AN EXPERIMENTAL STUDY OF GENDER DIFFERENCES IN DISTRIBUTIVE JUSTICE

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De conformidad con la base quinta de la convocatoria del Programa de Estímulo a la Investigación, este trabajo ha sido sometido a evaluación externa anónima de especialistas cualificados a fin de contrastar su nivel técnico.

La serie DOCUMENTOS DE TRABAJO incluye avances y resultados de investigaciones dentro de los programas de la Fundación de las Cajas de Ahorros.
Las opiniones son responsabilidad de los autores.
An Experimental Study of
Gender Differences in Distributive Justice

Ismael Rodriguez-Lara

Abstract

This paper investigates gender differences in distributive justice by means of a controlled laboratory experiment. I consider a dictator game with production, in which subjects first solve a quiz to accumulate earnings and then divide the surplus by choosing one of the following allocations: (1) keeping the entire surplus (the selfish allocation), (2) giving the entire surplus away, (3) dividing the surplus in two identical parts (the egalitarian allocation), (4) dividing the surplus according to the subject's performance in the quiz (the accountability allocation), or (5) dividing the surplus according to subjects' production, which is due to performance and circumstances (the libertarian allocation). I find that women and men have different performance in the quiz but do not choose a different criteria when dividing the surplus. The data suggest, however, that women's are more sensitive to the context as women's allocation choices depend on whether they have earned more or less money than their counterparts. It is also found that women are more likely to employ the fair allocation that most benefits their financial payoff, whereas this is not the case for men.

Keywords: dictator game, experimental evidence, gender differences, distributive justice.

JEL Classification code: C91, D30, D64, J16.
1. Introduction

On January 20, 2007, Hillary Clinton announced her intention to become the President of the US, the first woman in this position. While competing with Barack Obama for the Democratic nomination, the critics wondered the extent to which the candidates' economic measures could be affected by their gender.

This is indeed a non-trivial question. The study of gender differences is relevant in many areas of economic inquiry such as labor segregation or the gender pay gap (Blau and Kahn 2000). In terms of behavior, the empirical evidence highlights that gender differences in preferences can be observed in several fields. Since Rapoport and Chammah (1965), economists have aimed to explore these differences in controlled laboratory experiments. The findings of the literature include that women are more risk averse than men, have a lower preference for competitive environments and give more weight to others' payoffs or utilities.¹ In particular, the results in the dictator game (Forsythe et al. 1994) suggest that women are more likely to be socially-oriented whereas men are more likely to be selfish.² These differences in social preferences are expected by subjects (Aguiar et al 2009), and are found to be significant in some studies (Eckel and Grossman 1998, Andreoni and Vesterlund 2001) but not in others (Bolton and Katok 1995, Dufwenberg and Muren 2006). The lack of a clear-cut result might be explained because women are more sensitive to the experimental design (Croson and Gneezy 2009). The extent to which subjects are exposed to risk can also determine whether the observed differences are significant or not (Eckel and Grossman 2008). However, the magnitude and the direction of the gender differences are still far from being thoroughly understood (Cox and Deck 2006).

A comprehensive analysis of social preferences is crucial for economists and policymakers to approach the problem of distributive justice. The understanding of gender differences in social preferences is also important for voters to understand the economic policies. As pointed out by Debbie Walsh, the director of the Center for American Women and Politics at Rutgers University, this analysis might be particularly important nowadays since "women may be the change [voters are] looking for".³

This paper contributes to the current debate about gender differences in social preferences by eliciting women's and men's preferences over redistribution in a dictator game with production.⁴ The dictator game is a proper tool to study redistribution, since subjects freely (and anonymously) decide over giving away some money or nothing. To obtain clear evidence for the existence of social preferences in this game, subjects should contribute to the surplus that is being distributed (Cherry, Frykblom and

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¹ For a review of the literature, see Camerer (2003), Eckel and Grossman (2008) and Croson and Gneezy (2009)
² Psychologists have also studied social preferences of genders using meta-analyses (e.g., Eagly and Wood 1991). See Eagly (1995) for a review of gender differences in psychological studies.
³ http://content.usatoday.com/communities/onpolitics/post/2010/06/women-candidates-play-major-role-in-2010/1
⁴ Technically-speaking, I use a mini-dictator game since the dictator chooses from a set of allocations. In the dictator game, the dictator is allowed to choose any division of the surplus.
In addition, dictators should be aware of the possibility of keeping the entire surplus so as to avoid framing effects (Hoffman, McCabe and Smith 1996).  

The experiment in this paper is designed to address these issues. In line with Konow (2000), two different phases are considered. In the first one, subjects earn money by answering a multiple-choice test that pays a fixed and random reward for each correct answer. This reward is the same for all questions. However, it might vary across individuals according to three different treatments, in which randomly chosen dictators are paid less than, more than, or equal to the recipient for each correct answer. Hence, two factors determine a subject's contribution to the surplus: the score on the test and the way in which this score is turned into money. Using this procedure, the available surplus to be divided depends on subjects' effort, and rational behavior should be elicited (Cherry, Frykblom and Shogren 2002).  

In the second phase, dictators allocate the earned surplus after being informed about each subject's reward for each correct answer, and both members' contribution to the surplus. Since it is common knowledge that reward levels and roles are assigned at random, it is likely that distributional preferences based on earnings are highlighted. Dictators are thus offered five different allocations to divide the surplus. They can (1) keep the entire surplus, (2) give the entire surplus to the other subject, (3) divide the surplus in two identical parts (the egalitarian allocation), (4) divide the surplus according to the subjects' correct answers at the first phase (the accountability allocation), or (5) divide the surplus according to the subjects' monetary contribution (the libertarian allocation). This procedure makes clear to dictators that keeping the entire surplus is acceptable. Likewise, the fair allocations (i.e., the egalitarian, the accountability and the libertarian allocation) are used to categorize the subjects' behavior according to three different ideals of fairness in the literature of distributive justice (Cappelen et al. 2007).  

When analyzing gender differences in the allocation choices, I find that roughly 70% of the subjects choose one of the fair allocations, and no difference exists between the percentage of women and men who choose to keep the entire surplus. The same holds when testing for the proportion of women and men who choose the egalitarian allocation, which is frequently used to describe women's behavior in other studies (Andreoni and Vesterlund 2001). The data support the hypothesis of heterogeneity in the use of fair allocations for both men and women and no significant differences are found in the way that women and men allocate the surplus (i.e., the unconditional distribution of allocation choices when subjects' production is disregarded is fairly close). Interestingly, women do not behave in the same manner when they allocate the surplus after contributing more or less money than their counterparts, whereas men's allocation choices are invariant to their relative position with regard to the accumulated surplus (thus, the distribution of allocation choices when relative production is accounted for is different). This finding is in line with the idea that women and men have different behavior depending on the context (Croson and Gneezy 2009).  

If the surplus is windfall, dictators will be likely to give money away and rational behavior will not be elicited, so many authors have pointed out the importance of the earned surplus to study fairness attitudes (e.g., Ruffle 1998, Konow 2000, Oxoby and Spraggon 2008). See Branaš-Garza (2007), List (2007) and Bardsley (2008) for the effect of framing in dictators' allocations.
Besides analyzing the gender differences in the allocation choices, this paper studies whether dictators that chose one of the fair allocations did choose the one that brings them the highest payoff. Two strands of work in distributive justice inspire this analysis. On the one hand, authors that focus on the normative grounds of the theory of justice (e.g., Walzer 1983, Young 1994) emphasize that fairness defies generalization as it is a context-specific phenomenon (i.e., it varies across contexts). Young (1994) indeed suggests that fairness "is merely a word that hypocritical people use to cloak self-interest". On the other hand, a positive approach of the theory of justice that builds on the experimental evidence tends to interpret that "the underlying motivation driving much fair behavior might be self-interest, coupled with a desire to maintain the illusion of not being selfish." (Dana, Weber and Xi Kuang 2007). Along these lines, some authors note that dictators’ giving might be explained because subjects want to be perceived as fair (Andreoni and Bernheim 2009), because they want to avoid the "greedy" tag (Bolton, Katok, and Zwick 1998) or simply because fairness imposes a constraint on their self-interested behavior (Kahneman, Knetsch and Thaler 1986). In the light of this evidence, I analyze the possibility of dictators having a bias toward choosing the fair allocation that is "most convenient" to them. The observed differences in women’s and men’s allocation choices in this analysis represent one the main contributions of this paper.

When analyzing the effect of gender differences in choosing the most convenient allocation, it turns out that women’s allocations cannot be rejected to be the most convenient ones, whereas men’s allocations are far away from being the fair allocations that yield dictators the highest payoff. The statistical analysis reveal that 66% of women who chose a fair allocation, indeed chose the payoff-maximizing one. Only 40% of the men who chose the fair allocation did so. To isolate the possible effects of women and men's different contributions to the surplus, I consider a logit model that controls for this feature. It is found that (ceteris paribus) women are 27% more likely to choose the fair allocation that is most convenient to them and this difference is statistically significant. These results support the idea of self-interested behavior in problems of redistribution (Rutström and Williams 2000) but contribute to the current literature by assessing the impact of gender differences in this context. In particular, the data suggest that women are more likely than men to choose a convenient allocation.

The remainder of the paper is organized as follows. In Section 2, I formally describe the fair allocations and explain how these allocations relate to three different justice principles in the existent literature. Section 3 discusses the experimental design and procedures and Section 4 contains the results. The final section concludes.

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6 This idea contrasts with other authors (e.g., Konow 2001), who argue that justice is context-dependent justice, not because of a lack of a general principle, but due to the impact of context on the interpretation and application of general principles. In the field of empirical social choice and psychology, there exists some studies (mostly questionnaires) that attempt to evaluate several distribution mechanisms and show that the context matters as subjects choose different solutions for the same distribution problems depending on the prevalence of tastes or needs in the story underlying each question (Yaari and Bal-Hillel, Young 1994, Scott 2001).

7 The use of the most convenient allocation might be related to the existence of what Croson and Konow (2009) call "moral bias" (i.e., behavior biased away from impartial standards). Other concepts in the literature of distributive justice that might be related to the choice of the most convenient allocation are "self-serving bias" and "egocentric bias" (e.g., Messick and Sentis 1985, Babcock et al. 1995, Konow 2000), but these concepts require to compare the dictators’ allocation choices with their choices as impartial judges who divide the surplus for two other subjects.
2. Fair Allocations in the Dictator Game with Production

Consider the dictator game with production, in which the dictator may choose from a set of allocations to divide a certain surplus \( y \geq 0 \). The size of the surplus depends on the dictator and the recipient's monetary contributions, which are denoted by \( y_d \geq 0 \) and \( y_r \geq 0 \) respectively. In particular,

\[
\bar{y} = y_d + y_r = p_d q_d + p_r q_r
\]

where \( q_i \geq 0 \) represents subject i's performance in a previous stage and \( p_i > 0 \) is the weight assigned to this input, for \( i \in \{d, r\} \). In the experiment, subjects were asked to complete a test, so \( q_i \) is the number of subject i's correct answers and \( p_i \) the reward for each correct answer.

In principle, three allocations can be identified with a fairness ideal. The allocations are described in Table 1. I denote the amount that the dictator keeps by \( k \in [0, M] \) and the percentage of correct answers that are due to the dictator by \( r_d^q \in [0, 1] \), where

\[
r_d^q = \frac{q_d}{q_d + q_r}.
\]

Table 1. Fair allocations in the dictator game with production

<table>
<thead>
<tr>
<th>Definition</th>
<th>Description of the Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egalitarian</td>
<td>( k = \bar{y}/2 ) Keeping half of the surplus.</td>
</tr>
<tr>
<td>Accountability</td>
<td>( k = r_d^q \bar{y} ) Keeping the part of the surplus that is due to his/her effort.</td>
</tr>
<tr>
<td>Libertarian</td>
<td>( k = y_d ) Keeping exactly his/her monetary contribution to the surplus.</td>
</tr>
</tbody>
</table>

The allocations differ in the weight that dictators assign to effort and circumstances. If the dictator chooses the egalitarian allocation, then the dictator will divide the surplus in two identical parts, so that the source of the surplus and its size will be ignored. The behavior of the egalitarian dictator reflects the idea of subjects disliking unequal outcomes, which is usually referred to as inequality aversion (Fehr and Schmidt 1999). Unlike this allocation, the accountability and the libertarian allocation plead for a solution in which entitlements to the available surplus are directly determined by the subject's performance in the previous stage. In particular, the accountability allocation is based on the exerted effort (i.e., the number of correct answers) and corresponds to

\[^8\] To see the application of these allocations read Cappelen et al (2007), where the authors estimate the distribution of subjects that allocate the surplus according to each ideal in a dictator game with production. For a further description of various theories of justice see Konow (2003).
the idea of equity in the sense that those factors that cannot be controlled by subjects are not considered by dictators when they are making their choice (Roemer 1998). The libertarian allocation, on the contrary, takes into account the reward levels and states that subjects ought to receive as much as their contribution to the surplus (Nozick 1974).

In the experiment, the egalitarian allocation implies that neither the score in the test nor the reward levels is important to determine the dictator's giving. The accountability allocation is based solely on the first factor, and the libertarian allocation is based on both. Of course, there exist cases in which these allocations overlap. For instance, if \( p_d = p_r \); then the accountability and the libertarian allocation coincide \((r_d^a = y_d)\). When \( q_d = q_r \), the accountability allocation and the egalitarian allocation coincide \((r_d^e = 1/2)\). When the subjects' monetary contribution to the surplus is the same \((y_d = y_r)\), then the libertarian and the egalitarian allocations coincide \((y_d = y/2)\).

The main questions to be addressed concern the existence of gender differences in the allocation choices and the possibility of women and men behaving differently depending on the context (i.e., when they contribute to the surplus more or less than recipients). I also want to investigate whether subjects choose the fair allocation that is most convenient and the extent to which this choice can be determined by the dictator's gender, the performance in the test \((q_i)\) and the reward levels \((p_i)\).

3. Experimental Design

The experiment was run in May 2008 and November 2008 in the Laboratory for Theoretical and Experimental Economics (LaTE) at the University of Alicante. A total of 144 students (77 women and 67 men) were recruited among the undergraduate population of the University. Students read an advertisement that informed them about the possibility of earning some money in an economic experiment and it provided an e-mail for students to sign up. Students were phoned to confirm their attendance. They were inscribed in one of the sessions only if they reported no previous experience in experiments.

There were 24 subjects in each of the 6 sessions. The experiment was implemented using the z-Tree software credited to Fischbacher (2007). When subjects were in front of the computer, they were given written instructions which were also read aloud by the experimenter to ensure that all the subjects received the same information. Subjects were explained that the experiment had two stages. During the first one, they had to complete a test that would provide earnings for the second stage. At this point, it was

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9 This allocation, as first proposed by Konow (1996), combines both equity theory (which makes the final allocation proportional to agents' inputs), and attribution theory (which considers responsibility or control over inputs). The relationship between responsibility and fairness is relevant as it is discussed by Fleurbaey and Maniquet (2009).
common knowledge that the test was the same for all individuals. However, subjects were not told that earnings from the test would be used for redistribution.\footnote{The same procedure was used in Konow (2000), Frohlich, Oppenheimer and Kurki (2004) and Cappelen et al. (2007).}

The first-stage quiz contained 20 multiple-choice questions with a time constraint of 35 minutes. There was only one correct answer out of five possibilities. Before answering the questions, subjects knew that each of their correct answers would be randomly paid at a certain reward rate, $p_i$, which lies in the interval $[100,200]$. Subjects were informed that the reward was the same for all questions but it could vary across individuals.\footnote{The instructions are in the appendix and the complete test is available on request. In the test, I use questions 1 to 10 given by List and Cherry (2000) and 10 additional questions of my own, given that some questions in List and Cherry (2000) are not multiple-choice but need to be answered in an empty space. I use List and Cherry (2000) because their questions are easy to solve despite being time-consuming. The authors argued that these questions are a good way to measure effort, rather than talent. I therefore assume that agents should be held responsible for the result of the test. I acknowledge, however, that ambiguity about matters of responsibility may contribute to the spread in fairness allocations. For instance, when issues of control are more clear subjects might be likely to choose the accountability allocation (Konow, Saijo and Akai 2009).}

At the conclusion of the test, subjects were randomly matched in pairs and assigned a type, namely "player A" (dictator) or "player B" (recipient). It is common knowledge that the type does not depend on subjects' performance on the test or any individual characteristic (e.g., age, gender,...).

The realization of the reward level $p_i$ occurs after subjects were informed about their type. The subject who was selected as dictator was rewarded $p_d=150$ pesetas\footnote{It is standard practice for all experiments run in the University of 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.} per each correct answer, whereas the recipient received $p_r\in\{100,150,200\}$ pesetas depending on the treatment. All treatments consisted of 24 dictators and 24 recipients. In one of them, dictators were treated relatively worse than recipients since their correct answers were paid at a lower reward rate; that is, $p_d=150$ pesetas and $p_r=200$ pesetas. In another treatment, the previous situation was reversed and dictators received a higher reward per correct answer than recipients; that is, $p_d=150$ pesetas and $p_r=100$ pesetas. Finally, there existed a treatment in which reward levels coincided for both subjects, making $p_d = p_r=150$ pesetas. I refer to the treatments as Dictator Worse (DW), Dictator Better (DB) and Baseline (BL) treatment, respectively. In the following table, I report the number of women and men that were selected as dictators in each treatment.\footnote{Since types do not depend on any individual characteristic, I cannot control for having exactly the same number of women and men in each treatment. I chose this procedure so as to guarantee equality of opportunities, what is important to avoid compensation and control for responsibility (Fleurbaey and Maniquet 2009). In the same vein, subjects where not told about the existence of three different treatments.}

<table>
<thead>
<tr>
<th></th>
<th>Women</th>
<th>Men</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>DW (150:200)</td>
<td>12</td>
<td>12</td>
<td>24</td>
</tr>
</tbody>
</table>

\footnote{Since types do not depend on any individual characteristic, I cannot control for having exactly the same number of women and men in each treatment. I chose this procedure so as to guarantee equality of opportunities, what is important to avoid compensation and control for responsibility (Fleurbaey and Maniquet 2009). In the same vein, subjects where not told about the existence of three different treatments.}
When subjects were informed about their reward levels and their contribution to the surplus, the total surplus was divided according to the dictator's decision, which was made under anonymous conditions. Dictators had to decide between five allocation choices to divide the surplus: (1) Keeping the entire surplus, (2) Giving the entire surplus to the other subject, (3) Dividing the surplus in two identical parts, (4) Dividing the surplus according to the subjects' contribution in terms of correct answers, (5) Dividing the surplus according to the subjects' monetary contribution. All these allocations were listed at once on the computer screen, with subjects being informed about the distribution of payoffs in each case. It is worth noting that the selfish allocation (predicted by the Nash equilibrium) made clear to subjects that keeping the entire surplus was acceptable (Hoffman, McCabe and Smith 1996). The second allocation was presented so as to have the symmetric case. The other three allocations are related to fairness ideals as explained in Section 2.

While dictators chose one of the allocations, recipients were also asked to make a hypothetical division of the surplus. The purpose of asking these subjects to perform a choice task is to prevent them from identifying dictators as the sole decision makers.

Once the decisions were made, subjects were informed about the final allocation. A show-up fee of 4 Euros was paid to each participant at the end of the session, regardless of their performance in the quiz. The experiment lasted around 45 minutes in total and the average payoff was around 13 Euros.

### 4. Results

In this section, I analyze the data gathered during the experimental sessions. I focus on dictators' decisions given that recipients' hypothetical decisions are not incentive compatible. First, I outline the subjects' performance in the first-stage quiz. On average, women had 8.64 questions correctly when they were dictators, whereas men had 11.77 questions correctly (standard deviations are 2.27 and 2.77 respectively). Women faced recipients who had on average 11.32 questions correctly, whereas men's counterparts

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14 The only "cost" of revealing types before subjects divided the surplus is that allocations were not chosen behind a veil of ignorance. This is a mild cost as the veil of ignorance is a dubious mechanism to guarantee distributive justice (Moreno-Temerto and Roemer 2008). By revealing types before subjects divided the surplus, I also avoid uncertainty and strategic considerations, so that any allocation choice that is different from the selfish one would be inconsistent with the traditional notion of self-interest.
had 10.4 questions correctly. A simple t-test rejects the null hypothesis that women and men had the same number of questions correctly when they were dictators (t=5.23, p-value<0.000). In addition, the t-test rejects the null hypotheses that women and men had the same questions correctly than their counterparts (for women, t=4.03, p-value<0.003; for men t=2.10, p-value<0.043). I can therefore conclude that women's and men's performance in the first-stage quiz is significantly different.\textsuperscript{15}

The dictators' decisions in the distribution phase are summarized in Table 2. I report the number of dictators choosing each possible allocation by considering women and men separately. Since no dictator chose to give the entire surplus away, such an allocation is not listed. Likewise, recall that justice principles may coincide in some cases, so Table 2 presents both the raw data and the grouped data.

\textbf{Table 2.} Distribution of allocation choices in the dictator game

<table>
<thead>
<tr>
<th>Raw Data</th>
<th>Grouped Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Women</td>
</tr>
<tr>
<td>Selfish</td>
<td>10</td>
</tr>
<tr>
<td>Egalitarian</td>
<td>10</td>
</tr>
<tr>
<td>Accountability</td>
<td>6</td>
</tr>
<tr>
<td>Libertarian</td>
<td>2</td>
</tr>
<tr>
<td>Egal. = Account.</td>
<td>3</td>
</tr>
<tr>
<td>Egal. = Libert.</td>
<td>2</td>
</tr>
<tr>
<td>Account. = Libert.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>37</td>
</tr>
</tbody>
</table>

\* In each cell, I report the number of observations. The grouped data takes into account that some allocation choices might coincide under different scenarios.

We see that only 25 dictators (i.e., roughly 30\%) chose the selfish allocation, whereas 47 dictators (i.e., roughly 70\%) chose one of the fair allocations. One plausible reason for dictators not to behave selfish is the existence of the first phase in which subjects earn money (Ruffle 1998, Oxoby and Spraggon 2008, Cappelen et al. 2007). In Table 1 we observe that there exists heterogeneity in the use of fair allocations, which is consistent with Cappelen et al (2007). This result holds both for women and men, and the Pearson's $\chi^2$ test for goodness-of-fit rejects the null hypothesis that dictators' decisions can be explained by a unique justice principle (p-values<0.0001).

\textbf{Result 1} \textit{Women and men exhibit heterogeneous behavior concerning redistribution.}

\textsuperscript{15} This result seems to support the idea of men and women having different performance on mathematics (Hyde, Fennema and Lamon 1990).
Evidence from previous studies that investigate gender differences highlight (i) that women are more socially-oriented than men (Eckel and Grossman 1996), (ii) that women are more concerned with equalizing payoffs (Andreoni and Vesterlund 2001, Dickinson and Tiefenthaler 2002), and (iii) that women's decisions are more context-specific than men's (Croson and Gneezy 2009)

In Table 2, it is eye-catching that women are less likely to choose the selfish allocation and more likely to choose the egalitarian allocation. The test of proportion, however, suggests no significant difference between the proportion of women choosing the selfish option and the proportion of men doing so (Z=1.16, p-value=0.123). The same result holds when testing for the proportion of women and men choosing the egalitarian principle (Z=1.33, p-value=0.183). indeed, if I compare the distribution of allocations that women and men chose, the Fisher exact probability tests cannot reject the null hypothesis these allocation choices come from the same distribution (Fisher's exact=0.351).

**Result 2** Women and men are equally likely to be selfish and their allocation choices cannot be rejected to come from the same distribution.

To study whether decisions are context-dependent or not, I consider the dictator's relative position with regard to the accumulated surplus as a reference point. In Table 3, I report the distribution of allocations for both women and men by considering the case in which dictators contribute to the surplus more than recipients ($y_d \geq y_r$) and the case in which they do contribute less ($y_d < y_r$).

Table 3. Distribution of allocations depending on the dictator's relative earnings.

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16 When testing for the egalitarian allocation, I use a conservative test of proportions and consider that 15 women and 9 men chose this allocation. If I compute the women's and men's deviations from equality (k-y(2)), the Kolmogorov-Smirnov test cannot reject the null hypothesis that women's and men's allocation choices come from the same distribution (KS=0.250, p-value=0.15).

17 Andreoni and Vesterlund (2001) observe that subjects' behavior vary with the "relative price of giving" and Croson and Gneezy (2009) argue that differences in behavior are due to different responses to the experimental protocols. Thus, the second dimension to be explored is related to the treatment conditions. This analysis will not be very powerful since there are very few observations to compare women's and men's allocation choices both within and across treatment. In any case, the Fisher exact probability test cannot reject the hypothesis that for any given treatment women's and men's allocations come from the same distribution (p-values>0.162). If I transform the data and consider the proportion of the surplus that dictators decide to keep, k/y, the Kruskal-Wallis test suggests that neither women's decisions nor men decisions's are affected by the treatment conditions (women: $\chi^2=2.764$, p-value=0.2511; men $\chi^2=0.109$, p-value=0.9472).
\[
\begin{array}{cccc|cccc}
& y_d \geq y_r & & y_d < y_r & \\
& \text{Women} & \text{Men} & \text{Total} & \text{Women} & \text{Men} & \text{Total} \\
\hline
\text{Selfish} & 5 & 10 & 15 & 5 & 5 & 10 \\
\text{Egalitarian} & 0 & 3 & 3 & 10 & 3 & 13 \\
\text{Accountability} & 2 & 1 & 3 & 4 & 4 & 8 \\
\text{Libertarian} & 1 & 4 & 5 & 1 & 1 & 2 \\
\text{Egal. = Account.} & 1 & 2 & 3 & 2 & 1 & 3 \\
\text{Egal. = Libert.} & 2 & 0 & 2 & 0 & 0 & 0 \\
\text{Account. = Libert.} & 2 & 1 & 3 & 2 & 0 & 2 \\
\hline
13 & 21 & 34 & 24 & 14 & 38 \\
\end{array}
\]

*In each cell, I report the number of observations.

The Fisher exact probability test cannot reject the null hypothesis that women's and men's allocation choices come from the same distribution (Fisher's exact=0.283 when \(y_d \geq y_r\) and 0.622 when \(y_d < y_r\)). This finding would indicate that there are no significant differences in women and men's allocation choices, as suggested by Result 2. However, the Fisher exact probability test rejects the null hypothesis that the distribution of women's allocation choices when \(y_d \geq y_r\) is the same as the distribution of women's allocation choices when \(y_d < y_r\) (Fisher's exact =0.033). The test does not reject this hypothesis for men, who seem to behave in the same manner when they are in an advantageous position and when they are in a disadvantageous position with regard to the accumulated surplus (Fisher's exact=0.382). In line with Croson and Gneezy (2009), I note that women might be more sensitive to the context than men.\(^{18}\)

**Result 3** *Women's allocation choices are sensitive to the context since choices depend on whether women have earned more or less money than recipients.*

We have seen that women's and men's allocation choices are fairly close in spite of (i) their different performance in the first-stage quiz and (ii) their differences in behavior with regard to the accumulated surplus. One of the research questions in this paper concern the extent to which dictators choose a convenient allocation. To approach this issue, I present Table 4 which describes the allocations that dictators would choose if they were motivated by choosing the fair allocation that is most convenient to their interest; that is, the (hypothetical) distribution of allocations in Table 4 follows from agents' contribution to the surplus and it describes the fair allocations that give the dictator the highest payoff.

\(^{18}\) It seems that women are more likely to equalize payoffs when they contribute to the surplus less than recipients. In particular the test of proportion rejects the null hypothesis that women are equally likely to choose the egalitarian principle when \(y_d \geq y_r\) and when \(y_d < y_r\), in favor of the alternative that the egalitarian principle is chosen more frequently when \(y_d < y_r\) (p-value=0.0556).
Table 4. Distribution of (hypothetical) fair allocations that give the dictator the highest payoffs

<table>
<thead>
<tr>
<th>Raw Data</th>
<th>Grouped Data</th>
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<tr>
<td></td>
<td>Women</td>
</tr>
<tr>
<td>Selfish</td>
<td>0</td>
</tr>
<tr>
<td>Egalitarian</td>
<td>20</td>
</tr>
<tr>
<td>Accountability</td>
<td>1</td>
</tr>
<tr>
<td>Libertarian</td>
<td>8</td>
</tr>
<tr>
<td>Egal. = Account.</td>
<td>3</td>
</tr>
<tr>
<td>Egal. = Libert.</td>
<td>2</td>
</tr>
<tr>
<td>Account. = Libert.</td>
<td>2</td>
</tr>
<tr>
<td>Egal. = Acc. = Lib.</td>
<td>1</td>
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</table>

In each cell, I report the number of observations. The grouped data takes into account that some allocation choices might coincide under different scenarios.

The theoretical background to support the use of these choices is based on the idea that fairness "is merely a word that hypocritical people use to cloak self-interest" [Young 1994, page xi]. In this vein, the allocations in Table 4 would be consistent with the idea in Bolton, Katok and Zwick (1998) of a dictator who gives money away for not being labeled "greedy". The allocations would also reflect the idea that dictators give money away because they want to be perceived as fair (Dana, Weber and Xi Kuang 2007, Andreoni and Bernheim 2009).

I compare Table 4 and Table 2 using the Wilcoxon signed-rank test. The test cannot reject the null hypothesis that women's allocation choices are the most convenient ones (W=0.75, p-value=0.4495), but it rejects the same null hypothesis for men's allocation choices (W=2.36, p-value=0.0183). At the individual level, I find that 27 women chose to give money away, and 18 of them (i.e., roughly 66%) chose the most convenient allocation. There are 20 men who chose to give money away, and 8 of them (i.e., 40%), chose the most convenient allocation. The test of proportion rejects the null hypothesis that women and men are equally likely to be biased at the 10% significance level (Z=1.522, p-value=0.063).

Overall, it seems that women and men's behavior is fairly close but women are somehow inclined toward choosing the fair allocation that is most convenient. This finding can be affected by the subjects' performance in the test. Assume that women and men do have exactly the same preferences over redistribution so that they would choose the same allocations. If women do contribute to the surplus less than men but choose the same allocations, women would appear as being more convenient than men (even though they both have exactly the same preferences). Thus, the fact that women appear to be more likely to choose the convenient allocation could be

---

19 I am not aware of any statistical test that compares distributions of categorical data when more than two outcomes are possible and observations are not independent. To deal with this problem, I transform the data in Table 2 and Table 4 and I test whether the distribution of payoffs associated to allocations in Table 2 is the same as the distribution of payoffs associated to allocations in Table 4. To control for the effect of different reward levels (that yields a higher size of the surplus in the DB treatment), I focus on the proportion of the surplus that dictators decided to keep, k/y.
explained by their gender or simply by their relative performance in the quiz (e.g., $Q_{dif} = q_d - q_r$). The treatment conditions (i.e., the reward levels) could also affect the likelihood of choosing the most convenient allocation, since dictators may feel good or bad for being paid more or less than recipients. To disentangle the effect of these variables, I estimate a logit regression, in which the dependent variable is the probability of choosing the fair allocation that gives the dictator the highest payoff; i.e., the dependent variable is $Pr(k = k_{\text{max}})$, where $k_{\text{max}} = \max\{r_d, y_1, y_2, y_d\}$. In the logit model, the explanatory variables are the dictator's gender (i.e., a dummy variable WOMEN that takes the value 1 if the dictator is a woman), the treatment conditions (i.e., the dummy variables DW and DB) and the difference in subjects’ correct answers ($Q_{dif} = q_d - q_r$). As a result, I estimate:

$$Pr(k = k_{\text{max}}) = \frac{\exp(\beta_0 + \beta_1 \text{WOMEN} + \beta_2 \text{DW} + \beta_3 \text{DB} + \beta_4 Q_{dif})}{1 - \exp(\beta_0 + \beta_1 \text{WOMEN} + \beta_2 \text{DW} + \beta_3 \text{DB} + \beta_4 Q_{dif})}$$

In Table 5, I report the estimates and the marginal effects.20

Neither the treatment conditions nor the difference in correct answers seem to have a statistically significant effect on the likelihood of choosing the biased allocation. The dictator's gender, however, has a significant effect as women are 27% more likely to choose the biased allocation than men (ceteris paribus).

Table 5. Logit regression to study biased behavior

<table>
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<th>Coefficient</th>
<th>Std. Error</th>
<th>Marginal Effect</th>
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<tr>
<td>Constant</td>
<td>-0.923</td>
<td>0.55</td>
</tr>
<tr>
<td>Women</td>
<td>1.241**</td>
<td>0.60</td>
</tr>
<tr>
<td>DW</td>
<td>-0.137</td>
<td>0.62</td>
</tr>
<tr>
<td>DB</td>
<td>-0.888</td>
<td>0.66</td>
</tr>
<tr>
<td>Qdif</td>
<td>0.019</td>
<td>0.06</td>
</tr>
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</table>

*Significance at *10%, 5%, 1% level. Observations 72. Pseudo R=0.08.

These findings lead to a subtle but significant change in our understanding of what other studies have found with respect to the effect of gender on problems of distributive justice. The data indicate biased behavior for women and stand in stark contrast to previous experimental evidence that find that women are more socially-oriented and more concerned with equalizing payoffs.

20 I note that the regression results are robust to a number of other specifications. Hence, the marginal effects do not change qualitatively if instead of $Q_{dif}$ I consider a dummy variable $DQ_{dif}$ that takes the value 1 if $Q_{dif}$ > 0, or if I include in the model the product of the dummy variables WOMEN and $Q_{dif}$ as explanatory variable.
5. Conclusions

This paper studies gender differences in distributive justice by means of a controlled laboratory experiment. In the first phase of the experiment, subjects solve a questionnaire to earn money. I consider three different treatments in which dictators are paid less than, more than, or equal to the recipient for each correct answer so that the subject's effort is differentially rewarded relative to the size of the surplus. In the second phase, dictators divide the surplus according to five different allocations: dictators can (1) keep the entire surplus (the selfish allocation), (2) give the entire surplus to the recipient, (3) divide the surplus in two identical parts (the egalitarian allocation), (4) divide the surplus according to the subject's performance (the accountability allocation), or (5) divide the surplus according to subjects' monetary contribution, which is due to performance and circumstances (the libertarian allocation).

I analyze whether women and men exhibit different preferences towards these five different allocations. The data in this paper suggest that there exists heterogeneous behavior both for women and men, and no significant differences are found in the way that women and men allocate the surplus. In addition, gender differences are not observed within or across treatments, although women's allocation choices depend on whether they have contributed to the surplus more or less than recipients, whereas this is not the case for men. When considering the possibility of biased preferences over redistribution, I cannot reject that women choose the fair allocation that most benefits them. Maybe surprisingly, this result does not hold for men, what leads to a subtle but significant change in our understanding of the idea of women being more socially-oriented than men, as shown by previous studies.

The existence of the earning stage has probably contributed to the spread of justice principles and explains these new findings in the literature on gender differences. Still, there are some things to be done. The possibility to explore further women and men behavior within treatments and the idea of considering the dictators' behavior as a third-party view (i.e., comparing their choices when they are involved in the problem and their choices for other subjects) seem to be fruitful areas for future research. I hope the current research helps to spark interest in the study of gender differences in distributive justice.
References


Appendix: Instructions

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.
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.

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. This player has five different options to divide the earnings, as you will see in the computer screen. Player B will also have the possibility to choose an allocation, but the decision of player B will not be paid.

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

You have answered 10 questions correctly.
Since each question is paid at a price 150 pesetas, you have contributed 1500 pesetas to the total amount.

Player B has answered 10 questions correctly.
Since each question is paid at a price 200 pesetas, player B has contributed 1600 pesetas to the total amount.
The total amount of money that you both have contributed is 3100 pesetas.

You have to choose one of the following 5 allocations.
Allocation 1 (Keep it all). You get 3100 pesetas and player B receives 0 pesetas.
Allocation 2 (Give it all). You get 0 pesetas and player B receives 3100 pesetas.
Allocation 3 (50-50). You get 1550 pesetas and player B receives 1550 pesetas.
Allocation 4 (Dividing the money according to the number of correct answers). You get 1722 pesetas and player B receives 1378 pesetas.
Allocation 5 (Dividing the money according to the monetary contribution). You get 1500 pesetas and player B 1500 pesetas.

Allocation choice.  
I choose the following allocation:  
- Allocation 1 (Keep it all)  
- Allocation 2 (Give it all)  
- Allocation 3 (50-50)  
- Allocation 4 (Dividing the money according to the number of correct answers)  
- Allocation 5 (Dividing the money according to the monetary contribution)
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