serie ad

WP-AD 2010-13

Self-interest and justice principles

Ismael Rodríguez-Lara and Luis Moreno-Garrido

Ivie

Working papers
Working papers

Self-interest and justice principles[*]

Ismael Rodríguez-Lara and Luis Moreno-Garrido[**]

Abstract

We introduce non-enforceable property rights over bargaining surplus in a dictator game with production, in which the effort of the agents is differentially rewarded. Using experimental data we elicit individual preferences over the egalitarian, the accountability and the libertarian principle and provide evidence to support the inability of these justice principles to account for the observed behavior. Although this finding is consistent with the idea of individuals interpreting justice principles differently, we show that dictators behave self-interested concerning redistribution and choose which justice principle best maximizes their own payoff. We interpret this result as the justice norm imposing a constraint on otherwise self-maximizing agents.

Keywords: dictator game, justice principles, self-interest, self-serving bias.

JEL Classification: C91, D3, D63, D64, P14.

[**] I. Rodríguez-Lara and L. Moreno-Garrido: University of Alicante. Contact author: ismael@merlin.fae.ua.es

1   Introduction

The dictator game has long been presented as generating clear evidence to support the view that agents behave unselfishly. In this game, one of the players (dictator) chooses how to split a certain amount of money between herself and her counterpart (recipient), who has no strategic input into the final outcome. Thus, the prediction is that dictators will give nothing to recipients if the dictators are not altruistic. However, dictators frequently violate this prediction in experiments, giving around 20% of the pie (see Camerer 2003 for a review of the results).

Although the dictator's behavior has been usually interpreted as support for other-regarding preferences, recent studies emphasize that the dictator game has a caveat for studying fairness or altruistic attitudes given that players do not contribute to the production of the surplus that is distributed. In this vein, Cherry, Frykblom and Shogren (2002) find, under anonymous conditions, that 95% of dictators transfer no money at all when their effort determines the size of the pie, whereas Oxoby and Spraggon (2008) point out that dictators will be prone to give more money away if recipients work for the pie. The idea of desert is also presented in other studies such as Frohlich, Oppenheimer and Kurki (2004), who discuss the relationship between choices based on entitlements and egalitarian divisions of the pie and conclude that dictators are basically motivated by the former criterion.

Our goal in this paper is to elicit the subjects' preferences over justice principles when the effort of the agents is differentially rewarded to determine the size of the pie. We design a laboratory experiment with two phases. In the first phase (the earning stage), subjects earn money by answering a multiple-choice test that pays for each correct answer a fixed random reward. This reward is the same for all questions but might vary across individuals according to three different treatments in which dictators are paid less than, more than, or equal to the recipient for each correct answer. Hence, two factors determine a person's contribution to the pie: her score on the test and the rate at which this score is turned into money. Using this procedure, the available surplus to be divided depends on agents' effort: as a result, rational behavior should be produced, as argued by Cherry, Frykblom and Shogren (2002). In the second phase (the allocation stage), the dictators are randomly selected to split the earned surplus after being informed about each agent's reward for each correct answer and all members' contribution to the pie. Since it is common knowledge that reward levels and roles are completely random, it is likely that distributional preferences based on property rights are highlighted. In particular, the outcome of the second stage is then expected to be categorized according to three different justice principles: (i) dividing the surplus into two identical parts (egalitarian principle), (ii) using the number of agents' correct answers to split the pie (accountability principle) or (iii) taking into

account agents' monetary contribution to the surplus (libertarian principle).[1] We refer to these as natural justice principles.

We find that there is no single natural justice principle that can explain the allocators' choice but that dictators adapt themselves to the exogenous payoff parameter and seem to behave according to the "most selfish" of the natural justice principles. Hence, when dictators earn the money under unfavorable conditions (i.e., when they are paid a smaller reward per correct answer), we reject the libertarian principle (which bases redistribution on the agents' monetary contribution). However, the egalitarian or the accountability principle (which ignore the reward discrimination introduced by experimenters) can be presented as a plausible explanation to describe their behavior in this framework. Not surprisingly, such justice principles do not appear to characterize the dictators' choice when they have earnings under an advantageous position (i.e., when they are paid a higher reward per correct answer). The evidence in this latter scenario pinpoints that dictators respect agents' monetary contribution to the surplus during the first stage, in spite of the exogenous reward discrimination.

The inexistence of a unique natural justice principle supports the main findings of Cappelen et al. (2007, 2009) who highlight that individuals are heterogeneous regarding justice attitudes. However, they do not find evidence for self-serving bias and assume that "individuals have a fairness ideal that is independent of the distributional function in which they find themselves" [Cappelen et al. 2007, page 824]. In contrast, our evidence suggests that dictators endorse a biased-fairness ideal and justice attitudes are context-dependent. More precisely, we show that the justice principle that dictators endorse depends on the external circumstances (i.e., the rewards) that determine the surplus.[2]

The influence of the context in distributional justice has been studied in the field of emprical social choice since Yaari and Bar-Hillel (1984), who attempt at evaluating several distribution mechanisms by the way of

---

[1] Our approach can also be seen as an attempt at studying the extent to which the dictator feels responsible by the reward differences and tries to compensate for them in a laboratory experiment. See Fleurbaey and Maniquet (2009) for a review of the literature on compensation. To see that effort and the resulting sense of entitlement decreases self-interested behavior, read Konow (2000) and List (2007). Importantly, we randomly assign roles and rewards, what accounts for the problem of equality of opportunity given that each subject is given exactly the same opportunities to be rewarded more or less than her counterpart, regardless of their perfomance in the test. The introduction of the random reward is also key to test the libertarian principle, as the accountability and the libetarian principle differ in the weight that subjects assign to effort and circumstances. Finally, roles are randomly assigned because if the dictator is chosen after scoring higher in the test then selfish behavior arises more frequently (Hoffman et al. 1994). This may occur because the dictator associates her role with property rights (i.e., because the dictator role is "earned") or simply because the use of this device to identify the person who is the dictator alerts the dictator to what her property rights are (Harrison and McKee, 1985).

[2] Andreoni and Miller (2002) and Bardsley (2008) use a different approach to show that altruistic concerns change according to the "price of giving".

a questionnaire. Yaari and Bar-Hillel (1984) ask subjects to choose between different allocations and show that framing effects matter as individuals will be prone to choose different solutions for the same distribution problems depending on the prevalence of tastes or needs in the story underlaying each question. The "stated context" is also an important feauture in Konow (2001), who proposes a theory of positive justice in which three different justice principles (the accountability principle, efficiency and taste) interact with the context to determine the final allocation. Konow (2001) concludes that context matters because of the interpretation and application of the justice principles, rather than because of the lack of general principles. This idea of *context-dependent* justice differs from Young (1994) or Greenberg (1996), who suggest that fairness defies generalization as the contextual details are crucial to understand the concept of justice.[3]

To explore the issue of the lack of general principle, we leave aside the treatment approach while undertaking a pooled data analysis. In this framework, we seek for a justice principle that explains the dictator's behavior. We reject the hypothesis that any of the three natural justice principles above explains our data, but we cannot reject the hypothesis that dictators divide the pie according to a "bias principle" which is defined as the most convenient justice principle applicable in each instance. This bias principle encompasses the idea that all the justice principles are equally fair from the dictator's point of view, so the dictator chooses the one that maximizes her own payoff. The rationale for the bias principle is related to Karni and Safra (2002). They model the individual's preferences by considering two different components: the self-interest and the individual's moral value judgment. Then, Karni and Safra (2002) define a self-interested individual as the one who prefers an allocation over another if both are equally fair and the former is preferred over the latter. In our case, self-interest can be interpreted as the dictator's tendency to allocate the surplus according to the most favorable justice principle. This idea of "bias" justice goes back to Messick and Sentis (1983), who show that subjects choose equity (i.e., the accountability principle) or equality (i.e., the egalitarian principle) in a self-interested manner.[4]

Our findings represent a novelty in the dictator game literature by suggesting that dictators are self-interested agents who may not be concerned by the other agent's payoffs but constrained by the justice norms. In that sense, we do not propose to model the dictator's preferences by relying on the social preferences literature which, roughly speaking, underscore the assumption that allocators' utility does not depend only on their final payoffs but also on that of other agents as well as on the relationship between both amounts.[5] We

---

[3]Konow (2001) refers to this idea as *context-specific* justice. In this paper, we refer to *context-dependent* justice to stress that individuals endorse a justice principle which depends on the experimental treatment.

[4]Messick and Sentis (1983) conclude that agents have *egocentric bias* and have a tendency to believe it more fair for them to keep money for another to do so in the same situation. Recently, Cappelen et al. (2008) explore this idea in an experiment that involves real effort to explain the difference between rich and poor countries.

[5]These models usually consider that dictators give money away because they have increasing utility in recipients' payoff

instead conjecture that deviations from narrow self-interest are basically motivated by a context-dependent justice principle. As a result, dictators maximize their own payoffs constrained by being considered fair by at least one of the natural justice principles. Then, individuals exhibit a weak preference for fairness (Dana, Weber and Xi Kuang 2007) or at least a self-interested preference over redistribution (Rutström and Williams 2000).

The rest of the paper is organized as follows. Section 2 offers a template for different justice principles that could be considered in our dictator game analysis and formally presents our hypotheses. We outline our experimental design in Section 3 and devote Section 4 to present the main results, which are based on robust procedures. We conclude in Section 5.

2 Selfishness and Justice Principles in the Dictator Game

Consider the dictator game in which players can be labeled $i \in \{a, b\}$ such that $i = a$ (player a) embodies the dictator and $i = b$ (player b) is the recipient. The dictator has to divide a certain surplus ($M \geq 0$) between herself and her counterpart, where the available amount of money to be shared depends on agents' contribution to the pie, denoted by $m_i \geq 0$ for $i = \{a, b\}$.

In particular,

$$M = m_a + m_b = p_a q_a + p_b q_b$$

where $q_i \geq 0$ represents agent i's performance in a previous stage and $p_i > 0$ is the weight assigned to this input (in our context, subjects will be asked to solve a questionnaire, so q_i will be the number of agent i's correct answers in a quiz and p_i the reward for each correct answer).

We denote $s \in [0, 1]$ the proportion of the surplus that dictator allocates to the recipient, where $s(\mathbf{p}, \mathbf{q}) :$ $\mathbb{R}^2_+ \times \mathbb{Z}^2_+ \to [0, 1]$, for $\mathbf{p} = (p_a, p_b)$ and $\mathbf{q} = (q_a, q_b)$.

Definition 1 *We say that the dictator is* purely selfish *if* $s(\mathbf{p}, \mathbf{q}) = 0$, $\forall \mathbf{p} > 0, \mathbf{q} \geq 0$. *When* $s(\mathbf{p}, \mathbf{q}) = 0.5$, $\forall \mathbf{p} > 0, \mathbf{q} \geq 0$, *we say that the dictator allocation satisfies the* egalitarian *principle.*

Therefore, a *selfish dictator* would keep the entire surplus, regardless of the agents' contribution to the pie, whereas an *egalitarian dictator* would choose to divide it equally, ignoring the source of the surplus or its size. This definition makes the Nash Equilibrium prediction for non-altruistic dictators compatible with

---

(Kritikosa and Bollea 2001; Andreoni and Miller 2002), because they dislike payoff differences (Fehr and Schmidt 1999; Bolton and Ockenfels 2000; Frohlich, Oppenheimer and Kurki 2004) or because they want to maximize the lowest payoff to any one party (Engelmann and Strobel 2004).

the dictator's selfish behavior. The egalitarian behavior is related to the underlying idea of the inequality aversion models, which consider that people dislike unequal outcomes, regardless of the source of the inequality. Nevertheless, these concepts are distant from other justice theories that plead for a solution in which entitlements over the available surplus are directly determined by the Aristotle's idea of proportionality.

Definition 2 *Let* $x_q := \frac{q_b}{q_a+q_b}$ *denote the proportion of the answers that is due to the recipient. We say that the dictator follows the* accountability principle *if* $s(\mathbf{p}, \mathbf{q}) = x_q$.

We say that the dictator behaves according to the *accountability principle* whenever she relies on discretionary variables (the number of correct answers) to make the division of the pie. Basically, this notion of justice corresponds to an *equity principle* as it relies on the subject's performance (i.e., the inputs). Overall, the accountability principle implies that those factors that cannot be controlled by agents (i.e., the rewards) should not be considered by dictators when they are making their choice. In that vein, the final allocation would depend solely on the exerted effort (Roemer 1998).[6]

It can be argued, however, that each person should receive exactly what she produces (Nozick 1974) for an allocation to be considered just.

Definition 3 *Let* $x_m := \frac{m_b}{m_a+m_b}$ *denote the proportion of the surplus that is due to the recipient. We say that the dictator follows the* libertarian principle *if* $s(\mathbf{p}, \mathbf{q}) = x_m$.

The *libertarian principle* embodies the idea that those who had been lucky with reward assignments should not be punished to favor those who had been not. Unlike the previous principles, the libertarian idea does not assign any value to equality and stands for the case in which nature (i.e., luck or birth) plays a crucial role.

We assume that any of the above principles could be claimed to reflect entitlements over bargaining surplus and, thereby, they could be considered plausible *justice norms* from the dictators' point of view. The egalitarian principle implies that neither the score in the test nor the prices is important to determine the dictators' giving. The accountability principle is based solely on the first factor, and the libertarian principle is based on both. We refer to these principles as natural justice principles.[7]

---

[6] The accountability principle is also referred to as liberal egalitarianism or the attribution theory. Konow (2000) studies the extent to which this principle can explain the dictator's choice. See Fleurbaey (2008) for the relationship between responsibility and justice principles and Konow (2003) for a further description of various theories of justice.

[7] Of course, there exist cases in which these principles overlap. For instance, if $p_a = p_b$, then the accountability and the libertarian principle coincide ($x_q = x_m$). When $q_a = q_b$, the accountability principle and the egalitarian principle coincide ($x_q = 0.5$). When the agents' monetary contribution to the pie is the same ($m_a = m_b$), then the libertarian and the egalitarian principles coincide ($x_m = 0.5$).

If justice were a genuine concept, then dictators would follow any of them when dividing the surplus. We state this hypothesis as follows:

Hypothesis 1. *Dictators allocate the surplus according to a single natural principle and follow the egalitarian, the accountability or the libertarian principle, regardless of the external factors (i.e., the reward levels) that determine the subject's contribution to the pie.*

We want to reject Hypothesis 1 so as to claim that there is no unique or absolute natural justice principle to explain the dictator's behavior. This finding would be consistent with individuals being heterogeneous regarding justice attitudes, as pointed out by Cappelen et al. (2007, 2009). However, they assume that individuals endorse a justice principle that is not context-dependent. This implies that dictators are equally likely to distribute earnings according to each of the natural justice principles, regardless of the treatment conditions. We depart from this view and conjecture that justice principles are not stationary but affected by the exogenous variable (i.e., the reward levels). In the next section, we show that context matter by showing that dictators do not divide the total surplus according to the libertarian principle (i.e., the criteria based on earnings) when they are at a relative disadvantage with regard to accumulating money ($p_a < p_b$), whereas the accountability principle (i.e., the criteria based on effort) cannot be rejected in that case. Similarly, dictators follow the libertarian principle instead of the accountability principle when their correct answers are being rewarded at a higher rate ($p_a > p_b$).

Our second hypothesis states that dictators who transfer money away do not really have a preference relation for fairness but justice principles impose a constraint on their behavior (i.e., dictators try to maximize their earnings while being fair by at least one of the principles). The rationale for this hypothesis is that dictators are self-interested agents who endorse a bias fairness ideal and transfer $x_b := \min\{x_q, x_m, 0.5\}$, which is the minimum amount that they have to give away so as to appear just by at least one of the principles.[8]

Hypothesis 2. *When dictators give money away, they do not do not employ a bias principle, that is, they transfer an amount of money that is different to the one that maximizes their own payoff, among the fair allocations. Formally, $s(\mathbf{p}, \mathbf{q}) \neq x_b$.*

We want to reject Hypothesis 2 so as to claim that dictators who give money away allocate based on recipients' contribution, choosing which natural justice principle best maximizes their earnings. We use the

---

[8]As an alternative, we may think that dictators evaluate the egalitarian, the accountability and the libertarian principle as equally fair, precisely because all of them are natural justice principles. In that case, self-interest makes subjects to choose the most convinient principle to maximize their payoff. This reasoning is in line with Karni and Safra (2002).

bias principle as the plausible self-serving bias explanation to describe behavior. Our interpretation can be also related to the idea outlined by Kahneman, Knetsch and Thaler (1986) who explore the role of fairness in the firm's maximization problem and conclude that firms are constrained by fairness ideals when maximizing profits.

3 Experimental Design

A total of 144 students reporting no previous experience in experiments were recruited from the University of Alicante in May 2008 and November 2008. Through 6 different sessions, subjects were received in the Laboratory for Theoretical and Experimental Economics (LaTEx) and were invited to take a numbered ball to determine their place during the computerized experiment. The Laboratory consists of 24 networked computer workstations in separate cubicles. The experiment was implemented using the *z-Tree* software due to Fischbacher (2007).

The Earning Stage

When the subjects are in front of their computers, instructions are read aloud and students understand that they have to individually complete a test that will provide earnings for the second stage of the experiment. At this point, it is common knowledge that the test is the same for all individuals and that subjects are also informed about the existence of a second phase. However, they are not told that the test is intended to redistribute earnings. The quiz takes 35 minutes and contains 20 multiple-choice questions, with only one correct answer over the five possibilities. Before answering the questions, subjects know that each of their correct answers will be randomly paid at a certain reward rate $p_i \in [p_0, p_1]$, for $i \in \{a, b\}$. The reward coincides for all questions but might vary across individuals. The values of p_0 and p_1 are common knowledge but the realization of p_i is unknown until the second period.[9]

Treatments

When the time for the test expires, subjects are randomly matched in pairs and assigned a type, namely "player a" (dictators) or "player b" (recipients). This type does not depend on agents' performance in the

---

[9] The instructions are in the appendix and the complete test is available on request. We use questions 1 to 10 given by List and Cherry (2000) and 10 additional questions of our own. We use List and Cherry (2000) because their questions are easy to solve but time-consuming. List and Cherry (2000) argue that their questions are a good way to measuring effort, rather than talent.

test and is used to determine the subjects' role through the second stage of the experiment as well as the reward for their correct answers. We fix $p_a = 150$ pesetas[10] and $p_b \in \{100, 150, 200\}$ pesetas as follows.

In our *dictator worse (DW) treatment*, with 24 observations, dictators are treated relatively worse than recipients since their correct answers are paid at a lower reward rate, so $p_a = 150$ pesetas and $p_b = 200$ pesetas. In the *dictator better (DB) treatment,* with 24 observations, the previous situation is reversed and type-a players receive a higher reward per correct answer than type-b players, that is, $p_a = 150$ pesetas and $p_b = 100$ pesetas. Finally, in our *baseline (BL) treatment*, with 24 observations, reward levels coincide for both subjects, so $p_a = p_b = 150$ pesetas.

The Allocation Stage

When subjects are informed about their rewards and their contribution to the pie, it is common knowledge that reward levels and roles have been randomly decided. The total surplus is then divided according to a dictators' decision, which is made under anonymous conditions.[11]

In the allocation stage, "player b" was asked to make an hypothetical division of the surplus. The purpose of asking subjects b to perform a choice task was to prevent them from identifying player a by observing some subjects making a choice and others not.

A show-up fee of 4 Euros is paid to each participant at the end of the session, regardless of their performance in the quiz.

4   Behavior in the dictator game

On average, the dictators divided around 3000 pesetas (18 Euros) in the allocation stage and no significant difference exists between the number of dictators' and recipients' correct answers except in the BL treatment, where recipients have more correct answers than dictators.[12]

---

[10] It is standard practice for all experiments run in Alicante to use Spanish pesetas as experimental currency. The reason for this design choice is twofold. First, it mitigates integer problems, compared with other currencies (USD or Euros, for example). Second, although Spanish pesetas are no longer in use (replaced by the Euro in 2002), Spanish people still use pesetas to express monetary values in their everyday life. In this respect, by using a "real" (as opposed to an artificial) currency, we avoid the problem of framing the incentive structure of the experiment using a scale (e.g. "Experimental Currency") with no cognitive content. Exchange rate: 1 Euro = 166,386 pesetas.

[11] We do not use a double-blind procedure because it might make agents skeptical about whether transfers will be carried out (Bolton, Katok and Zwick 1998). The appendix provides further details about the allocation stage.

[12] In the BL treatment, the null $H_0 : q_a = q_b$ can be rejected at a 5% significance level in favor of the alternative $H_1 : q_a \neq q_b$ ($t = 2.14$, $p - value = 0.036$).

Table 1 summarizes the main variables for each treatment and presents an overview of our data. In the earning stage, q_i denotes the average number of correct answers for player $i \in \{a, b\}$. In the allocation stage, $s \in [0, 1]$ stands for the proportion of the pie that dictators give away, whereas $(s - x_q)$ and $(s - x_m)$ are used to measure the dictator's deviation from the accountability and the libertarian principle, respectively. In all the cases, standard deviations are reported in brackets.[13]

We find that positive transfers occur 90% of the time and that average distribution is around 40 percent of the pie, which is significantly higher than the average distribution in dictator games without production. This may indicate that the presence of the earning stage makes people care more about fairness consideration (Cappelen et al. 2007; Oxoby and Spraggon 2008). We observe in Table 1 that the shares given away are higher in the DW scenario than in the rest of the treatments.[14] One way to interpret why $s \in [0, 1]$ is higher in the DW is to recall that $p_a < p_b$ in this case, so it is likely for the recipient's monetary contribution to the pie to be higher in this framework. Indeed, we can see that $(s - x_m)$ is never positive in the DW treatment, whereas the mean of this difference is close to zero in the DB treatment. Across treatments, we also observe that deviations from the accountability principle are not constant and that $(s - x_q)$ is closer to zero in the DW treatment. These findings suggest that entitlements are important to drive behavior but that justice principles seem to be treatment-dependent. For instance, it seems that the accountability principle can explain the dictator's behavior in the DW treatment but it is not the case for the libertarian principle.

We provide further evidence for this conjecture in Figure 1. Along the horizontal axis, we plot the proportion of the pie that is due to recipients' performance in the quiz and we use the vertical axis to represent dictators' giving, $s \in [0, 1]$. As a consequence, the 45-degree line represents the appropriate theoretical prediction in the sense that observations on this line indicate that recipients are being transferred exactly the proportion of the pie that they have contributed. Since the recipients' contribution to the pie depends on inputs and payments, we distinguish between the proportion of the pie that is due to recipients' correct answers (x_q) in Figure 1a and the proportion of the pie that is due to their monetary contribution (x_m) in Figure 1b.

In the DW treatment $(p_a < p_b)$, self-interested dictators would be strictly better off if they followed the accountability principle instead of the libertarian principle. Figure 1a suggests that (on average) dictators rely on recipients' correct answers when they split the money. This is the case because of the data clouds

---

[13] We do not report the results for player b, given that economic incentives were not involved in their decision. However, the conclusions for player a do also hold for player b.

[14] If we compare average giving, the difference is not significant across treatments (e.g., $t = 1.38$, $p - value = 0.174$ for the comparison between DW and DB). However, we reject that the distributions of offers are the same using the Kolmogorov-Smirnov test ($KS = 0.33$, $p - value = 0.089$). A Chow test yields the same results.

around the line predicted by the accountability principle. Figure 1b actually shows that observations lie on the right-hand side of the 45-degree line when we consider the libertarian principle as the theoretical prediction. This implies that the recipients' monetary contribution to the pie is an upper bound from the dictators' objective of deciding how much to give in this treatment. As commented above, the straightforward interpretation is that dictators do not transfer their earnings to the recipients, which is probably under the belief that recipients are being paid a higher reward per correct answer.

The key question to be addressed is whether dictators behave in a self-interested manner. We undertake a similar approach to Konow (2000) to study the extent to which each natural justice principle can explain the dictator's behavior in each of the treatments. We estimate $s_i = \alpha + \beta x_{k,i} + \varepsilon_i$ for $k \in \{q, m\}$ and test for the intercept (α) not being significantly different from zero and the slope (β) not being significantly different from one in each of the treatments. If the null hypothesis $H_0 : \alpha = 0, \beta = 1$ cannot be rejected after running the regression over the independent variable x_q (x_m), then we will not find evidence against the accountability (libertarian) principle. In both regressions, not rejecting the hypothesis that the intercept is 0.5 and the slope is 0 would imply that there is no evidence to reject that dictators follow the egalitarian principle, giving away half of the pie.

In Table 2 we report the estimates of the parameters (α and β) and the corresponding p-values for the individual significance (in brackets). We consider the Huber/White sandwich estimator of the variance to accomplish robust estimates. We also report the results after predicting the median offer by minimizing the sum of absolute residuals (i.e., we run quantile regressions).[15] Additionally, we report in Table 2 the results for the hypothesis testing (i.e., the statistical values), including the Wilcoxon signed-rank test.

In the linear regressions, we find that the intercept is generally not significantly different from zero but that the slope is. If we test for the justice principles, we observe that regardless of the procedure, the dictator's allocation fails to satisfy the libertarian principle in the DW treatment ($F_{2,22} = 7.93$, $F_{2,22} = 8.03$ and $W = 4.09$, with $p - value = 0.0025$, 0.0024 and 0.0000 respectively), although we cannot reject the accountability principle in this case ($F_{2,22} = 2.04$, $F_{2,22} = 1.39$ and $W = 0.93$, where $p - value = 0.1534$, 0.2705 and 0.3529 respectively).[16] The results are reversed for the DB treatment. In this case, we cannot

---

[15] We bootstrap the results to ensure that the standard errors are correct if the residuals are neither normally distributed nor homoscedastic. Robust procedures (i.e., the use of the Huber/White sandwich estimator) allows the fitting of a model that does contain heteroscedastic residuals. Additionally, quantile regressions protects against the influence of vertical outliers, which are defined as observations that have outlying values for the y dimension but are not outlying in the x dimension. See Kennedy (2008) for an introduction to robust procedures and Rousseuw and Leroy (2003) for a more detailed analysis.

[16] The results for the egalitarian principle are not clear-cut. We reject the egalitarian principle in light of the robust regression estimates ($F_{2,22} = 4.28$, $p-value = 0.0269$), but we cannot do so in light of the quantile regression and the Wilcoxon signed-rank test ($F_{2,22} = 0.61$ and $W = 1.06$, with $p - value = 0.5524$ and 0.2889 respectively)

reject the libertarian principle ($F_{2,22} = 0.88$, $F_{2,22} = 0.00$ and $W = 0.29$, with $p-value = 0.4278$, 1 and 0.7719), but the accountability and the egalitarian principle can be rejected at any plausible significance level ($p-value < 0.0032$ in all the cases). As a result, there exists no natural justice principle that survives in all treatment conditions.

In the last column of Table 2 we observe that none of the natural justice principles can be used to explain the pooled data ($p-values < 0.0020$ in all the cases). Our second hypothesis states that dictators do not behave as self-interested agents in the sense that they will not distribute earnings according to the most favorable justice principle in each instance. We employ pooled data analysis to test this hypothesis. We isolate the effect of purely selfish dictators and estimate $s_i = \alpha + \beta x_{b,i} + \varepsilon_i$, where $x_b := \min\{x_q, x_m, 0.5\}$ is defined as the bias principle. Alternatively, we can estimate the median offer by considering $med(s_i) = \alpha + \beta x_{b,i} + \varepsilon_i$, where $x_b := \min\{x_q, x_m, 0.5\}$. In both cases, we test the null hypothesis $H_0 : \alpha = 0, \beta = 1$ to reject that dictators endorse a biased ideal of fairness.[17]

The results in Table 3 show that the intercept is not significantly different from zero but that the slope is. Moreover, none of the test procedures rejects the hypothesis that the bias principle drives dictators' behavior ($F_{2,60} = 0.69, F_{2,60} = 0.35, W = 0.10$, with $p-values = 0.5064, 0.7056$ and 0.9172, respectively). We interpret this result as evidence rejecting Hypothesis 2: therefore dictators appear to behave according to the most favorable justice principle (bias principle) when dividing the pie.

5   Conclusion

All during 80's and 90's, researchers have presented the dictator game as paradigmatic situation to support the agent's deviation from narrow self-interest. The gist of their argument is that subjects who are initially allocated a certain amount of money (dictators) give some money away to their counterparts (recipients), who play no proper role in the division but to accept any share.

We design a laboratory experiment with three different treatments in which dictators are paid less than, more than, or equal to the recipient for each correct answer so that the agent's effort is differentially rewarded relative to the size of the pie. We provide experimental evidence to show that there is no single natural

---

[17] In total we have 72 observations (i.e., 24 observations in each treatment). We have 8 dictators choosing $s = 0$, one giving $s = 0.01$ and another one transferring $s = 0.02$. In the case of the robust regression, we do not consider these observations to isolate the influence of selfish dictators (outliers) who give away less than 5% of the pie and can be said to follow the theoretical prediction $s = 0$. Still, we have one dictator who gives $s = 0.08$ in the DB treatment. We include this observation in our analysis, but the exact same results are valid when this observation is removed. Similarly, the results are the same when we undertake other robust procedures, such as M-estimators, which down-weight the influence of outliers.

justice principle to explain the dictator's behavior but rather that justice principles are context-dependent. Moreover, our results suggest that justice can interpreted as a constraint on otherwise self-maximizing agents. This implies that dictators are self-interested agents who behave according to the justice principle that best maximizes her own payoff.

Appendix

WELCOME TO THE EXPERIMENT! (Spanish translation)

This is an experiment to study decision making, so we are not interested in your particular choices but rather on the individual's average behavior. Thus, all through the experiment you will be treated anonymously. Neither the experimenters nor the people in this room will ever know your particular choices. Please do not think that we expect a particular behavior from you. However, keep in mind that your behavior will affect the amount of money you can win.

Next, you will find instructions on the computer screen explaining how the experiment unfolds. The instructions are the same for all subjects in the laboratory and will be read aloud by experimenters. Please follow them carefully, as it is important that you understand the experiment before starting.

Talking is forbidden during the experiment. If you have any questions, raise your hand and remain silent. You will be attended to by the experimenters as soon as possible.

THE EXPERIMENT

First phase

The experiment has two phases. In the first one, you are able to get money by solving a questionnaire.

The quiz that you will face is the same for all subjects in the room and contains 20 multiple-choice questions with 5 possible answers (only one of them is correct). You have 35 minutes to solve the quiz. Each of your correct answers will be rewarded at a reward rate that will be the same for each correct answer but may vary across individuals. No questions will be rewarded higher than others and the reward of each correct answer will be *randomly* announced once you finish the questionnaire. This reward per correct answer lies between 100 and 200 pesetas and does not depend on your performance.

You will now receive the questionnaire on a piece of paper. To answer the questions, you must use the computer screen. Please do not write on the questionnaire, and make sure that you have selected your answers correctly on the computer screen before continuing, as the computer will automatically check your answers at the end of this phase. Calculators cannot be used during the experiment. You will be provided an additional piece of paper to make computations if needed.

Remember that during the experiment you are not allowed to communicate with each other: you can only communicate with the experimenters.

(Subjects introduced their answers in the computer screen. See Figure 2)

Second phase

In this second phase, you will be randomly matched with a subject in this room and your total earnings will be announced. Remember that the reward of each correct answer is randomly determined so it does not depend on your performance in the quiz.

(Subjects were informed about their earnings. They faced a computer screen quite similar to Figure 3, which was used for the allocation stage).

Now, you will be assigned a type, that is, you will either be player A or player B. This type is randomly determined to choose the one subject that divides the pie. Hence, the subject selected as player A will divide the total earnings. Remember that your choices will be treated anonymously. Neither during the experiment nor after the experiment will you know the identity of the person you are matched with.[18]

---

[18]Notice that we do not constrain dictators to choose from a menu or a set of alternatives: rather, they freely decide how to divide the earned surplus according to some internal principle. Moreover, dictators are not informed about which division corresponds to which "justice principle". In that sense, justice principles arise naturally in our experimental design. It is also worth noting that prices are said to be randomly determined. In each session, we have 24 subjects, who are randomly paid as follows: 16 subjects receive a reward equal to 150 pesetas, 4 subjects are rewarded 200 pesetas, and 4 subjects are rewarded 100 pesetas. The prices do not depend on performance.

FIGURE 1. Justice Principles and Dictator's Giving in the DW treatment

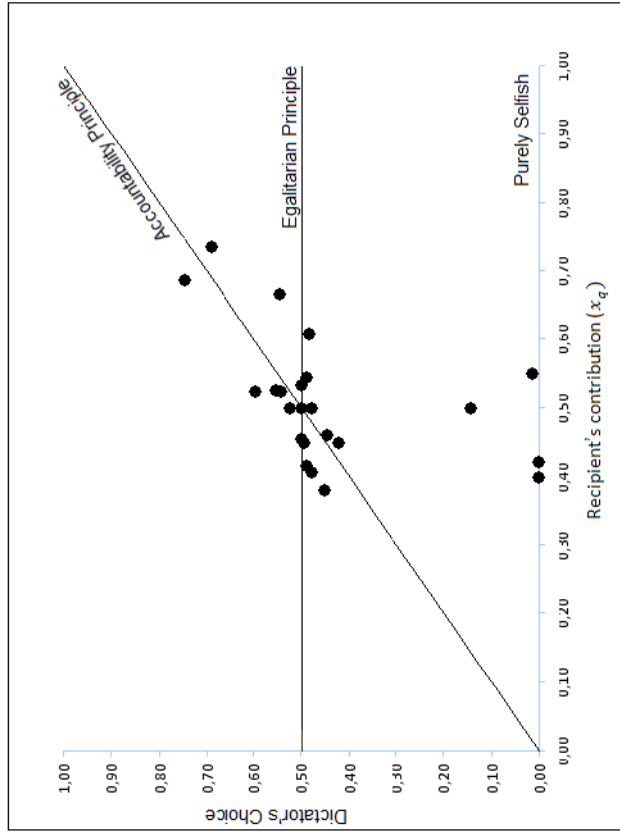Figure 1A. Accountability principle in the DW treatment

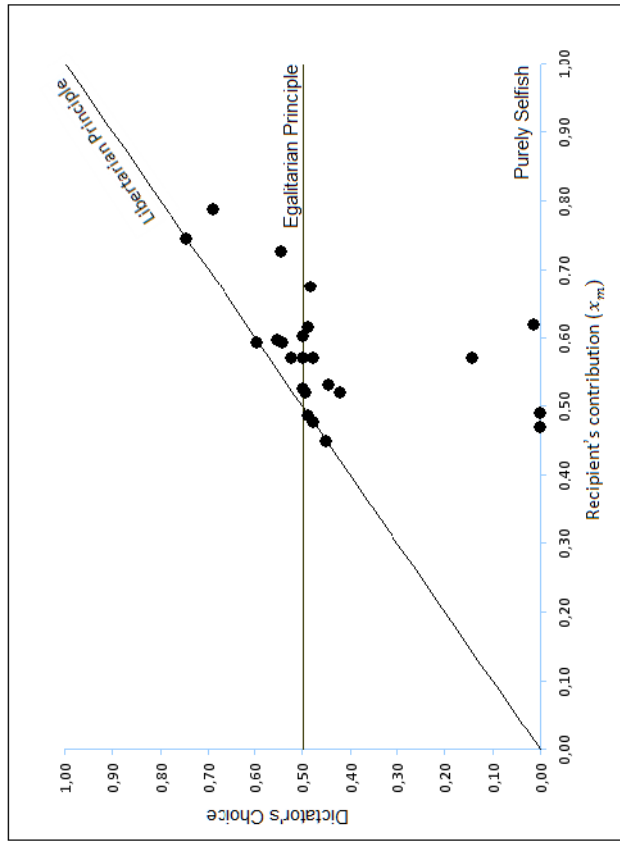Figure 1B. Libertarian principle in the DW treatment

Figure 2. Computer Screen: Test

Period	
1 de 1	Remaining Time [sec]: 2098

Question 1 ○ 1A
○ 1B
○ 1C
○ 1D
○ 1E

Question 2 ○ 2A
○ 2B
○ 2C
○ 2D
○ 2E

Question 3 ○ 3A
○ 3B
○ 3C
○ 3D
○ 3E

Question 4 ○ 4A
○ 4B
○ 4C
○ 4D
○ 4E

Question 5 ○ 5A
○ 5B
○ 5C
○ 5D
○ 5E

Question 6 ○ 6A
○ 6B
○ 6C
○ 6D
○ 6E

Question 7 ○ 7A
○ 7B
○ 7C
○ 7D
○ 7E

Question 8 ○ 8A
○ 8B
○ 8C
○ 8D
○ 8E

Question 10 ○ 9A
○ 9B
○ 9C
○ 9D
○ 9E

Question 10 ○ 10A
○ 10B
○ 10C
○ 10D
○ 10E

Question 11 ○ 11A
○ 11B
○ 11C
○ 11D
○ 11E

Question 12 ○ 12A
○ 12B
○ 12C
○ 12D
○ 12E

Question 13 ○ 13A
○ 13B
○ 13C
○ 13D
○ 13E

Question 14 ○ 14A
○ 14B
○ 14C
○ 14D
○ 14E

Question 15 ○ 15A
○ 15B
○ 15C
○ 15D
○ 15E

Question 16 ○ 16A
○ 16B
○ 16C
○ 16D
○ 16E

Question 17 ○ 17A
○ 17B
○ 17C
○ 17D
○ 17E

Question 18 ○ 18A
○ 18B
○ 18C
○ 18D
○ 18E

Question 19 ○ 19A
○ 19B
○ 19C
○ 19D
○ 19E

Question 20 ○ 20A
○ 20B
○ 20C
○ 20D
○ 20E

OK

Figure 3. Computer Screen: Dictator's choice (Bargaining Stage)

Remaning Time [sec]: 60

You have been randomly selected as player A and you have to decide how to split the money.

You have answered 12 questions correctly. Since each question is paid at price 150 pesetas, you have contributed 1800 pesetas to the total amount.

Player B have answered 11 questions correctly. Since her/his questions are paid at price 200 pesetas, she/he has contributed 2200 pesetas to the total amount.

The total amount of money that both have accumulated is 4000 pesetas.
How do you decide to split it?

For me [   ]
For her/him [   ]

OK

TABLE 1. Descriptive Statistics

	DW (150:200)	DB (150:100)	BL (150:150)	Pooled Data
		Treatment		
I. Earning Stage				
q_a: Mean (Std. Dev.)	9.92 (2.95)	10.75 (2.41)	9.83 (3.47)	10.16 (2.96)
Minimum/ Maximum	5/16	7/15	3/17	3/17
q_b: Mean (Std. Dev.)	10.17 (2.39)	10.5 (3.13)	11.96 (3.38)	10.87 (3.06)
Minimum/Maximum	6/16	5/19	4/18	4/19
II. Allocation Stage				
s: Mean (Std. Dev.)	0.44 (0.20)	0.37 (0.17)	0.36 (0.21)	0.39 (0.19)
Minimum/ Maximum	0/0.74	0/0.57	0/0.63	0/0.74
Share offering nothing	0.08	0.04	0.17	0.10
Share offering above 0.5	0.29	0.17	0.25	0.24
$s - x_q$: Mean (Std. Dev.)	-0.07 (0.17)	-0.12 (0.16)	-0.18 (0.25)	-0.13 (0.20)
Minimum/Maximum	-0.53/0.07	-0.56/0.12	-0.69/0.10	-0.69/0.12
$s - x_m$: Mean (Std. Dev.)	-0.14 (0.17)	-0.03 (0.16)	-0.18 (0.25)	-0.11 (0.20)
Minimum/Maximum	-0.60/0	-0.46/0.21	-0.69/0.10	-0.69/0.21

Notes. There exists 24 observations in each treatment. The variables $s - x_q$ and $s - x_m$ are defined so as to capture the dictator's deviations from the accountability and the libertarian principle respectively.

TABLE 2. Linear Estimates and Hypothesis Testing for the Existence of a Unique Natural Justice Principle

	Treatment					
	DW (150:200)		DB (150:100)		Pooled Data	
I. Linear regressions						
	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\alpha}$	$\hat{\beta}$
Robust Regression						
$s = \alpha + \beta x_q + \varepsilon$	-0.08	1.03***	0.03	0.68**	0.18*	0.41*
	(0.19)	(0.35)	(0.12)	(0.24)	(0.10)	(0.21)
$s = \alpha + \beta x_m + \varepsilon$	-0.18	1.07 ***	0.08	0.73***	0.20**	0.38**
	(0.23)	(0.38)	(0.10)	(0.25)	(0.08)	(0.16)
Bootstrapped Quantile Regression						
$med(s) = \alpha + \beta x_q + \varepsilon$	0.30***	0.41**	-0.06	0.93***	0.16**	0.58***
	(0.18)	(0.35)	(0.06)	(0.11)	(0.10)	(0.18)
$med(s) = \alpha + \beta x_m + \varepsilon$	0.27**	0.41**	0	1***	0.20***	0.49***
	(0.22)	(0.38)	(0.14)	(0.32)	(0.07)	(0.16)
II. Justice Principles						
Accountability principle						
F-test (Robust Regression)	2.04		7.50***		16.03***	
F-test (Quantile Regression)	1.39		25.47***		13.98***	
Wilcoxon signed-rank test	0.93		3.258***		4.93***	
Libertarian principle						
F-test (Robust Regression)	7.93***		0.88		15.72***	
F-test (Quantile Regression)	8.03***		0.00		6.79***	
Wilcoxon signed-rank test	4.095***		0.29		4.484***	
Egalitarian principle						
F-test (Robust Regression)	4.28**		13.32***		21.46***	
F-test (Quantile Regression)	0.61		7.56***		10.70***	
Wilcoxon signed-rank test	1.060		3.067***		3.936***	

Notes. Standard errors are reported in brackets. The robust regression is performed using the Huber/White sandwich estimator of the variance to correct for heteroskedasticity. Quantile regressions are run to predict the median share of total money given to the recipient. The results are bootstrapped to correct for nonnormal and heteroskedastic errors. When testing the justice principles, F- tests rely on the null hypothesis Ho: $\alpha=0, \beta=1$, for the monetary and the accountability principle. The null hypothesis Ho: $\alpha=0.5, \beta=0$ is considered when the independent variable x_m to test for the egalitarian principle. The Wilcoxon signed-rank is a non-parametric procedure for testing whether the dictator's deviations from the natural justice principles are zero. Significance at ***1%, **5%, *10%.

TABLE 3. Dictator's behavior and Self-Serving Bias

I. Linear Estimates

	$\hat{\alpha}$	$\hat{\beta}$
Robust Regression (Unselfish)		
$s = \alpha + \beta x_b + \varepsilon$	0.07	0.87***
	(0.07)	(0.17)
Bootstrapped Quantile Regression		
$med(s) = \alpha + \beta x_b + \varepsilon$	0.005	0.99***
	(0.01)	(0.03)

II. The bias principle

F-test (Robust Regression)	0.69
F-test (Quantile Regression)	0.35
Wilcoxon signed-rank test	0.10

Notes. Standard errors are reported in brackets. The robust regression is performed using the Huber/White sandwich estimator of the variance to correct for heteroskedasticity. The regression is run over the unselfish dictators (62 observations) to decrease the influence of outliers. Quantile regressions are run to predict the median share of total money given to the recipient. The results are bootstrapped to correct for nonnormal and heteroskedastic errors. When testing for the bias principle, F- tests rely on the null hypothesis Ho: $\alpha=0, \beta=1$. The Wilcoxon signed-rank is a non-parametric procedure for testing Ho: $s = x_b$. Significance at ***1%, **5%, *10%.

References

[1] Andreoni, J., Miller, J. (2002). Giving According to GARP: An Experimental Test of the Consistency of Preferences for Altruism. Econometrica, 70, 737-753.

[2] Bardsley, N. (2008). Dictator Game Giving: Altruism or Artefact? Experimental Economics, 11, 122-133.

[3] Bolton, G. E., Katok, E., Zwick, R. (1998). Dictator Game Giving: Rules of Fairness versus Acts of Kindness. International Journal of Game Theory, 27, 269-299.

[4] Bolton, G. E., Ockenfels, A. (2000). A Theory of Equity, Reciprocity, and Competition. American Economic Review, 30, 166–193.

[5] Camerer, C. (2003) Behavioral Game Theory. Princeton University Press, New Jersey.

[6] Cappelen, A. W., Hole, A. D., Sørensen, E., Tungodden, B. (2007). The Pluralism of Fairness Ideals: An Experimental Approach. American Economic Review, 97, 818-827.

[7] Cappelen, A. W., Moene, K. O., Sørensen, E., Tungodden, B. (2008). Rich Meets Poor – An International Fairness Experiment. Tinbergen Institute Discussion Paper, TI 2008-098/3.

[8] Cappelen, A. W., Sørensen, E., Tungodden, B. (2009) Responsability for What? Fairness and Individual Responsibility. European Economic Review, doi: 10.1016/j.euroecorev.2009.08.005

[9] Cherry, T. L., Frykblom, P., Shogren, J. F. (2002). Hardnose the Dictator. American Economic Review, 92, 1218-1221.

[10] Dana, J., Weber, R. A., Xi Kuang, J. (2007). Exploiting Moral Wiggle Room: Experiments Demonstrating an Illusory Preference for Fairness. Economic Theory, 33, 67–80.

[11] Engelmann, D., Strobel, M. (2004). Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments. American Economic Review, 94, 857–869.

[12] Fehr, E., Schmidt, K. (1999). A Theory of Fairness, Competition and Cooperation. Quarterly Journal of Economics, 114, 817-868.

[13] Fischbacher, U. (2007). z-Tree: Zurich Toolbox for Ready-made Economic Experiments. Experimental Economics, 10, 171-178.

[14] Fleurbaey, M. (2008). Fairness, Responsability and Welfare. Oxford University Press, New York.

[15] Fleurbaey, M., Maniquet, F. (2009). Compensation and Responsability. In: Handbook of Social Choice and Welfare. Vol. 2. Ed. Kennet Arrow, Amartya Sen and Kotaro Suzumura. Northe-Holland. Forthcoming.

[16] Frohlich, N., Oppenheimer, J., Kurki, A. (2004). Modeling Other-Regarding Preferences and an Experimental Test. Public Choice, 119, 91-117.

[17] Greenberg, J. (1996). The Quest for Justice on the Job: Essays and Experiments. Sage, Thousand Oaks, CA.

[18] Harrison, G. W., McKee, M. (1985). Experimental Evaluation of the Coase Theorem. Journal of Law Economics, 28, 653-670.

[19] Hoffman, E., McCabe, K., Shachat, K., Smith, V. (1994). Preferences, Property Rights, and Anonymity in Bargaining Games. Games and Economic Behavior, 7, 346-380.

[20] Karni, E., Safra, Z. (2002). Individual Sense of Justice: A Utility Representation. Econometrica, 70, 263-284

[21] Kahneman, D., Knetsch, J. L., Thaler, R. T. (1986). Fairness as a Constraint on Profit Seeking: Entitlements in the Market. American Economic Review, 76, 728-741.

[22] Kennedy, P. (2008). Robust Estimation. In: A guide to Econometrics (pp 345-360). Blackwell Publishing Ltd.

[23] Kritikosa, A., Bollea, F. (2001). Distributional Concerns: Equity- or Efficiency-Oriented? Economics Letters, 73, 333-338.

[24] Konow, J. (2000). Fair Shares: Accountability and Cognitive Dissonance in Allocation Decisions. American Economic Review, 90, 1072-1091.

[25] Konow, J. (2001). Fair and Square: The Four Sides of Distributive Justice. Journal of Economic Behavior and Organization, 46, 137-164.

[26] Konow, J. (2003). Which is the Fairest one of all? A Positive Analysis of Justice Theories. Journal of Economic Literature, 41, 1188-1239.

[27] List, J. A. (2007). On the Interpretation of Giving in Dictator Games. Journal of Political Economy, 115, 482-492.

[28] List, J. A., Cherry, T. L. (2000). Learning to Accept in the Ultimatum Game: Evidence from an Experimental Design that Generates Low Offers. Experimental Economics, 3, 11-29.

[29] Messick, D., Sentis, K. (1983). Fairness, Preference and Fairness Biases. In: Messick D and Cook CS (ed) Equity theory. Psychological and sociological perspectives (pp 61-94). Praeger Publishers, New York.

[30] Nozick, R. (1974). Anarchy, State and Utopia. New York: Basic Books. Wiley-Blackwell.

[31] Oxoby, R. J., Spraggon, J. (2008). Mine and Yours: Property Rights in Dictator Games. Journal of Economic Behavior and Organization, 65, 703-713.

[32] Roemer, J. E. (1998). Equality of Opportunity. Harvard University Press, Cambridge.

[33] Rousseeuw, P. J., Leroy, A. N. (2003). Robust Regression and Outlier Detection. John Wiley and Sons, Inc. Hoboken, New Jersey.

[34] Rutström, E. E., Williams, M. B. (2000). Entitlements and Fairness: An Experimental Study of Distributive Preferences. Journal of Economic Behavior and Organization, 43, 75–89.

[35] Yaari, M., Bar-Hillel, M. (1984). On Dividing Justly. Social Choice and Welfare, 1, 1-24.

[36] Young, P. (1994). Equity: In Theory and Practice. Princeton University Press.

PUBLISHED ISSUES [*]

WP-AD 2010-01   "Scaling methods for categorical self-assessed health measures"
P. Cubí-Mollá. January 2010.

WP-AD 2010-02   "Strong ties in a small world"
M.J. van der Leij, S. Goyal. January 2010.

WP-AD 2010-03   "Timing of protectionism"
A. Gómez-Galvarriato, C.L. Guerrero-Luchtenberg. January 2010.

WP-AD 2010-04   "Some game-theoretic grounds for meeting people half-way"
P.Gadea-Blanco, J.M. Jiménez-Gómez, M.C. Marco-Gil. February 2010.

WP-AD 2010-05   "Sequential city growth: empirical evidence"
A. Cuberes. February 2010.

WP-AD 2010-06   "Preferences, comparative advantage, and compensating wage differentials for job routinization".
C. Quintana-Domeque. February 2010.

WP-AD 2010-07   "The diffusion of Internet: a cross-country analysis"
L. Andrés, D. Cuberes, M.A. Diouf, T. Serebrisky. February 2010.

WP-AD 2010-08   "How endogenous is money? Evidence from a new microeconomic estimate"
D. Cuberes, W.R: Dougan. February 2010.

WP-AD 2010-09   "Trade liberalization in vertically related markets"
R. Moner-Colonques, J.J. Sempere-Monerris, A. Urbano. February 2010.

WP-AD 2010-10   "Tax evasion as a global game (TEGG) in the laboratory"
M. Sánchez-Villalba. February 2010.

WP-AD 2010-11   "The effects of the tax system on education decisions and welfare"
L.A. Viianto. March 2010.

WP-AD 2010-12   "The pecuniary and non-pecuniary costs of job displacement. The risky job of getting back to work"
R. Leombruni, T. Razzolini, F. Serti. March 2010.

WP-AD 2010-13   "Self-interest and justice principles"
I. Rodríguez-Lara, L. Moreno-Garrido. March 2010.

WP-AD 2010-14   "On spatial equilibria in a social interaction model"
P. Mossay, P.M. Picard. March 2010.

WP-AD 2010-15   "Noncooperative justifications for old bankruptcy rules"
J.M. Jiménez-Gómez. March 2010.

---

[*] Please contact Ivie's Publications Department to obtain a list of publications previous to 2010.