, Works Full-Time	0.204	**	2.128	0.198	**	2.091	0.149		1.604			
Missing data in Hours Worked = 3	-2.097	***	-7.481	-1.997	***	-7.101	-1.800	***	-6.147			
Father's Education = 2, High School and others	-0.229	***	-3.226	-0.223	***	-3.267	-0.199	***	-3.022			
Father's Education = 3, Completed College or more	0.062		0.505	0.104		0.833	0.089		0.743			
Missing data in father's Education	-0.251		-1.473	-0.364	**	-2.049	-0.310		-1.507			
Mother's Education = 2, High School and others	0.065		0.973	0.070		1.046	0.025		0.371			
Mother's Education = 3, Completed College or more	0.052		0.405	0.031		0.248	0.019		0.156			
Missing data in Mothers' Education	0.163		0.456	0.098		0.273	0.147		0.410			
Perceived position (decil 4, 5 and 6)	-0.007		-0.071	-0.010		-0.110	-0.010		-0.099			
Perceived position (decil 7, 8, 9 and 10)	-0.132		-1.056	-0.140		-1.092	-0.162		-1.184			
Year of the survey	-0.047		-0.666	-0.041		-0.551	-0.010		-0.153	0.022		0.324
Ideology: Center (5)				0.193	**	2.214	0.227	**	2.431			
Ideology: right (>5)				0.112		1.262	0.097		1.156			
Missing in ideology				-0.012		-0.101	0.135		1.101			
HH Income = 2, Between 1000 and 2000 USD Monthly							-0.157	*	-1.783			
HH Income = 3, More than 2000 Monthly							0.118		1.119			
Missing in HH Income							0.220	*	1.713			
Constant	0.027		0.096	-0.199		-0.663	-0.144		-0.487			
Observations	315			315			315			315		

Notes: Inequality aversion parameter is based on equation 2 and sample of students in which we applied the fairness treatment at the individual level. Coefficients were estimated using interval regression. It excludes participants that make inconsistent choices in at least one of the three replications of the experiment (Control, Effort, Luck).