Journal of Economic Psychology xxx (2013) xxx–xxx

Contents lists available at SciVerse ScienceDirect

Journal of Economic Psychology

journal homepage: www.elsevier.com/locate/joep

The consistency of fairness rules: An experimental study

Paloma Ubeda

University of the Basque Country (UPV/EHU) & BRIDGE, Avda. Lehendakari Aguirre, 83, 48015 Bilbao, Spain

ARTICLE INFO

Article history:
Received 20 January 2012
Received in revised form 4 November 2012
Accepted 8 December 2012
Available online xxxx

JEL classification:
D63
C91

PsycINFO classification:
2260
2340
3020

Keywords:
Distributive justice
Fairness
Laboratory experiments
Self-serving bias
Consistency

ABSTRACT

This paper studies individual consistency in the use of fairness rules, together with the role of self-serving bias in decision-making. We likewise attempt to characterize the different decision-making processes associated with the two types of self-interested behavior (pure selfish and self-serving). We use a within-subject design, which allows us to compare individual behavior when the context changes. In line with the literature, we find a multiplicity of fairness rules. However, the set of fairness rules is considerably smaller when we control for consistency. Only selfishness and strict egalitarianism seem to survive the stricter consistency requirements. We observe that this result is mainly explained by a self-serving bias. Additionally, we observe that faster decisions are self-interested and decisions dealing with moral trade-off are slower.

1. Introduction

Individual self-interest is the source of various kinds of human behavior. In this sense, two main forms of self-interested behavior have been theoretically proposed and empirically tested in Psychology and Economics. The first type is what is typically known as *pure selfishness* and it has been the dominant motive in standard economic theory. The second type of individual self-interest has been labeled as *self-serving behavior*. Although the latter was first proposed by psychologists, it is now widely accepted in Economics as well. The central question of this paper is to consider the behavioral consequences, as well as the underlying cognitive processes, of these two different materializations of individual self-interest.

It is broadly assumed that pure selfish behavior is driven by the maximization of a single motive, pure material interest. Moreover, as an empirical fact, selfish behavior is the dominant motive in studies where the experimenters have reduced the possibility of other motives–such as social image or reciprocity-intervening (Hoffman, McCabe, & Smith, 1996; Cherry, Frykblom, & Shogren, 2002). The general assumption is that selfish people do not make any trade-off between self-regarding and other-regarding concerns when taking a decision. In this sense, the cognitive process behind a selfish decision is reduced to its minimal form, that of achieving a unique and well-defined goal. This is confirmed by several recent studies, which have suggested that purely selfish decisions are faster. For instance, Piovesan and Wengström (2009) show that faster participants in a dictator game are those making egoistic choices. These authors conclude that participants' response time (RT) is corre-

E-mail address: paloma.ubeda@ehu.es

0167-4870/$ - see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.joep.2012.12.007

lated with the degree of social concerns in the decision-making process. Hertwig, Fischbacher, and Bruhin (2013) report similar results. They study RT in mini-ultimatum games and observe that selfish responders take faster decisions.[1]

In sharp contrast to pure selfishness, self-serving behavior involves a mix of behavioral motives by definition. When there are multiple behavioral motives, people typically face a trade-off between their own material interest and the well being of others.[2] However, a multiplicity of motives *per se* does not necessarily lead to self-interested behavior. What can be branded as self-interest is the self-serving use of these motives.

The experimental literature on distributive justice supposes a good example of self-serving behavior in action. This literature has shown that different people have different fairness concerns that can be expressed through a multiplicity of fairness rules, such as pure equality or effort-based equity (see among others, Konow, 2000; Frohlich, Oppenheimer, & Kurki, 2004; Cappelen, Hole, Sorensen, & Tungodden, 2007). These fairness rules are the result of individually weighting motives differently. While the standard equity rule places all the weight on the individual contributions of each of the interested parties, the strict egalitarian approach disregards individual contributions. Interestingly, it has been shown that people change the weight they assign to different motives depending on the situation. The self-serving bias appears when individuals resort to alternative fairness rules and motives self-servingly.

In psychology, Messick and Sentis (1979) find an egocentric bias in fairness judgments. They show that non-strict equality subjects consider it fair to be paid more than the other participant when they both work the same amount of hours. Similarly, they think that being paid equally is fair when they work fewer hours than their partner. In economic experiments, Konow (2000) find that the conflict between self-interest and fairness motives leads subjects to self-deception, and hence to behave in a self serving biased fashion. Babcock, Loewenstein, Issacharoff, and Camerer (1995)[3] ask subjects to judge real trial cases and then to reach a settlement providing arguments supporting their decision. Introducing a richer context in the experiment allows subjects to focus on the arguments that favor them. The authors show that settlements are more difficult because the arguments of the different players are biased towards their own interests. In a recent paper, Barr, Burns, Miller, and Shaw (2011) show that the real context in which people interact influences individual distributive decisions. While the relative well-off individuals acknowledge individual effort, the worst-off do not. It seems that people's notion of distributive justice is associated with their own relative economic status.

This second type of self-interested behavior is more sophisticated, since people have to weigh motives and use the context to reajust the weights to their own benefit. It seems obvious then that the level of individual reasoning needed to carry out this type of behavior should be higher than that needed for taking a purely selfish decision. Therefore, purely selfish behavior might come from what a dual-process theory would name as System 1 thinking – a process that is unconscious, rapid, automatic, while self-serving behavior should come from System 2 – a process that is conscious, slow, deliberative.[4]

Studies on the self-serving bias using a non-incentivized method to elicit fairness ideals, have so far been conducted using a between-subjects design, or both. This was the case of survey and hypothetical experiments (Konow, 1996; Messick & Sentis, 1979). Yet, as Konow (2005, :359) puts it, "although studies with and without real stakes lead to similar conclusions, some results are affected by the presence of real stakes, such as the average level of unfairness."[5] This paper uses a within-subjects design to study two related questions. First, do people switch between behavioral rules, i.e., are inconsistent, when they make distribution decisions in different contexts? And second, are the decision-making processes leading to alternative behaviors different?

To answer our two main questions, we conduct an experiment in which participants make distribution decisions in a changing context. The experiment allows us to study individual (in)consistent behavior, as well as the role of self-serving bias in decision-making. In addition, we will characterize the different decision-making processes associated with the two types of self-interested behavior described above.[6]

Participants' decisions in our experiment are very consistent with the results reported in previous studies. We find a multiplicity of fairness rules. However, when we explore individual consistency across periods, we find that selfish and strict egalitarian participants are strikingly consistent. In contrast, no participant consistently follows more complex fairness rules suggested in the previous literature. Moreover, our data show that 'inconsistencies' in the experiment are driven by a self-serving bias.

In addition to empirically showing the two types of self-interested behavior-selfish and self-serving-discussed in this introduction, we also provide preliminary evidence on the cognitive processes behind these two behaviors. Purely selfish decisions are faster than self-serving choices. However, the slowest of all decisions are those dominated by other-regarding concerns.

[1] Response time is commonly used in psychology to measure, for instance, reactions to different types of stimulus (for a review of this literature see Kosinski (2010)). In addition to the papers cited above, in economics Wilcox (1993a, 1993b), Moffatt (2005), Achtziger, and Alos-Ferrer (2010) and Brañas-Garza, Meloso, and Miller (2012) report studies using the response time of participants.

[2] Recently, a number of papers have tried to incorporate these other-regarding concerns in the traditional utility function (Rabin, 1993; Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000; Charness & Rabin, 2002).

[3] See also Babcock, Wang, and Loewenstein (1996), Babcock and Loewenstein (1997), Loewenstein, Issacharoff, Camerer, and Babcock (1993) and (Rodriguez-Lara & Moreno-Garrido, 2012).

[4] See Evans (2008) for a distinction of different cognitive processes.

[5] Rustichini and Villeval (2012) provide further evidence of this phenomenon. They show that the range of fair or unfair shares differs when participants are in a hypothetical situation and when they are playing the game for real incentives.

[6] Andreoni and Miller (2002), Fisman, Kariv, and Markovits (2007) and Blanco, Engelmann, and Normann (2011) among others, have also used a within subject analysis to test the consistency of models of other regarding preferences.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

2. Experimental design and procedures

2.1. Experimental design

The experiment consists of 20 one-shot pure distribution games with production. In each one-shot, participants play two phases. At the beginning of the first phase random pairs are formed. The same two subjects take part in the first and the second phase. In the first phase participants perform a real effort task. In the second phase, subjects face a pure distribution problem.

2.1.1. Production phase

The goal of the production phase is to induce a feeling of entitlement by using a real-effort task. The real-effort task consists of a series of puzzles in which the letters of a word have been scrambled. Subjects have to unscramble as many puzzles as they can out of 10.[7] Individuals receive initial endowments corresponding to their effort in this phase. For each word they correctly unscramble they get four tokens. After the production phase, a random shock is introduced. Each individual outcome has an independent 50% probability of being affected. The shock halves participants' endowment, thus the group endowment is also reduced. Individual, group endowments, as well as the random shocks are common knowledge to both participants. In this experiment, both discretionary and non-discretionary variables can potentially differ among subjects.

2.1.2. Distribution phase

In the second phase, participants face a pure distribution problem. Both members of the group have to decide anonymously how to distribute, between them, the joint benefits after the shock.[8] They do not receive any feedback until the end of the experiment, which prevents them from forming expectations about others' behavior, thus trying to rule out reciprocity. In every one-shot, participants are randomly paired with another participant in the room. A random stranger mechanism is used. At the end of the experiment, the computer randomly chooses one period and one decision for each pair to be paid. The exchange rate is three tokens = 1 GBP.

In this phase we also record the time participants need to make a decision. We will later use participants' response time to interpret decisions as more impulsive or more deliberative.

2.2. Fairness rules

After the experiment, participants' decisions are classified according to several fairness rules. This paper uses the definition of fairness ideals proposed by Cappelen et al. (2007) to evaluate subjects' decisions.[9]

The three fairness ideals are then defined as:

Strict egalitarian:

$$m_i^{SE}(a,q) = \frac{X(a,q)}{2} \tag{1}$$

Liberal egalitarianism:

$$m_i^{LE}(a,q) = \frac{q_i}{(q_i+q_j)} X(a,q) \tag{2}$$

Libertarian[10]:

$$m_i^{L}(a,q) = a_i q_i \tag{3}$$

$m^k \epsilon \{m^{SE}, m^L, m^{LE}\}$ represents the different fairness ideals, and it corresponds to the amount a particular subject keeps for herself.

$X(a,q)$ represents the final outcome to be distributed, and it comes from the amount produced by both subjects i and j, where $i \neq j$. In this case the outcome could be affected by two variables: discretional (q) and exogenous (a) variables.

$$X(a,q) = x_i(a_i,q_i) + x_j(a_j,q_j) \tag{4}$$

$$x_i = a_i q_i \tag{5}$$

$$x_j = a_j q_j \tag{6}$$

[7] The real effort task is taken from Carpenter, Holmes, and Matthews (2011).

[8] If a shock has occurred at all.

[9] In the economic literature different fairness rules have been discussed, see for instance Rustichini and Villeval (2012), Selten, Mitzkewitz, and Uhlich (1997) or Mitzkewitz and Nagel (1993). However, in the following we will only focus on rules that are directly applicable to our design.

[10] We use the definition of libertarian as output equity as proposed by Cappelen et al. (2007). This is not of course the only definition of libertarian that one can find in the social science and philosophical literature.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

In our experiment, a external shock, which subjects have no control over. In contrast, q corresponds to subjects' effort in the production phase, which of course can be discretionally affected by subjects. a and q take the following values:

$$a \in \{0.5, 1\} \tag{7}$$
$$q \in [0, 40] \tag{8}$$

Variables, q and a, change across the 20 one-shot games producing heterogeneity in the final outcomes. This heterogeneity allows us to study the (in)consistency of subjects' decisions. The rationale for modeling the non-discretionary component of the model as an external shock is the real-world observation that production is often affected by exogenous shocks, e.g. meteorological conditions.

2.3. Experimental procedures

The experiment took place at CESS at Nuffield College, University of Oxford. Subjects were 60 students[11] from 26 different fields at the University of Oxford who were recruited using ORSEE (Greiner, 2004). The experiment was run using *z*-tree (Fischbacher, 2007) and lasted for about 90 min. Subjects were randomly assigned to one computer terminal. We gave a copy of the instructions to subjects and then a research assistant read the instructions aloud. We asked them to complete a control questionnaire to ensure that everyone understood the instructions. After the experiment, participants filled in a post-experimental questionnaire in which we asked them some socio-demographic questions and questions related to the rules and strategies they had followed. Subjects earned 11.5 GBP on average, ranged from a minimum of 6 GBP to a maximum of 26 GBP, including the show-up fee of 4 GBP and 2 GBP for the post experimental questionnaire (announced after the experiment was over).

3. Predictions

We build on the previous literature and tentatively derive the following predictions.

1. Participants' behavior can be better described by a multiplicity of fairness rules. Specifically, we expect to find participants whose decisions can be classified by either a purely selfish behavioral rule or the three fairness rules explained above.
2. Participants that display purely selfish behavior are consistent across contexts. By consistency we mean that a particular individual follows always the same behavioral rule, independently of the context. This will be more common among selfish subjects because they do not face any trade-off between selfish consumption and other-regarding motives. Once they act selfishly, they would not find reasons to deviate from their maximizing strategy. Hence, subjects will take consistently selfish decisions over time and across contexts. This is indeed what Brosig, Riechmann, and Weimann (2007) find.
3. Non-selfish decisions are context-dependent (List, 2007; Bardsley, 2008). Hence, those individuals who are motivated by notions of fairness behave more inconsistently. Deviating from fairness rules will be more likely to occur than deviations from a purely selfish behavior. Deviations can be due to the self-serving bias phenomena (see among others, Miller & Ross, 1975; Arkin, Cooper, & Kolditz, 1980), leading participants to make inconsistent choices. We predict that subjects endowed with preferences for fairness will choose the fairness rule that benefits them the most in a given moment.
4. Decisions involving several motives will be slower (more deliberative) than pure selfish decisions that should be more automatic (Piovesan & Wengström, 2009).

4. Results

The data comprise five experimental sessions involving a total of 60 subjects.[12] Each session lasted for 20 periods. Given that each subject makes a decision in each of the 20 periods, we have a total 1200 distribution decisions.

In this section, we first present some descriptive statistics to show a general picture of the data. We then classify decisions using the three fairness rules described in Section 2. After that, we explore individual consistency across periods and analyze the factors that lead participants to take inconsistent decisions. Finally, we examine, using the participants decisions' RT, the decision-making processes behind the different behaviors found in the experiment.

4.1. Frequency of different allocation rules

Fig. 1 shows the relative amount participants allocate to their partner. As it is commonly found in standard dictator games (Camerer, 2003), the distribution is bimodal with peaks at 0% and 50%, corresponding to the typical allocation of a purely

[11] Subjects were originally from English speaking countries (England, Ireland, Canada, and US) and only one participant was Swiss.

[12] We acknowledge the fact that the number of participants is small, but there are several reasons why we believe it is enough to support the conclusions drawn in the paper. First, in the experiment there are no exogenous treatments, and all participants face comparable situations. Second, the experiment is repeated 20 times, so the total number of observations is 1200. We adequately control for the non-independence of observations in the econometric analysis. Finally, the number of participants seems to be enough for the statistical analysis presented below.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

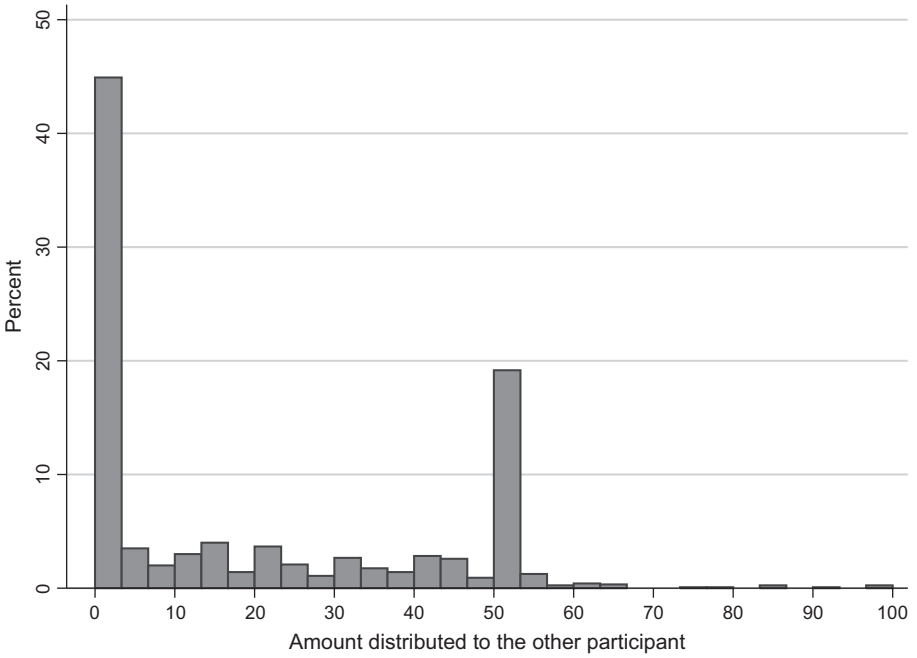

Fig. 1. Relative amount allocated to the other participant, pooled over all periods.

Table 1
Percentage and frequency of decisions according to one rule.

Rules	1 Period	20 Periods
Strict egalitarian	13/60 (21.7%)	222/1200 (18.5%)
Liberal egalitarian	5/60 (8.3%)	105/1200 (8.8%)
Libertarian	7/60 (11.7%)	107/1200 (8.9%)
Selfish	24/60 (40%)	513/1200 (42.8%)
Charity	7/60 (11.7%)	109/1200 (9.1%)
Others	11/60 (18.3%)	286/1200 (23.8%)

selfish and a strict egalitarian person, respectively. Allocations between these two points, as well as those above 50–50 distribution, may indicate the presence of additional behavioral rules.

Table 1 reports the percentage and the frequency of decisions taken according to each of the fairness rules we considered in this paper. We classify decisions according to the exact prediction of each rule.[13] The large majority of decisions are either purely selfish or can be classified using any of the three fairness ideals described in Section 2, and this is true for period one (70%) as well as for the 20 periods (67.1%). An additional rule, defined as Charity, explains an extra 10% of behavior.[14] All other decisions (23.8%) that are not able to classify are in the 'Other group' category. The 'Other group' is formed mainly by mistakes (1.2%) and by proposals that offer receivers more than what is predicted by the Charity rule but less than the prediction of any other fairness rule (22.6%).

Giving the structure of our data and that we are able to classify almost 80% of the decisions with the exact prediction of one of the five behavioral rules described so far, in the following analysis we will not add any further structure to the data in order to avoid an over-fitting of the data. However, we present in Appendix A (see Table 5) additional analysis that show that we are not able to classify many more decisions considering a one-token deviation above or below the prediction for each rule as noise. Doing a *k*-means cluster analysis,[15] we obtain similar results (see Table 6 in Appendix A).

[13] One decision can be classified into more than one fairness rule if the different rules predict the same result in one situation.

[14] The group defined as Charity consists of subjects that give less than four tokens and more than nothing. Note that the exchange rate is three tokens 1 GBP. Frohlich et al. (2004) and Becker and Miller (2009) find a similar behavior rule. This behavior is, moreover, confirmed by the answers subjects gave in the post-experimental questionnaire. For instance, subject 16 answered the question 'Have you followed any particular rule to distribute the total number of tokens?' in the following way: 'Largest number divisible by three'.

[15] This method of cluster analysis classifies observations into *k* number of clusters, in which each observation belongs to the cluster with the nearest mean. Alternative clustering methods provide similar results.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

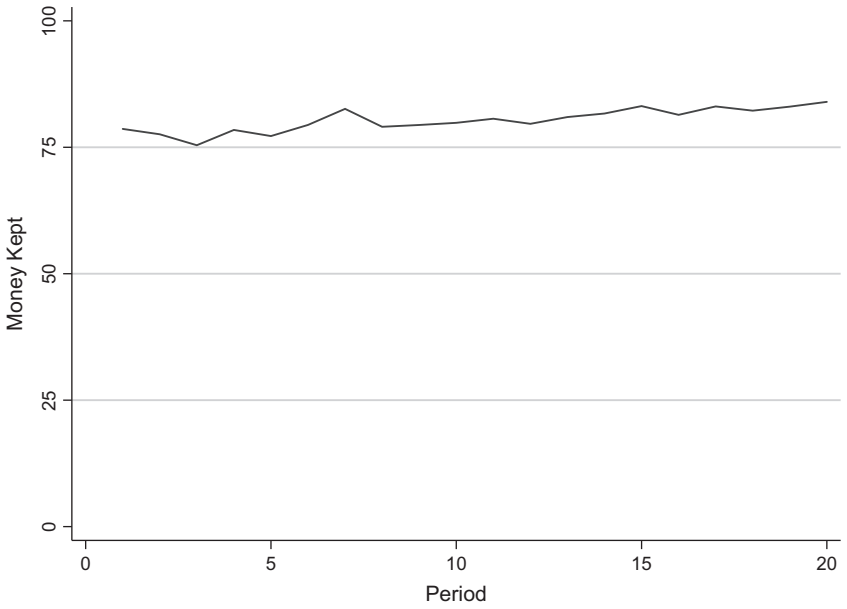

Fig. 2. Distribution across periods.

When we consider fairness decisions, small deviations can also reflect a self-serving behavior.[16] This is shown by Figs. 6 and 7 in Appendix A, where most of the deviations in allocations to self are above the fairness rule that gives the highest payoff in that situation.

Focusing now on the frequency of the different behavioral rules here considered, we find that selfish behavior is considerably above the level reported in previous real-effort experiments. In our experiment, more than 40% of decisions can be classified as selfish, in contrast to 30% reported in Cappelen et al. (2007) and 10% reported in Frohlich et al. (2004). However, the high proportion of selfish decisions is still below the 62% reported in Erkal, Gangadharan, and Nikiforakis (2011).[17] About 20% of decisions coincide with a strict egalitarian rule, and slightly less than 20% with liberal egalitarian (8.8%) or libertarian (8.9%) rules.

At an aggregate level, the frequencies of decisions in the first period (left column, Table 1) and in the complete experiment (right column, Table 1) are strikingly similar. We will explore the consistency of decisions at the individual level in Section 4.3. Before that, we will study whether participants' behavior evolve over time as well as other behavioral determinants.

4.2. Behavioral determinants

Fig. 2 plots the period-average relative amount participants keep in the distribution phase. We observe that subjects keep on average 75% of the total joint amount, being the trend slightly increasing.

Table 2 displays the results of a fixed effect model.[18] Our dependent variable is the relative amount subjects keep for themselves. The variables we consider relevant for explaining distribution behavior are the following: *Period* that takes values from 1 to 20. *Shock* is a dummy that takes value 1 if the participant has suffered a shock in this period and 0 otherwise. *Endowment* is the subject's relative contribution to the total amount before the shock and *Pie* is the sum of the *Endowment* of the two groups members.

We observe that *Period* and *Endowment* affect individual decisions. As we have observed in Fig. 2, subjects tend to keep a higher proportion of the total joint amount as time goes on. It seems that subjects learn to behave selfishly, that is in line with Brosig et al. (2007). Furthermore, *Endowment* has a positive effect on the subject's decisions. They keep a higher proportion of the total amount as their contribution increases. In the next subsection we will show whether some subjects are immune to these effects and take consistent decisions.

[16] This statement is supported by the answer of subject 35 to the question Q5: Have you followed any particular rule to distribute the total number of tokens? A: Try to be fair, while obviously favoring myself slightly.

[17] Papers which have studied the multiplicity of fairness rules have predominantly focused on one-shot games. There are several methodological choices that may have led to more selfish behavior. First, the repeated setting that we study could increase the number of selfish choices. Second, we use a random-dictator mechanism and pay only one period. This means that the probability of a decision to be payoff-relevant is 0.025, and people may be more selfish with such a low probability to guarantee a sufficiently large payoff at the end of the experiment.

[18] We obtain the same results using a random effects GLS model with clustering at the individual level. The same applies if we use *Pie* instead of *Partner shock*.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

Table 2
Behavioral determinants.

	Marginal effects	Standard errors
Cons	70.760***	(1.888)
Period	0.332***	(0.052)
Shock	−0.999	(0.679)
Endowment	0.138***	(0.026)
Pie	−0.007	(0.028)
Number of observations = 1200	$F(59, 1136) = 73.01$	Prob > F = 0.0000

Note: We use a fixed effect model. The dependent variable is the relative amount of money subjects keep for themselves.
*** Denotes significance at the 1% level.

Table 3
Numbers and percentages of subjects applying each rule most of the time.

	20 Times (in every round)	19 Times	18 Times	17 Times (in 85% of rounds)
Strict egalitarian	3 (5%)	4 (6.6%)	6 (10%)	7 (11.6%)
Liberal egalitarian	0	0	0	0
Libertarian	0	0	0	0
Selfish	18 (30%)	19 (31.6%)	20 (33.3%)	21 (35%)
Charity	1 (1.7%)	1 (1.7%)	1 (1.7%)	1 (1.7%)

4.3. Consistency of individual decisions

Table 3 reports the proportion of subjects who choose consistently with one of the rules 17 times or more.[19] Only selfish, strict egalitarian and Charity rules are consistently chosen. No individual distributed consistently according to liberal egalitarian or libertarian rules, even allowing for three inconsistent decisions.

Figs. 6 and 7, in Appendix A, show graphically the level of individual consistency. Both figures provide individual plots of the relation between the amount participants keep for themselves and the endowment before the shock (Fig. 6) and after the shock (Fig. 7). The endowment is normalized to one hundred to better interpret the figures. More specifically, Fig. 6 shows whether subjects follow the strict egalitarian rule (middle horizontal line), the liberal egalitarian rule (decision on the 45° line) or they are behaving purely selfishly (top horizontal line). In contrast, Fig. 7 shows the same for the Libertarian rule (decisions on the 45° line).

Approximately half of the subjects make consistent choices, i.e., all their decisions fall along the same line. They follow the same rule across periods. In line with our second prediction, a large number of participants (35%) are consistently selfish. However, there are a non-negligible proportion of subjects that consistently apply the strict egalitarian rule (11.7%). There is only one participant that consistently chooses distributions that fit the Charity rule. Finally, we find no single participant that consistently applies the liberal egalitarian or the libertarian ideal.

Brosig et al. (2007) find selfish subjects to be highly consistent. We additionally show that strictly egalitarian individuals also seem to be consistent. Although this result has not been shown in an economic experiment before, Messick and Sentis (1979) find that strict egalitarians are consistent with their choices using hypothetical questionnaires. The next section addresses the issue of the large number of inconsistencies.

4.4. Self-serving bias

As described in Section 3, one of the potential explanations for the inconsistency of some participants might be self-serving bias. To test this hypothesis, we analyze the behavior of subjects who follow some of the fairness rules presented in Section 2. We then define whether the chosen rule in a period gives the highest possible individual payoff among the three rules. We say that a rule is optimal when its associated payoff is the highest among the three fairness rules.

Fig. 3 shows the proportion of choices that coincides with a strict egalitarian, a liberal egalitarian and a libertarian rule. In each column, the black area shows the proportion of decisions that are optimal and the white area the proportion of non-optimal decisions. The percentage of decisions taken according to one rule when this rule is the most advantageous is strikingly high (77.1%). Sixty-one percent of strict egalitarian decisions were taken when this rule was the optimal. In the liberal egalitarian and libertarian cases this percentage is higher, being 82.7% and 87.9%, respectively. The percentage of strict egalitarian decisions is lower due to a proportion of subjects who choose consistently this rule. Considering only inconsistent

[19] We use three-times mistakes because we observe two groups of participants, those who follow the same behavioral rules at least 17 times and those who follow a rule less than 13 times. No participant makes decision following the same rule between 12 and 17 times.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

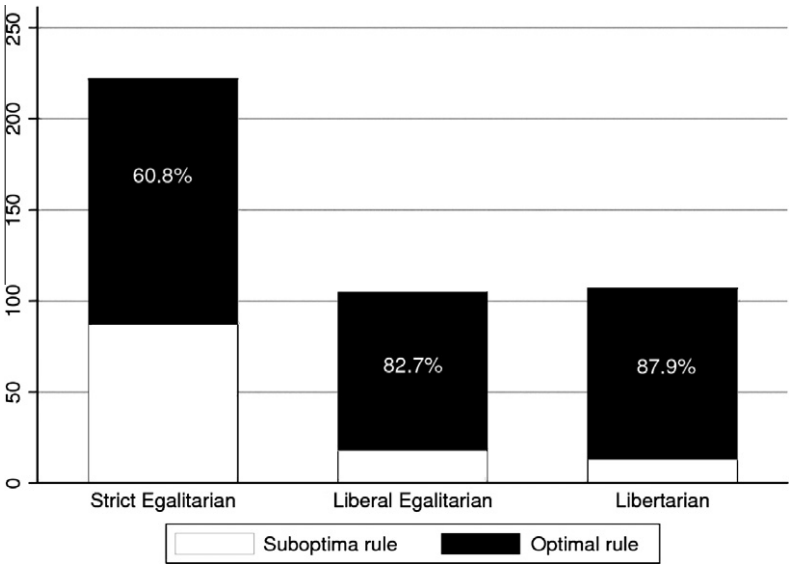

Fig. 3. Self-serving bias.

subjects, the percentage of decisions taken according to the strict egalitarian rule when this is the optimal rule increases considerably (76.7%). This clearly shows that decisions from inconsistent subjects are biased.

A one-side binomial test of proportions confirms our hypothesis. We reject the null hypothesis of equal proportion of optimal and non-optimal decisions ($p < 0.001$). It seems that inconsistent participants are biased in a self-serving manner.

For a robustness check, we now replicate the self-serving result at the individual level, using a multinomial logit model (see Table 4). Our dependent variable has four categories: decisions taken according to the strict egalitarian rule, decisions consistent with the liberal egalitarian rule, decisions in line with the Libertarian prediction and all other decisions. This latter category will be used as the base outcome for comparison.

We study the probability of choosing one of the three fairness rules. We regress the rule chosen by inconsistent participant on a dummy indicating whether this rule is optimal or not and controlling for the trend (*Period*), for the discretional and exogenous variables (*Endowment*, *Partner Endowment*, *Shock*, *Partner Shock*) and for a dummy that indicates whether my endowment after the shock is higher than my partner endowment after the shock in a given period (*Relative Position*).

Consistently with the non-parametric test, we find that the optimal rule variable predicts subjects' behavior in all the three cases. The probability of choosing according to one of the three fairness rules increases when this specific rule gives the highest payoff to the subject. *Relative Position* variable also indicates the same effect. The larger my final payoff compared with my partner, the lower the probability of the pie being split equally and the higher the probability of behaving like a liberal egalitarian or libertarian person.

Table 4
Multinomial logit.

	Strict egalitarian	Liberal egalitarian	Libertarian
Optimal rule	0.270***	0.330***	0.336***
	(0.038)	(0.022)	(0.022)
Shock	0.069	0.127**	−0.199***
	(0.062)	(0.064)	(0.065)
Partner Shock	−0.133**	−0.075	0.241***
	(0.058)	(0.059)	(0.071)
Endowment	−0.012*	0.008*	0.005**
	(0.007)	(0.005)	(0.002)
Partner Endowment	0.010*	−0.005	−0.006**
	(0.006)	(0.004)	(0.002)
Relative Position	−0.316***	0.172***	0.117***
	(0.063)	(0.056)	(0.029)
Period	−0.004	0.001	0.002
	(0.005)	(0.003)	(0.002)
	Log likelihood = −383.60821	Observations = 719	Pseudo R^2 = 0.4914

* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

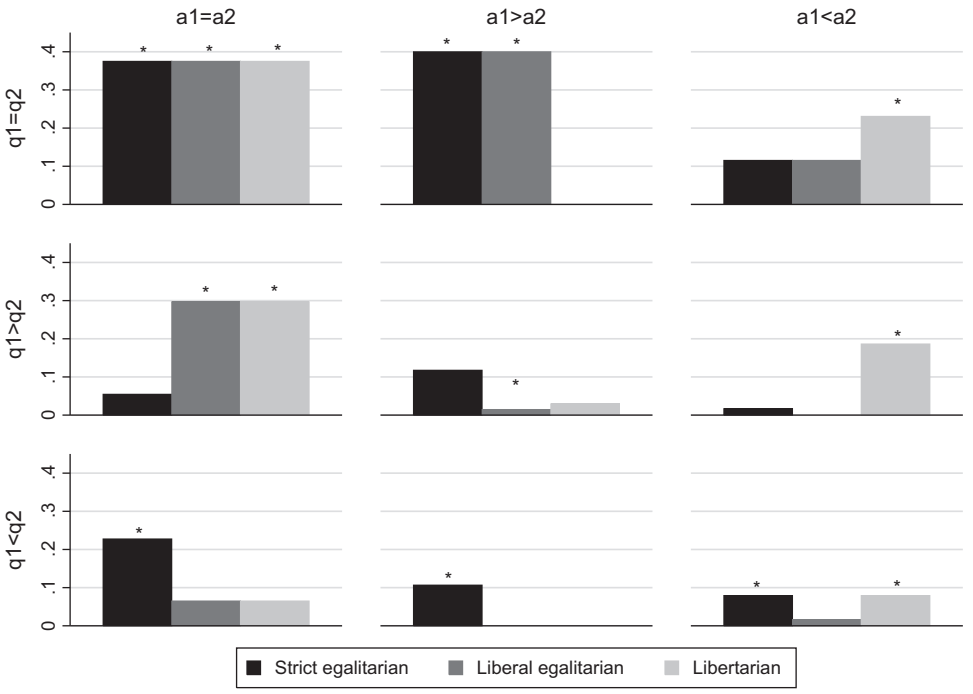

Fig. 4. Proportion of rules by situation (inconsistent decisions).

The results of the multinomial logit regression are consistent with the non-parametric results, showing a very strong association between choosing a rule and the fact that this rule is optimal. This supports the idea that inconsistencies are partly due to self-serving bias.

We get the same idea from Fig. 4. This graph shows the proportion of inconsistent decisions taken according to one fairness rule by situation. Our design leads to nine different situations that come from the combination of our two treatment variables: my shock (a_1) and my partner' shock (a_2) and my effort (q_1) and my partner' effort (q_2). The asterisk indicates

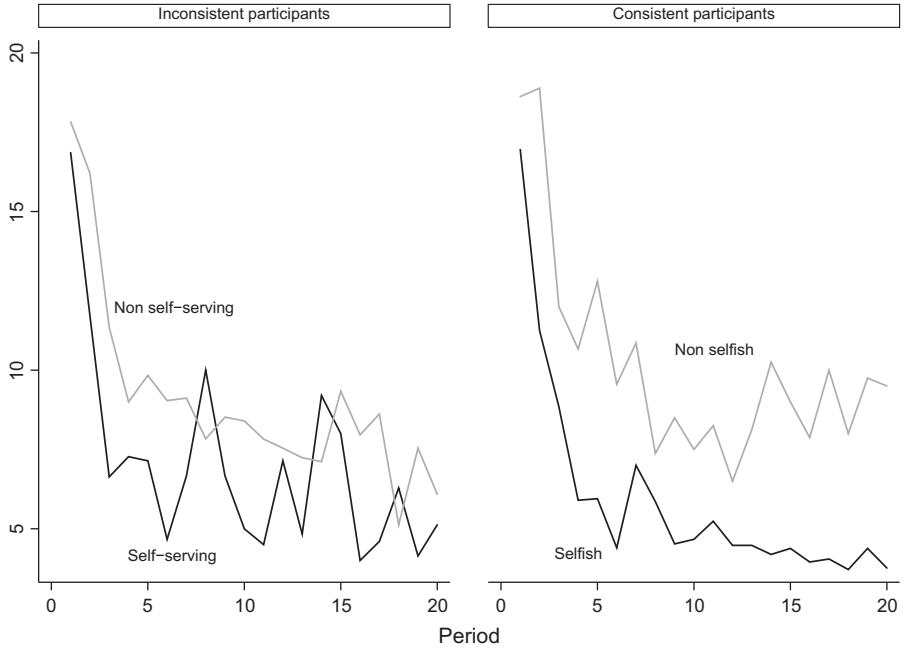

Fig. 5. Average RT over time.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

the optimal rule in each situation. Two results need to be commented here. First, in eight out of the nine situations the proportion of decisions taken according to the optimal rule is higher. Second, the proportion of decisions taken according to one rule varies from one situation to another. These two results suggest that participants do not follow a fairness rule but switch between them depending on whether the rule is optimal or not.

4.5. Cognitive processes

Finally, we use the response time (RT) of participants and speculate about whether purely selfish and self-serving decisions correspond to alternative decision-making processes. In the introduction, we discussed that the two types of self-interested behavior would be cognitively different. While pure selfish decisions should be more automatic, as participants only have a monetary concern in mind, self-serving behavior would come from a more deliberative process. To check whether this is the case, we analyze the average RT of both types of decisions.

The average RT employed by consistent participants taking pure selfish decisions is 5.88 s (sd: 5.20), whereas this time increases up to 7.21 s (sd: 5.60) when we focus on the self-serving decisions taken by inconsistent participants. Selfish behavior seems to be more automatic and self-serving behavior more deliberative. The average response time of self-serving participants is, however, smaller than the time (9.66 s) of those who are not self-interested (selfish or self-serving).

The same result is observed in Fig. 5 that displays the average RT over time. First, we observe that in all the cases there is a decrease in RT during the first periods, however as we pointed out using the above descriptives, the level in RT in the remaining periods differs depending on the type of decision taken. Faster decisions are self-interested and decisions dealing with moral trade-off (nonself-interested) are slower.

We speculate that while selfish decisions are automatic and nonself-interested decisions are deliberative, self-serving decisions seem to be between the two types of processes. This latter group of people may have a clear goal in mind: they want to be perceived as a good person but without being against their own interest. So, they do not have to solve any conflict between self and other, as nonself-interested people do, but either can take automatic decisions. Self-serving participants, however, have to evaluate the payoffs from the different fairness rules that can be at place in each situation and choose the less harmful for them.

5. Conclusions

In this paper, we have presented the results of an experiment conducted to study the various fairness rules people follow, as well as whether people are consistent with these rules when the experimental context changes. After that, we have employed the response time of participants as a proxy of the cognitive process-either automatic or deliberative-followed by different individuals.

In the experiment, we find that the large majority of the decisions can be classified with reference to a limited number of behavioral rules. 80% of choices, both in the first period and the whole experiment, conform to one of the following rules: selfish, strict egalitarian, liberal egalitarian, libertarian, and charity. We observe a slight tendency but not significant towards more selfish allocations, but fairness rules do not vanish even in the last periods of the experiment. We confirm our first prediction and demonstrate the relevance of several behavioral fairness rules.

Although we find a multiplicity of behavioral rules, participants do not use the various rules similarly. Whereas most subjects who choose either a selfish or a strict egalitarian rule are highly consistent across periods, we find no consistent use of either the liberal egalitarian or the libertarian rule. This confirms our second prediction regarding the consistency of selfish individuals. The consistency of strict egalitarian participants is a result that we had not predicted, but it is in line with a previous study (Messick & Sentis, 1979). Strong preferences for equality, social norms and social image can account for this result. Next, we briefly discuss the latter two.

The 50–50 norm is probably the best known and accepted rule of distributive justice. Previous experimental results on the Ultimatum Game and related experimental paradigms confirm so (Güth, Huck, & Müller, 2001). In our experiment, as well as in real life, the definition of alternative rules such as equity may be ambiguous. For instance, participants may consider it fair to distribute the money according to effort or to outcomes. In contrast, the definition of the equality norm is always the same.

An alternative but related explanation is the one proposed by Andreoni and Bernheim (2009). They claim that social image may help to explain why the equal split is a widespread norm in many social contexts. Dividing the pie equally is a clear signal of fair behavior. On the contrary, people may feel that an alternative fairness rule, e.g., liberal egalitarian or libertarian, do not convey as clear signal of fairness as the egalitarian rule. So, people highly concerned with their social image would always follow the equality rule.

Half of the participants in the experiment are still inconsistent. We show that, in general, inconsistent participants apply the fairness rule that is most beneficial to them in a given context. This means that they do not stick to a rule, but switch between fairness rules in order to maximize their payoff at the same time that they appear to behave fairly.

Finally, we observe that the two types of self-interested decisions identified in this work-pure selfishness and self-serving behavior-differ in terms of response time. Pure selfish decisions are significantly faster than self-serving decisions, and the latter are in turn faster than fair decisions.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

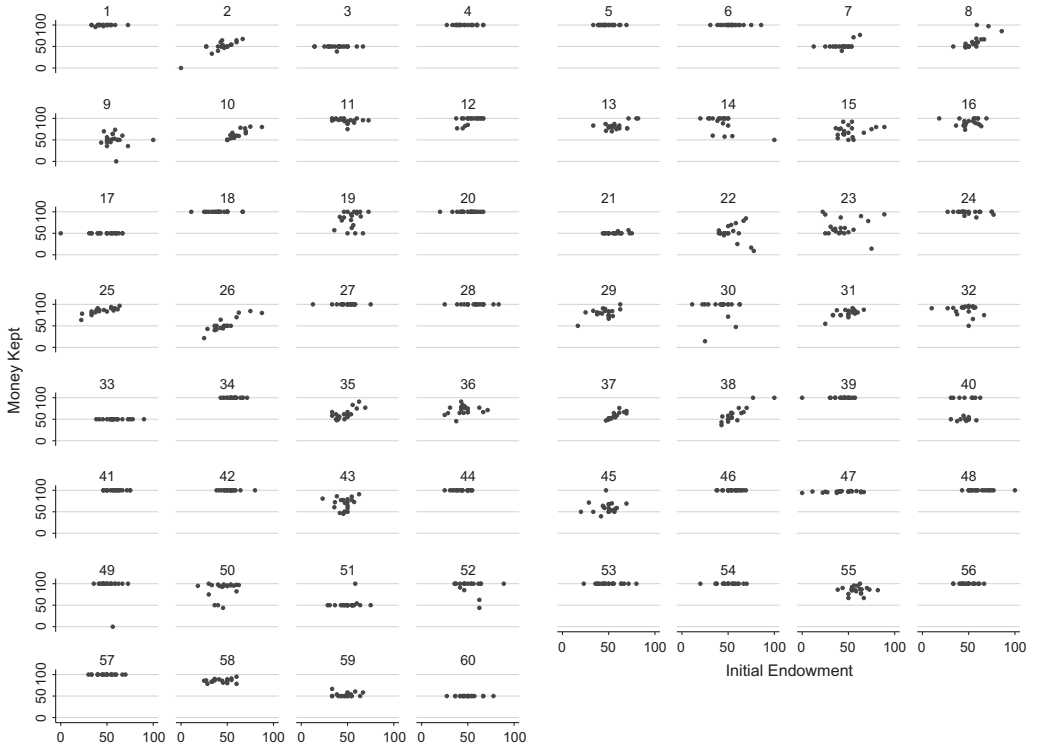

Fig. 6. Strict egalitarian and liberal egalitarian rule.

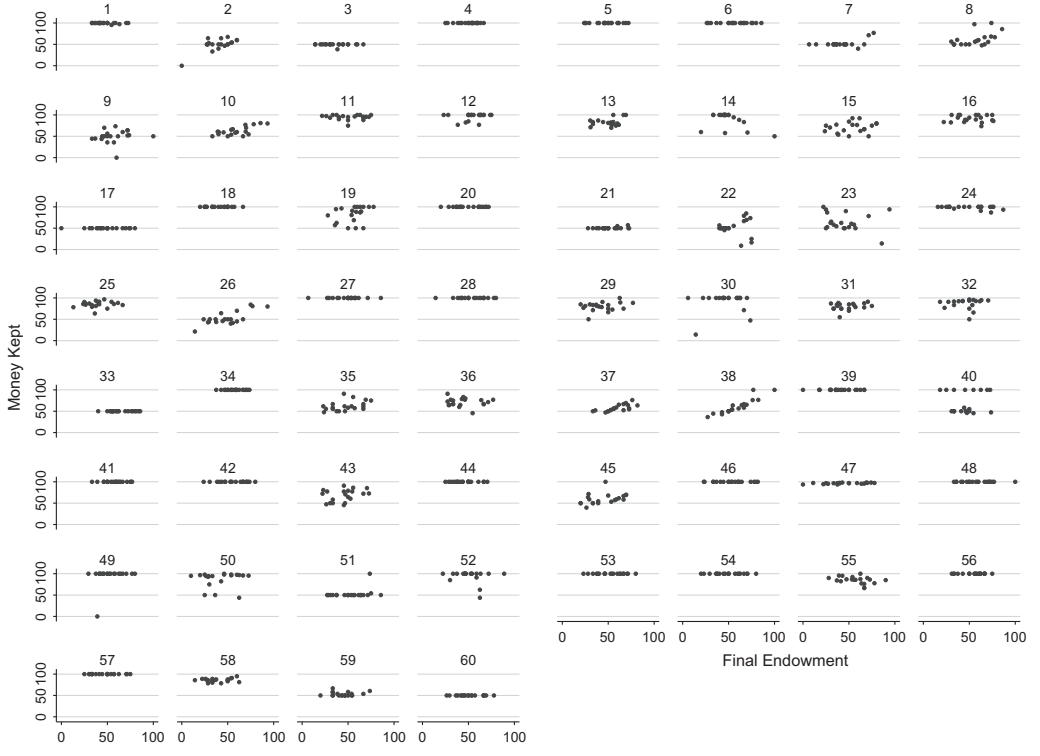

Fig. 7. Libertarian rule.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

Table 5
Tokens deviations.

	0 Tokens	1 Tokens	2 Tokens	3 Tokens
Strict egalitarian	222 (18.5%)	253 (21.1%)	296 (24.7%)	328 (27.3%)
Liberal egalitarian	105 (8.8%)	131 (10.9%)	175 (14.6%)	194 (16.1%)
Libertarian	107 (8.9%)	143 (11.9%)	205 (17.1%)	239 (19.9%)
Selfish	513 (42.8%)	558 (46.5%)	598 (49.8%)	622 (51.8%)
Charity	109 (9.1%)	136 (11.3%)	159 (13.3%)	233 (19.4%)
Others	286 (23.8%)	236 (19.7%)	171 (14.3%)	91 (7.6%)
Total explained	914 (76.2%)	964 (80.3%)	1029 (85.8%)	1109 (92.4%)
Total	111.9%	121.4%	133.8%	142.1%

Table 6
Cluster analysis.

Possible rules	4 Categories	5 Categories	6 Categories
Strict egalitarian	306 (25.5%)	295 (24.6%)	269 (22.4%)
Liberal egalitarian	119 (9.9%)	104 (8.7%)	84 (7.0%)
Libertarian	181 (15.1%)	117 (9.8%)	87 (7.3%)
Selfish	594 (49.5%)	567 (47.3%)	580 (48.3%)
Charity	–	117 (9.8%)	113 (9.4%)
Others	–	–	67 (5.6%)
	Observations = 1200 Pearson $\chi^2(177) = 1.8e + 0.3$ Pr = 0.000 Likelihood-ratio $\chi^2(177) = 1.8e + 0.3$ Pr = 0.000	Observations = 1200 Pearson $\chi^2(236) = 2.1e + 0.3$ Pr = 0.000 Likelihood $\chi^2(236) = 2.0e + 0.3$ Pr = 0.000	Observations = 1200 Pearson $\chi^2(295) = 2.2e + 0.3$ Pr = 0.000 Pearson $\chi^2(295) = 2.1e + 0.3$ Pr = 0.000

We argue that self-serving participants face a trade-off between the self and others, as people taking fair decisions do. However, if that was the case, the RT of these two latter types of decisions should be indistinguishable. To the contrary, what the data seems to indicate is that self-serving participants do not solve any internal conflict, but they have a clear strategy to follow. They want to be perceived as fair people being self-interested. So, the only thing they do is to evaluate the payoff of the different fairness rules that can be followed in each situation and choose the least harmful for them.

Acknowledgements

I am indebted to Abigail Barr, Dirk Engelmann and Luis Miller for their valuable comments. I also thank Michele Belot, Enrique Fatas, the two anonymous referees and the editors Carlos Alos-Ferrer and Fritz Strack for very useful comments and Matthew Bennet and Anthony Harris for their help conducting the experiment. Financial support from Conselleria d'Educació de la Generalitat Valenciana (BFPI/2007/260 and GV/2012/047), Especialización de Personal Investigador del Viccerrectorado de Investigación de la UPV/EHU and Ministerio de Economía y Competitividad (ECO2012-30626) are gratefully acknowledged.

Appendix A

Figs. 6 and 7 and Tables 5 and 6.

References

Achtziger, A., & Alos-Ferrer, C. (2010). Fast or Rational? A Response-Time Study of Bayesian Updating. Mimeo.
Andreoni, J., & Bernheim, B. D. (2009). Social image and the 50–50 norm: A theoretical and experimental analysis of audience effects. *Econometrica, 77*(5), 1607–1636.
Andreoni, J., & Miller, J. (2002). Giving according to GARP: An experimental test of the consistency of preferences for altruism. *Econometrica, 70*(2), 737–753.
Arkin, R., Cooper, H., & Kolditz, T. (1980). A statistical review of the literature concerning the self-serving attribution bias in interpersonal influence situations. *Journal of Personality, 48*(4), 435–448.
Babcock, L., & Loewenstein, G. (1997). Explaining bargaining impasse: The role of self-serving biases. *Jounal of Economic Perspectives, 11*(1), 109–126.
Babcock, L., Loewenstein, G., Issacharoff, S., & Camerer, C. (1995). Biased judgments of fairness in bargaining. *American Economic Review, 85*(5), 1337–1343.
Babcock, L., Wang, X., & Loewenstein, G. (1996). Chossing the wrong pond: Social comparisons in negotiations that reflect a self-serving bias. *Quarterly Journal of Economics, 111*(1), 1–19.
Bardsley, N. (2008). Dictator game giving: altruism or artefact? *Experimental Economics, 11*, 122–133.
Barr, A., Burns, J., Miller, L., & Shaw, I. (2011). Individual notions of distributive justice and relative economic status. *IFS Working Paper*, 11/19.
Becker, A., & Miller, L. (2009). Promoting justice by treating people unequally: An experimental study. *Experimental Economics, 12*(4), 437–449.
Blanco, M., Engelmann, D., & Normann, H. T. (2011). A within-subject analysis of other-regarding preferences. *Games and Economic Behavior, 72*(2), 321–338.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007

Bolton, G. E., & Ockenfels, A. (2000). ERC: A theory of equity, reciprocity, and competition. *American Economic Review, 90*(1), 166–193.
Brañas-Garza, P., Meloso, D., & Miller, L. (2012). Interactive and moral reasoning: A comparative study of response times. *IGIER working paper no. 440*.
Brosig, J., Riechmann, T., & Weimann, J. (2007). Selfish in the end? An investigation of consistency and stability of individual behaviour. *MPRA paper no. 2035*.
Camerer, C. F. (2003). *Behavioral game theory: Experiments in strategic interaction*. New York: Princeton University Press.
Cappelen, A., Hole, A., Sorensen, E., & Tungodden, B. (2007). The pluralism of fairness ideals: An experimental approach. *American Economic Review, 97*(3), 818–827.
Carpenter, J., Holmes, J., & Matthews, P. (2011). Jumping and sniping at the silents: Does it matter for Charities? *Journal of Public Economics, 95*(5–6), 395–402.
Charness, G., & Rabin, M. (2002). Understanding social preferences with simple tests. *Quarterly Journal of Economics, 117*(3), 817–869.
Cherry, T. D., Frykblom, P., & Shogren, J. F. (2002). Hardnose the dictator. *The American Economic Review, 92*(4), 1218–1221.
Erkal, N., Gangadharan, L., & Nikiforakis, N. (2011). Relative earnings and giving in a real-effort experiment. *The American Economic Review, 101*(7), 3330–3348.
Evans, J. (2008). Dual-processing accounts of reasoning, judgment and social cognition. *Annual Review of Psychology, 59*, 225–278.
Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition and cooperation. *The Quarterly Journal of Economics, 114*(3), 817–868.
Fischbacher, U. (2007). *z*-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics, 10*(2), 171–178.
Fisman, R., Kariv, S., & Markovits, D. (2007). Individual preferences for giving. *American Economic Review, 97*(5), 1858–1876.
Frohlich, N., Oppenheimer, J., & Kurki, A. (2004). Modeling other-regarding preferences and an experimental test. *Public Choice, 119*, 91–117.
Greiner, B. (2004). An online recruitment system for economic experiments. In K. Kremer, V. Macho (Eds.), *Forschung und wissenschaftliches Rechnen* (pp. 79–93).
Güth, W., Huck, S., & Müller, W. (2001). The relevance of equal splits in ultimatum games. *Games and Economic Behavior, 37*, 161–169.
Hertwig, R., Fischbacher, U., & Bruhin, A. (2013). Simple heuristics in a social game. In R. Hertwig, U. Hoffrage, & the ABC Research Group (Eds.), *Simple heuristics in a social world* (pp. 39–65). New York: Oxford University Press.
Hoffman, E., McCabe, K., & Smith, V. (1996). Social distance and other-regarding behavior in dictator games. *American Economic Review, 86*, 653–660.
Konow, J. (1996). A positive theory of economic fairness. *Journal of Economic Behavior and Organization, 31*(1), 13–35.
Konow, J. (2000). Fair shares: Accountability and cognitive dissonance in allocation decisions. *American Economic Review, 90*(4), 1072–1091.
Konow, J. (2005). Blind spots: The effects of information and stakes on fairness bias and dispersion. *Social Justice Research, 18*(4), 349–390.
Kosinski, R. A. (2010). A literature review on reaction time. <http://biology.clemson.edu/bpc/bp/Lab/110/reaction.htm>.
List, J. A. (2007). On the interpretation of giving in dictator games. *Journal of Political Economy, 115*, 482–493.
Loewenstein, G., Issacharoff, S., Camerer, C., & Babcock, L. (1993). Self-serving assessments of fairness and pretrial bargaining. *Journal of Legal Studies, 22*(1), 135–159.
Messick, D. M., & Sentis, K. P. (1979). Fairness and preference. *Journal of Experimental Social Psychology, 15*, 418–434.
Miller, D. T., & Ross, M. (1975). Self-serving biases in the attribution of causality: Fact or fiction? *Psychological Bulletin, 82*(2), 213–225.
Mitzkewitz, M., & Nagel, R. (1993). Experimental results on ultimatum games with incomplete information. *International Journal of Game Theory, 22*, 171–198.
Moffatt, P. G. (2005). Stochastic choice and the allocation of cognitive effort. *Experimental Economics, 8*(4), 369–388.
Piovesan, M., & Wengström, E. (2009). Fast or fair? A study of response times. *Economics Letters, 105*, 193–196.
Rabin, M. (1993). Incorporating fairness into game theory and economics. *American Economic Review, 83*(5), 1281–1302.
Rodriguez-Lara, I., & Moreno-Garrido, L. (2012). Self-interest and fairness: Self-serving choices of justice principles. *Experimental Economics, 15*, 158–175.
Rustichini, A., & Villeval, M.C. (2012). *Moral hypocrisy, power and social preferences. IZA discussion paper no. 6590*.
Selten, R., Mitzkewitz, M., & Uhlich, G. R. (1997). Duopoly strategies programmed by experienced players. *Econometrica*, 517–555.
Wilcox, N. T. (1993a). On a lottery pricing anomaly: Time tells the tale. *Journal of Risk and Uncertainty, 7*(3), 311–324.
Wilcox, N. T. (1993b). Lottery choice: Incentives, complexity and decision time. *The Economic Journal, 103*, 1397–1417.

Please cite this article in press as: Ubeda, P. The consistency of fairness rules: An experimental study. *Journal of Economic Psychology* (2013), http://dx.doi.org/10.1016/j.joep.2012.12.007