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Social preferences across different populations: Meta-analyses on the ultimatum and dictator games

François COCHARD*, Julie LE GALLO†, Nikolaos GEORGANTZIS‡,
Jean-Christian TISSERAND§

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Abstract

We perform meta-regressions on a single database containing 96 observations of simple ultimatum games and 144 observations of simple dictator games to disentangle the fairness hypothesis based on the degree of economic development of a country. According to the fairness hypothesis, offers in the two games should not differ if they were motivated by a subject's fairness concerns. Using the difference across countries between offers in ultimatum and dictator games, we address the effect of being exposed to the market mechanism on pure fairness concerns and other-regarding, expectations-driven fairness. Our results show in particular that the lower the level of economic development in a country, the less likely the rejection of the fairness hypothesis.

Keywords: ultimatum game, dictator game, meta-analysis, social preferences

JEL Classification: C13, C78, D03, D64

*CRESE, Université de Franche-Comté, F-25000 Besançon, France. Tel: (33)3 81 66 67 76.
francois.cochard@univ-fcomte.fr

†CESAER, INRAE, Agrosup Dijon, Université de Bourgogne Franche-Comté, F-21000 Dijon, France.
julie.le-gallo@agrosupdijon.fr

‡Corresponding author. CEREN, EA 7477, Burgundy School of Business - Université Bourgogne Franche-Comté. nick.geogantzis@gmail.com

§CEREN, EA 7477, Burgundy School of Business - Université Bourgogne Franche-Comté; Swiss Distance Learning University (UniDistance), Überlandstrasse 12, Postfach 265 CH-3900 Brigue.
jean-christian.tisserand@bsb-education.com

1 Introduction

What is fair and what is not? People’s perceived norms of fairness and overall expectations depend of their experience in their cultural, social and economic environments and are thus very likely to vary across countries. For example, Corneo (2001) argue that people from a country in which intense redistribution takes place exhibit greater concerns for fairness than individuals in countries with less tradition in redistribution. In fact, according to Alesina and Giuliano (2011), such “home grown” values are carried over and persist among immigrants in the destination country. Related to our study, Alesina and Angeletos (2005) point that in countries in which people trust the market mechanism as a fair device for the allocation of resources, unequal outcomes are more likely to be tolerated as the result of differences in the citizens’ efforts. Therefore, exposure to a more developed market may lead agents to accept more unequal outcomes. In this paper, we investigate the relationship between market exposure and pure fairness concerns and other-regarding, expectations-driven fairness. We are the first, to our knowledge, to use experimental data to investigate this issue.

Fairness is an essential component of the decisions taken by the subjects who participate in economic experiments. Among many related experimental paradigms, the dictator game (DG) and the ultimatum game (UG) have sparked much discussion regarding fairness. In a DG, when splitting a pie between one’s self and another person, giving anything to another player may be the result of a preference for more fair outcomes (see e.g. Fehr and Schmidt, 1999). Similarly, in an UG (Güth et al., 1982), the proposer may also have fairness concerns and raise offers above the minimum predicted by the subgame perfect equilibrium. According to Forsythe et al. (1994), under the “fairness hypothesis”, distributions of offers in both the DG and UG should be the same. Alternatively, if the distribution of offers differs between the two games, then fairness alone is not enough to explain the subjects’ choices in the UG.

Of course, one can fairly expect higher offers in an UG than in the DG because the first player in an UG must also account for the second player’s Minimum Acceptable Offer (MAO), apart from any other-regarding motivation leading to a fairer split of the pie. Therefore, the receivers’ veto power and the beliefs of proposers regarding their counterparts’ MAO create an extra motivation for higher than minimum offers in the UG than in the DG. The share of this extra belief- and risk-related motivation in proposers’ offers in an UG can be measured by the difference between donations in a DG and proposals in an UG. If the two coincide the “fairness hypothesis”), non-minimal proposals in an UG are fully motivated by fairness concerns, whereas if they significantly differ from each other, then the fairness motivation in UG offers can be rejected. One could envisage within-subject designs, measuring the difference between UG offers and DG donations, which would capture heterogeneity across individuals as far as the underlying behavioral motivations are concerned. Alternatively, one could look at differences across countries to identify socio-economic factors which could determine the size of the difference. Addressing the second type of question requires distinguishing between socio-economic determinants of the other-regarding component in dictators’ behavior, on one hand and, on the other hand, determinants of proposers’ behavior, which we interpret under some assumptions as the (expected) MAO of UG receivers.¹ In this article, we investigate whether the “fairness hypothesis” is supported for experimental data collected in different countries.

¹This is further detailed in section 2.

Our article is motivated by the fact that experimental economics has provided very interesting but contradictory evidence to the debate. Henrich et al. (2001, 2005) investigate how the social and economic environment as well as cultural differences can shape the subject's behavior in experimental games. Their studies focus on small-scale societies' inhabitants rather than university students. Using various proxies for market integration in different locations such as individuals' participation in wage labor, reliance on cash cropping, competence in national language, or the amount of land an individual devotes to cash cropping, their UG and DG results show that exposure to markets is positively correlated to higher offers from proposers.²

However, a recent meta-study by Engel (2011) provides results that may appear somehow different for the DG. He summarizes the evidence about the past 25 years of dictator experiments and addresses the issue of the relation between DG offers and the level of development of a country. Using an ordered categorical variable to distinguish between more or less developed countries, Engel finds a strongly significant negative correlation between DG offers and the level of development of a country. He concludes that "the more a society is primal, the more dictators are willing to share". As development shows high correlation with market integration, this may suggest a contradiction with previous results.

To investigate this issue, we implement a meta-analysis on a large number of UG and DG experiments to test whether the fairness hypothesis depends on the level of economic development of a society. For this purpose, we gathered a total of 96 standard UG and 144 standard DG. Apart from the obvious advantage of statistical power, the meta-analysis method is particularly crucial for investigating such a research question. Indeed, very few cross-country experimental studies comparing offers in both games are available in the literature. The only ones we are aware of are Henrich (2000), Ensminger (2004) and Henrich et al. (2010), and only for small-scale societies. The meta-analyses by Engel (2011) and Oosterbeek et al. (2004) focus respectively on the DG and on the UG, they do not compare the two.

The first attempt to investigate cultural differences in bargaining behavior was undertaken by Roth et al. (1991). Their paper reports data from UGs that were collected in four different countries: Israel, Japan, the United States, and Yugoslavia. The data show that the observed bargaining outcomes are significantly different from the perfect-equilibrium predictions in every country. Yet, offers made by proposers vary substantially across countries: the highest offers are observed in the United States and Yugoslavia while the lowest offers are made in Israel. Using data from 75 UGs, Oosterbeek et al. (2004) conduct a meta-analysis in which they investigate the forces that shape the amount offered by the proposer in the UG. They found no significant differences in proposers' offers across different countries. However, it is useful to bear in mind that the authors clustered the countries of their database by continents, using a dummy variable for each continent.

The large number of existing experiments on DG and UG allows us to study the existence of significant country differences in the divergence between DG donations and UG offers. Our results are the first evidence that such differences have their origin in the effect of economic development on the preference for fairness.

Specifically, the more developed a country is, the lower are the donations in the DG. Interestingly, no effect of economic development is found on UG offers. Therefore, the gap between DG donations and offers in the UG and, thus, the rejection probability of

²The term market integration here refers to the simplicity for a country or for a community to have access to common markets.

the fairness hypothesis increases as we move from less to more developed countries. This implies that a country's development does not affect the expectation of UG proposers on their counterparts' MAO but, rather, the extent to which UG proposers and dictators in the DG have a preference for more fair outcomes.

Our meta-analysis has two major implications. First, the socioeconomic environment and, in particular, the economic development of a country influences negatively the share of fairness among the motivations of more generous actions. Hence, the fairness hypothesis will not be rejected for the less developed countries, contrary to what has been found in all past studies generally based on western countries' subject pools. Second, there is a large value-added potential in the combined meta-analysis of data obtained from different games, as a source of information on the underlying motivations of observed behavior.

The remaining part of the article is organized as follows. Section 2 offers a very simple model clearly defining the fairness hypothesis. Section 3 presents the data and design of the meta-analysis. We describe the procedure used to select the studies, the explanatory variables of the meta-regression, and the estimation methods. Section 4 is devoted to the comparative meta-analysis of DG and UG offers. Section 5 concludes.

2 The fairness hypothesis

According to Forsythe et al. (1994), under the fairness hypothesis, distributions of offers in the DG and in the UG should not be different. Alternatively, if the distribution of offers differs between the two games, then fairness alone is not enough to explain the subjects' choices in the UG. In other words, the veto power conferred on the respondent in the UG creates a strategic environment that may cause the proposer to offer a greater amount, in order to avoid rejection by the respondent. In fact, this only occurs if the proposer believes that the amount he would be willing to give in the absence of veto power would not satisfy the receiver's MAO. In this situation, the proposer will consider the recipient's preferences and increase his offer to meet their MAO and avoid rejection. This extra gift can be described as a "strategic gift".

Fairness is not an absolute but a relative concept that depends on the norms that apply in a given culture or in a given geographical area. As stated by Chaudhuri (2008), "notions of fairness may vary across cultures in that offers that are considered unfair and routinely turned down in one society are readily accepted in others." Giving 30% of your endowment can appear greedy if recipients expect you to give 50% but can also appear decidedly generous if they expect you to give 10%. For simplification purposes, it is reasonable to consider that fairness is a matter of norms and expectations where giving the norm is fair while giving under the norm is not.

According to this definition of fairness, measuring and comparing proposers' fairness would require estimating the difference between the actual norm of fairness in a given country or in a given culture and the share proposers give when nothing forces them to (the DG). But what defines the norm? The average "maximal acceptable offer" (hereafter MAO) of recipients in a population does. More precisely, the average MAO can be interpreted as the recipient's aversion to disadvantageous inequality. Supposing that proposers are good at guessing the threshold below which their offer will be refused, average UG offers just reflect the norm of tolerance to disadvantageous inequality. Tisserand (2016) performed meta-analysis of the UG and focused on the respondents' MAO. The results show that, on average, respondents' MAO that can be found in papers using the strategic method coincides with the average amount offered by proposers. Under the as-

sumption that proposers’ beliefs about recipients’ MAO are accurate, our study aims at investigating whether proposers’ fairness depends on the level of economic development of countries.

We formalize this interpretation for more clarity. Let w denote the proposer’s initial endowment and $y_{ult} \in [0, w]$ (respect. $y_{dic} \in [0, w]$) denote his offer in the ultimatum (respect. dictator) game. The value $\tilde{x} \in [0, w]$ denotes the recipient’s MAO. The distribution of \tilde{x} in the population may vary with the country where the UG is played. Let $\tilde{\theta}$ denote the proposer’s belief about \tilde{x} . We need to formulate two assumptions:

Assumption 1: Proposers have a correct belief about the distribution of the recipients’ MAOs: $\tilde{\theta} = \tilde{x}$, so that they correctly infer the recipients’ average MAO, i.e. $E(\tilde{\theta}) = E(\tilde{x})$.

Assumption 2: Proposers are risk-neutral.

Under these assumptions, the proposers’ payoff maximizing strategy in the UG is clearly to offer $y_{ult} = E(\tilde{x})$. A straightforward definition follows:

Definition: In the DG, under Assumptions 1 and 2, a fair (respect. unfair) offer y_{dic} is characterized by $y_{dic} = y_{ult}$ (respect. $y_{dic} < y_{ult}$).

Of course if proposers are risk- or ambiguity-averse, they may add a safety margin in addition to the mean MAO in the UG. In this case, our reasoning still holds if that safety margin is constant across all countries, i.e. supposing that risk aversion does not substantially differ across different countries. Similarly, if proposers’ MAO estimates are inaccurate, our result will still hold provided that the estimation biases do not vary across countries.

Hence, under our assumptions, if we consider that the recipients’ MAO reflects the norm of fairness in a given culture or in a given geographical area, our study allows us to investigate whether proposers’ fairness depends on a country’s level of economic development.

3 Data and design

3.1 Design of meta-analysis

For this comparative meta-analysis of the UG and the DG, we first constructed two separate databases that were merged later. We used Econlit and Google Scholar with four different combinations of keywords: “Dictator game”, “Dictator experiment”, “Ultimatum game”, and “Ultimatum experiment”. The search for “dictator game” and “dictator experiment” papers in Econlit yielded respectively 368 and 110 results while we obtained 396 and 105 results for “ultimatum game” and “ultimatum experiment”.

On Google scholar, results are much more numerous but may also become less relevant over subsequent pages.³ We found a large number of articles in common in the two databases which still provided a fair amount of studies with which to perform meta-analyses. The search was completed in February 2014.

Our main purpose is to establish a comparative study of the DG and the UG. It is thus important that the average offers of both games are computed on the basis of very similar criteria and are not affected by protocol differences which is why we focused our

³On Google Scholar, we obtained 70,800 results for the DG and 42,700 for the UG. Among these numerous results, approximately the first 30 pages, with 10 results per page, displayed articles related to our study.

analysis on standard UG and DG. Restraining our observations to these games allows us to ensure that our analysis is not confounded by unobserved heterogeneity associated to protocol designs departing largely from the standard design.⁴

For the DG we chose to retain only standard protocols referring to the DG under its original form initially proposed by Forsythe et al. (1994), with two anonymous subjects and a random entitlement. Restricting the selected studies to such DG led us to exclude a large number of studies, for example those with the following characteristics:

- Studies in which the available set of actions is too restricted, constraining subjects to choose either the selfish outcome or the equal share. We thus chose to keep the studies in which the number of feasible actions for dictators was at least eight.

- Studies in which no money or fake money is at stake. As assumed by economic theory, subjects are sensitive to monetary incentives. We have no reason to believe that a dictator would make the same decision when earnings are hypothetical. Moreover, we also excluded studies in which dictators are endowed with less than \$4. We made this choice to ensure that monetary incentives were non-negligible.

- Studies in which dictators are asked to give their money to a charity association. In this case subjects' behavior may obviously be altered compared to a standard protocol.

- Studies in which subjects "earned" the dictator position. In this case, since subjects deserve the dictator position, they may behave more selfishly than usual.

- Studies in which the subjects' anonymity is not totally guaranteed. Such a protocol can improve subjects' generosity in case of observability of their choice.

- Studies which involve any form of competition. Such protocols modify subjects' incentives depending on the purpose of the competition.

- Studies in which subjects played any other game prior to the DG. This restriction is set to avoid contagion effect across treatments.

- Studies implying more than two subjects or computerized subjects.

- Framed studies in which players do not have neutral denominations. For example protocols in which the recipient is called the "partner" can increase dictators' generosity toward the recipient. Similarly, framed studies in which players are called "sellers" and "buyers" can influence players' decisions and are thus excluded.

These restriction criteria led us to rule out many studies and, for many others to select only one observation, the control treatment. As we seek to estimate the average proportion of the endowment offered in a standard DG, we set these restrictions to ensure that our estimate is not altered by uncontrolled protocol differences.

For the ultimatum games we also chose to retain only standard protocols, referring to the UG under its original form initially proposed by Güth et al. (1982) with two anonymous subjects and a random entitlement. We thus, for example, excluded studies having the following characteristics:

- Repeated games in which subjects are matched with the same subject for all the periods (partner protocols). We retained only stranger protocols to avoid reputation effects.

- Repeated games in which players' mean offer is revealed at the end of each period. This information can influence players' decisions.

- Studies which involve any form of competition.

⁴A large number of protocols are unique or have only been performed a few times. Even if it might technically be possible to include a dummy variable to control for the effect of one particular study, the statistical power of such a "control" would be too weak to draw any conclusions.

- Studies in which the information differs between the proposer and the responder. In these studies, there is uncertainty about the endowment or the offer made by the proposer.
- Studies in which decisions are taken in groups and studies involving more than two subjects or computerized subjects.
- Studies in which the set of actions available to proposers is not at least eight.
- Studies in which there is no real money at stake. Studies in which proposers are not endowed with at least \$4 (or equivalent).
- Studies in which proposers earned the proposer position.
- Studies in which anonymity is not totally guaranteed.
- Studies in which subjects played another game prior to the UG.
- Studies in which the Nash perfect sub-game equilibrium is revealed to players before they make a decision. This information can obviously influence players' decisions.
- Framed studies in which players are called seller/buyer in the experiment.

Again, we chose to set these restrictions to ensure an accurate estimate of the average proportion of the endowment offered by a proposer in the standard UG, excluding protocol differences.

Although these criteria may seem restrictive, they are necessary for the DG and the UG to be comparable.⁵ Finally, the DG database contains a total of 144 observations collected from 96 articles. The articles were published between 1994 and 2013, 2008 being the median date of the sample. Regarding the geographical distribution of the studies, observations were collected from 30 different countries (see the list of included countries in Table 8 in the Appendix). Our UG database contains a total of 96 observations collected from 42 articles and one book. The articles were published between 1983 and 2011, 2001 being the median date of the sample. The selected UGs were collected from a set of 29 different countries.

3.2 Variables

For each selected article, ultimatum or dictator, we recorded three categories of information. First, the essential information are:

- The average offer of the study, as it is our dependent variable of interest, expressed as a proportion of the initial proposer's endowment.
- The standard error of the average offer, which allows us to define the appropriate weights of the studies. Some papers did not report information about the dispersion of offers or the distribution of offers. In these cases, we sent emails to the authors whose papers did not allow us to record the standard deviations of offers.

The second category of variables are the explanatory variables of interest, related to the game (ultimatum or dictator) and to the degree of economic development of the country where the experiment was run. Since there is no standard method to measure how developed a country is, we used three different proxies, each measuring economic development level by very different approaches. We choose to rely on heterogeneous measures of economic development as a robustness check of our results. Table 8 in the Appendix shows the value of these variables for each country involved in the analysis.

- Macroeconomic development

⁵Given the purpose of our meta-analysis, we did not systematically supplement our list of papers by those from the meta-analyses of Engel (2011) and Oosterbeek et al. (2004). We found it more important to avoid biases between the searches for UG and DG papers than to find as many papers as possible.

Our first proxy relies exclusively on macroeconomic indicators. It considers the GDP per capita, the HDI (Human Development Indicator) index, the poverty rate of the country where the experiment was run, and the year it was run. This information was available on the World Bank database (www.worldbank.org). As including them simultaneously in the meta-regressions would lead to serious multicollinearity problems, we built a synthetic variable based on a principal component analysis (PCA) of these three variables. From this analysis, we only kept the first axis since it explained more than 80% of the total variation.

- Ease of doing business

The second proxy refers to the regulatory environment of business. We use the “ease of doing business” indicator of the World Bank website (www.doingbusiness.org/rankings). The ease of doing business index ranks economies from 1 to 189 with first place referring to the most business-friendly economy. A high ranking (a low numerical rank) means that the regulatory environment is conducive to business operation. The index averages the country’s percentile rankings on 10 topics covered in the World Bank’s Doing Business.⁶ In contrast to the other two proxies, highly developed countries are thus among the lowest numerical values. Hence, for comparison purposes, we report the results obtained when the scale of this variable is reversed.

- Bank account penetration

The third proxy is a measure of financial inclusion. We use the “account penetration” rate of the global Findex database (datatopics.worldbank.org/financialinclusion) to assess countries’ financial inclusion. This rate is the percentage of inhabitants (aged 15+) who possess a bank account with a financial institution.

There is no consensus about the effect of the degree of economic development of a country on subjects’ choices in both games. On the one hand, the results of Henrich (2000), Henrich et al. (2010), and Ensminger (2004) show that exposure to markets is positively correlated to higher offers from proposers in both the UG and DG. On the other hand, Engel (2011) finds a strongly significant negative correlation between DG offers and the level of development of countries. As regards the UG, Oosterbeek et al. (2004) find no evidence that countries influence subjects’ choices. However, it is useful to bear in mind that the authors clustered the countries of their database by continent.

The third category of variables are control variables:

- Amount of money to share (proposer’s endowment). We systematically converted this amount into dollars in Purchasing Power Parity (PPP) at the date we wrote the article. Neither in the UG (Hoffman et al., 1996; Slonim and Roth, 1998; Cameron, 1999) nor in the DG (Carpenter et al., 2005; Cherry et al., 2002; Forsythe et al., 1994) has the literature shown evidence of any significant effect of the amount of money at stake on the subject’s choices. We nevertheless include this variable for better control.

- Whether or not subjects are students in economics.⁷ In the UG, Carter and Irons (1991) show that economics students behave in a more selfish way than other subjects. In the DG, this variable has not been studied to our knowledge.

- Whether or not the experiment has been run in a laboratory. Note that since the proportion of experiments that are run in a laboratory is greater in developed countries

⁶This ranking takes account of the ease of doing the following actions: resolving insolvency, enforcing contracts, trading across borders, protecting minority investors, obtaining credit, registering property, getting electricity, paying taxes, dealing with construction permits, and starting a business.

⁷This does not include business students. This variable equals 1 only if 100% of the subjects in the study are students of economics.

than in undeveloped countries, this variable is highly correlated with our development variables. Moreover, since all except one study in labs involve students, we did not introduce an additional dummy variable when the subjects are students or not.

- Whether or not the game has been run with a double blind procedure. Players may be more selfish when they are ensured anonymity toward experimenters. In his meta-study, Engel (2011) finds no significant effect for the double blind procedure in the DG.

- Whether or not the game is repeated. Since proposers in repeated UGs have the opportunity to play the game multiple times, it is possible that the mean of the mean offers across all periods in a repeated UG could differ from the mean of one-shot offers in non-repeated UGs. Studies by Roth and Erev (1995) and Tisserand (2016) suggest that proposers' offers remain constant over time. Cooper and Dutcher (2011) find that proposers adjust their behavior according to responders' choices in order to maximize their profit.

- We also coded two dummy variables to control for the two possible strategy methods. These variables are equal to 1 when the strategy method is used, and 0 when it is not. As these protocols may be more likely to be used in field experiments for organizational purposes, their effect could be correlated with economic development. There are two possible uses of the strategy method. The first strategy method concerns the responder in the UG. The responder must announce his minimum acceptable offer before receiving the proposer's offer. The second strategy method, in both the UG and DG, consists of making decisions for the two possible roles before players' roles are randomly drawn.

Table 1 provides an overview of the main descriptive statistics of our two databases.

Table 1: Descriptive statistics of the ultimatum and dictator game studies

	Ultimatum game				Dictator game			
	<i>Mean</i>	<i>Median</i>	<i>Min</i>	<i>Max.</i>	<i>Mean</i>	<i>Median</i>	<i>Min.</i>	<i>Max.</i>
<i>Mean offer</i>	41.50%	42.40%	25%	56.80%	25.31%	25%	6.30%	47%
<i>Number of subjects</i>	82	40	14	320	66	35.5	12	426
<i>Publication date</i>	2001	2001	1983	2011	2006	2008	1994	2013
<i>GDP per capita^(a)</i>	23096	28459	349	87998	32592	38175	350	93352
<i>HDI</i>	0.779	0.880	0.4	0.93	0.8756	0.951	0.467	0.961
<i>Poverty</i>	13.08%	8.50%	1%	35%	17.86%	13.20%	1.16%	63.70%
<i>Account penetration</i>	80.04%	94%	7%	99%	82.15%	94%	7%	100%
<i>Ease of doing business (reversed)</i>	147.1	173	19	184	152.6	181	19	188
<i>Amount at stake (PPP)^(a)</i>	41.21	11.56	2	700	19.25	10	1	110
<i>Economist subjects</i>	18.75%				10.42%			
<i>Laboratory</i>	72.92%				75%			
<i>Double-blind</i>	-				49.31%			
<i>Repeated</i>	18.75%				2.77%			
<i>Strategy method 1</i>	14.58%				-			
<i>Strategy method 2</i>	3.12%				7.63%			

^(a) In US dollars at the time the paper was published.

4 Meta-regression and the fairness hypothesis

In this section, we aim at exploiting statistical power of the meta-analysis to investigate the fairness hypothesis across different countries. In particular, we test the fairness hypothesis for different degrees of economic development, measured by three different proxies.

Our analysis is based on the collection of two separate datasets that have been merged. The DG database contains a total of 144 observations, while the UG database contains a total of 96 observations. Since meta-studies by Engel (2011) and Oosterbeek et al. (2004)

provided an exhaustive analysis of both the DG and UG, we only provide here the results. Regarding the amount offered in both games at the aggregate level, our results are very similar to those of Engel (2011) for the DG and Oosterbeek et al. (2004) for the UG. Using a simple FAT-PET-MRA model for each game, it appears that estimated mean offers are 30.6% and 42.58% respectively of the total amount to share and the estimated 95% confidence intervals for the average value of the offer are respectively of [29.05%; 32.17%] and [40.88%; 44.28%].

Subsequently, we perform a meta-regression on the merged sample to investigate the fairness hypothesis across different types of populations.⁸ Our baseline model is specified as follows:

$$\hat{\gamma}_{is} = \gamma_0 + \gamma_1 D_{is} + x_{is}\beta_1 + x_{is}D_{is}\beta_2 + z_{1is}\beta_3 + z_{2is}D_{is}\beta_4 + \epsilon_{is} \quad (1)$$

where $\hat{\gamma}_{is}$ represents the s^{th} mean offer sampled from study i ; γ_0 is the intercept; D_{is} is a dummy variable aimed at distinguishing between the DG and the UG, this dummy is equal to 1 if the s^{th} in study i is an UG and 0 otherwise.

x_{is} is the vector with the variables of interest (macroeconomic development, account penetration, ease of doing business). β_1 is then the corresponding vector of parameters to be estimated that capture the specific impact of these variables on the estimated offer in the DG. β_2 is the vector of parameters to be estimated that should be interpreted as the difference in impact of these variables between the UG and the DG. We consider three specifications, depending on the content of x_{is} : the three variables of interest are included separately.

z_{1is} is the vector with the control variables relevant for the DG: Amount at stake, Economist, Laboratory, Double.blind, Repeated and Strategic2. β_3 is the corresponding vector and indicates the specific impact on the estimated offer of these variables for the DG.

z_{2is} is the vector with the control variables relevant for the UG: Amount at stake, Economist, Laboratory, Repeated, Strategic1 and Strategic2. β_4 is the corresponding vector to be estimated. For these variables common to the DG, the corresponding coefficients must be interpreted as the difference in impact of these variables between the UG and the DG. For the variable Strategic1, which is specific to the UG, the coefficient should be interpreted as the specific impact of this variable on the estimated offer in the UG.

Finally, ϵ_{is} is the error term with $\epsilon_{is} \sim iid(0, \sigma_{is}^2)$.

In order to control for potential publication bias, Stanley (2005) proposes to include the estimated standard error as an additional moderator variable. We, therefore, also consider the following specification:

$$\hat{\gamma}_{is} = \gamma_0 + \gamma_1 D_{is} + x_{is}\beta_1 + x_i D_{is}\beta_2 + z_{1is}\beta_3 + z_{2is}D_{is}\beta_4 + \phi_1 se(\hat{\gamma}_{is}) + \phi_2 D_{is} se(\hat{\gamma}_{is}) + \epsilon_{is} \quad (2)$$

where $se(\hat{\gamma})$ is the estimated standard error of the mean offer. Considering that this publication bias might be different for the UG and the DG, we also include an interaction variable between $se(\hat{\gamma})$ and D_{is} . Hence, ϕ_1 controls for publication bias in the DG and ϕ_2 controls whether there is a difference in publication bias between the UG and the DG.

⁸The meta-analysis focuses on the value of the variable of interest whereas the meta-regression focuses on the variables that influence this variable. For further details, see Stanley and Doucouliagos (2012).

Several methods can be used to estimate these models. Obviously, a fixed effect estimator is not relevant for our purpose, since it assumes that all studies share the same real variable of interest. Because of unobserved protocol differences, it is impossible to reliably apply this estimation method. This is further confirmed by the fact that the Q -test of heterogeneity applied to equations (1) and (2) strongly rejects the null hypothesis of between-study homogeneity for all three configurations of x_{is} , as shown in the first column of Table 2. Conversely, the random effects estimator allows the real variables of interest to vary from one study to the other but this method may be sensitive in case of publication bias. Stanley and Doucouliagos (2015, 2016) propose to estimate equations (1) and (2) using an unrestricted least squares (WLS) model, which consists in estimating equations (1) or (2) using weighted least squares with $1/se^2(\hat{\gamma}_{is})$ as the weights. We performed Breusch-Pagan (BP) tests against (i) all variables (ii) a clustering variable related to each study to check for within-study dependence and (iii) $se(\hat{\gamma})$ to check whether the WLS method is necessary.

The results are reported in the last three columns of Table 2. They are consistent across all specifications. The null hypothesis of homoscedasticity is strongly rejected when the BP test is computed with all variables. It is also rejected when the BP test is computed with the study variable. However, the null hypothesis of homoscedasticity cannot be rejected when the BP test is computed with $se(\hat{\gamma})$. Hence, we estimated equations (1) and (2) using both random effects and OLS with White robust-standard errors. The results with standard errors clustered at the study level are similar and available from the authors upon request.

Table 2: Specification tests.

		Q -test of heterogeneity	BP test All variables	BP test Study	BP test $se(\hat{\gamma})$
<i>Macroeconomic development</i>	eq (1)	2389.847***	72.974***	10.979***	0.381
	eq (2)	2367.498***	76.487***	12.162***	0.320
<i>Account penetration</i>	eq (1)	2389.847***	80.236***	12.187***	0.276
	eq (2)	2383.591***	83.901***	13.078***	0.314
<i>Ease of doing business (reversed)</i>	eq (1)	2738.345***	78.258***	9.938***	0.889
	eq (2)	2302.408***	80.779***	10.840***	0.884

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%

Table 3 provides the estimation results for equation (1).

Table 3: Meta-regression for the pooled sample: Random effects and OLS estimation results

	<i>Dependent variable: Mean offer</i>					
	Macroeconomic development		Account penetration		Ease of doing business	
	OLS-White	Random effects	OLS-White	Random effects	OLS-White	Random effects
Ultimatum	0.067*** (0.024)	0.066*** (0.023)	-0.065* (0.037)	-0.064* (0.035)	-0.045 (0.032)	-0.008 (0.037)
Macroeconomic development	-0.023*** (0.005)	-0.023*** (0.005)				
Account penetration			-0.001*** (0.0003)	-0.001*** (0.0002)		
Ease of doing business (reversed)					-0.001*** (0.0003)	-0.008*** (0.0001)
Amount at stake	-0.0001 (0.0002)	-0.0001 (0.0003)	-0.0003 (0.0002)	-0.0003 (0.0003)		
Economist	-0.032* (0.017)	-0.032* (0.019)	-0.043** (0.020)	-0.046** (0.019)		
Double blind	-0.032** (0.014)	-0.032* (0.013)	-0.043** (0.014)	-0.044** (0.013)		
Repeated	-0.013 (0.077)	-0.023 (0.034)	-0.016 (0.077)	-0.026 (0.034)		
Strategy2	-0.023 (0.018)	-0.016 (0.022)	-0.034** (0.017)	-0.027 (0.022)		
Lab	-0.051*** (0.018)	-0.059*** (0.017)	-0.062*** (0.016)	-0.072*** (0.015)		
Macroeconomic development*Ultimatum	0.024*** (0.007)	0.023*** (0.008)				
Account penetration*Ultimatum			0.001*** (0.003)	0.002** (0.004)		
Ease business (reversed)*Ultimatum					0.001*** (0.0002)	0.008*** (0.0002)
Amount at stake*Ultimatum	0.0002 (0.0002)	0.0002 (0.0003)	0.0003 (0.0003)	0.0002 (0.0003)		
Economist*Ultimatum	-0.008 (0.020)	-0.008 (0.027)	0.004 (0.027)	0.004 (0.027)		
Repeated*Ultimatum	-0.008 (0.077)	0.004 (0.039)	-0.005 (0.078)	0.007 (0.039)		
Strategy1*Ultimatum	0.007 (0.010)	0.007 (0.019)	0.005 (0.009)	0.006 (0.009)		
Strategy2*Ultimatum	0.024 (0.007)	0.0170 (0.043)	0.035 (0.022)	0.027 (0.043)		
Lab*Ultimatum	0.092*** (0.023)	0.098*** (0.024)	0.099*** (0.021)	0.107*** (0.022)		
Constant	0.327*** (0.019)	0.331*** (0.017)	0.443*** (0.029)	0.446*** (0.022)		
Observations	240	240	240	240	240	240
Adjusted R ²	0.640	0.695	0.647	0.700	0.657	0.711

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%
OLS-White means OLS with White robust standard errors in brackets.

First, with respect to the control variables, we have computed marginal effects. In the case of the DG, they simply correspond to β_3 . For the UG, they correspond to $\beta_3 + \beta_4$. Our results show that the amount of money at stake does not significantly influence the choice of the proposer in the UG or the DG. In other words, the remuneration of subjects is unable to explain the observed average offers. These results are consistent with studies by Cameron (1999), Hoffman et al. (1996) and Slonim and Roth (1998) for the amount of money at stake. Regarding the environment of the experiment, in all specifications, the dummy variable Repeated does not significantly affect the amount offered in the UG or in the DG. The two types of strategic protocols we considered do not significantly affect players' offers in the UG. In the DG, the strategy method shows a small negative and significant effect in two of our 6 models. Economists tend to give significantly less than their non-economist counterparts in both games. Finally, the results show that offers made in laboratory experiments differ significantly from offers made in field experiments. DGs that are run in a laboratory rather than in the field lead to significantly lower offers (for instance, -5.10% in specification (1)) while UGs that are run in a laboratory lead to significantly greater offers (for instance, $-5.10\% + 9.20\% = 4.1\%$ in specification (1)).

Second, the level of economic development of countries in which experiments were run as measured by the different proxies significantly influences subjects' offers in all specifications for the DG and the UG. While dictators' offers tend to fall as the level of economic development rises (β_1 is significant and negative), offers in the UG stay stable with the level of economic development ($\beta_1 + \beta_2$ is never significant). These results are robust across the two estimation methods and the three different proxies considered.

Hence, conclusions are similar for the three specifications : the gap between UG and DG offers increases as the level of economic development increases which suggests that the fairness hypothesis is more likely to be rejected in highly developed countries.

To illustrate the differences between the UG and the DG, we made in-sample predictions for the DG and UG offers for the minimum and maximum values of the three variables of interest. Computing these offers involved defining a value for each control variable of each regression. For each control variable, we chose to set the value according to the number of observations available. In other words, except for Lab, each dummy control variable was set to its most common value. The continuous control variable amount at stake is set to its average value. The estimated offers displayed in tables 4 and 5 thus correspond to the following configuration: non-economist subject, non-strategic protocol, non-double blind, average amount at stake. In each case, we also performed tests of mean difference between UG and DG offers for both the most and the least developed country. These F-tests were based on the estimation results in Table 3 for the OLS-White specification⁹. Specifically, we tested the following null hypothesis: $H_0 : \gamma_1 + x_{is}\beta_2 + \tilde{z}_2\beta_4 = 0$ in equation (1), where \tilde{z}_2 has its variables set as explained above. If H_0 cannot be rejected for a given value of x_{is} , then there is no significant difference between the UG and the DG offers for this value of x_{is} . We performed these tests for $min(x_{is})$ and $max(x_{is})$ for each variable of interest. The results of the in-sample predictions and the F-tests are displayed in Table 4 for predicted offers in labs ($Lab = 1$) and in Table 5 for predicted offers not in labs ($Lab = 0$).

⁹The results for the random effects specification are similar and are available upon request from the authors.

Table 4: Estimated offers of non-economist subjects for an average amount at stake, non strategic settings, non-double blind, *in the lab*

	Minimum macro. development	Maximum macro. development
Ultimatum	43.30% (38.86% - 48.74%)	43.79% (39.98% - 47.59%)
Dictator	35.51% (31.08% - 39.94%)	20.98% (18.50% - 23.45%)
F-test of difference between ultimatum and dictator offer	3.57*	337.38***
	Minimum account penetration	Maximum account penetration
Ultimatum	41.87% (36.49% - 47.25%)	43.98% (41.72% - 46.24%)
Dictator	36.27% (31.89% - 40.65%)	23.98% (22.10% - 25.87%)
F-test of difference between ultimatum and dictator offer	2.927*	316.56***
	Ease of doing business, last rank	Ease of doing business, first rank
Ultimatum	42.73% (37.72% - 47.73%)	43.79% (41.58% - 45.99%)
Dictator	36.66% (32.16% - 41.15%)	23.46% (21.53% - 25.40%)
F-test of difference between ultimatum and dictator offer	0.4215	62.734***

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%
5% prediction confidence intervals in parentheses.

Table 5: Estimated offers of non-economist subjects for an average amount at stake, non strategic settings, non-double blind, *in the field*

	Minimum macro. development	Maximum macro. development
Ultimatum	39.28% (34.71% - 48.83%)	39.75% (34.05% - 45.46%)
Dictator	40.65% (37.06% - 44.24%)	26.11% (21.84% - 30.38%)
F-test of difference between ultimatum and dictator offer	0.247	16.41***
	Minimum account penetration	Maximum account penetration
Ultimatum	38.17% (33.39% - 42.95%)	40.28% (36.50% - 44.07%)
Dictator	42.50% (38.60% - 46.41%)	30.21% (27.11% - 33.32%)
F-test of difference between ultimatum and dictator offer	1.741	17.433***
	Ease of doing business, last rank	Ease of doing business, first rank
Ultimatum	38.93% (34.82% - 43.04%)	39.99% (35.95% - 44.03%)
Dictator	41.24% (37.66% - 44.82%)	28.04% (24.48% - 31.60%)
F-test of difference between ultimatum and dictator offer	0.685	18.866***

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%
5% prediction confidence intervals in parentheses.

In the lab the results are homogeneous across all models. While the fairness hypothesis cannot be rejected at the 5% error threshold for the least developed country in all specifications, the same does not hold true for the most developed country.

First, regarding the highest values of the three proxies of economic development, we find that in specification (1), the average UG offer is estimated at 43.79% of the amount at stake while it amounts to 20.98% in the DG. This 22.81% gap between UG and DG offers allows rejecting the fairness hypothesis for the most developed country without any doubt. Specifications (2) and (3) provide very similar results with respectively 20.00% and 20.33% difference between UG and DG offers.

Turning to the lowest values of economic development proxies, results are also homogeneous across all models. In specification (1), the average UG offer is estimated at 43.30% of the endowment while it amounts to 35.51% in the DG. The estimated difference between UG and DG offers proves to be much tighter (7.79% difference) for the least developed country¹⁰. Specifications (2) and (3) show similar results with respectively 5.50% and 6.07% difference between UG and DG offers.

In the field, the results are also consistent across all models. In all specifications, as shown by the F-tests, the difference between UG and DG offers is not significant at

¹⁰This difference is mildly statistically significant at the 10% significance level in the two first specifications, whereas it is not in the third specification.

conventional significance levels for the least developed country while it is highly significant for the most developed country.

The estimated differences between UG and DG offers are less important in field experiments, in both highly and least developed countries. In the least developed country, the DG offer is estimated to be higher than the UG offer in all specifications. In the most developed country, dictators keep an extra 13.64% of the pie compared to the UG in specification (1)¹¹.

These results show that the more developed countries are more likely to reject the fairness hypothesis of Forsythe et al. (1994). This is even more true in field experiments where DG offers are estimated to be higher than UG offers. According to the definition of fairness we proposed in section 2, we conclude that people from less developed countries tend to be fair whereas people from more developed countries tend to be unfair¹².

5 Conclusion

In this study, we report results from a meta-analysis of the UG and the DG. Specifically, we have studied offer differences across the two games and interpreted them as departures from the fairness hypothesis driven by differences in exposure to market mechanism. The differences observed have been studied, looking for country differences.

Our results show that the degree of economic development of a country influences DG but not UG offers. In particular, we find that people from more developed countries tend to give less in the DG. Thus, we provide support to the findings of Engel (2011) regarding the DG but differ from the results of Henrich et al. (2001) and Henrich et al. (2005), who find offers to be positively correlated with market integration in both games.

The interesting consequence of our results is that the gap between UG and DG offers widens as the level of economic development increases, implying that the fairness hypothesis is rejected for the highest developed countries but not for lowest developed ones.

The conclusions that can be drawn about fairness from these results depend on how fairness is defined. As first suggested by Henrich et al. (2001), notions of fairness vary across cultures and countries, and situations that constitute the norm in some societies might be perceived as unfair in others. In our study, we defined fairness as a relative, rather than absolute concept, liable to vary across different countries or cultures. In particular, for simplification purposes we define fairness as a matter of norms and expectations where giving the norm (or above) is fair while giving less than the norm is not. Following this definition, we then seek to compare fairness across different populations by comparing the difference between the actual norm of fairness in a given country or in a given culture and the share proposers give when nothing forces them to (the DG). We assume that,

¹¹10.07% in specification (2), 11.95% in specification (3).

¹²To ensure the robustness of these results we have also investigated some alternative specifications. First, as there are only four studies with a repeated protocol in DGs and only three studies with a Strategic2 protocol in UGs, we removed these studies from the sample and reestimated the model without the variables Repeated and Strategic2*Ultimatum. On this specification, we then performed the same in-sample predictions as before. Our findings are robust to this change. The results are available upon request from the authors. Second, we estimated equation (2) with the standard error and its interaction with the UG dummy as additional moderator variables. The corresponding coefficients are either not significant, or only significant at 10%. The in-sample predictions based on this specification are reported in Table 6 and Table 7 in Appendix A for experiments run in labs and in the field respectively, setting the value of the standard error to 0. They show that our main result still holds.

on average, UG proposers have an accurate idea of recipients' MAO and take the mean UG offers as a measure of fairness norms in different locations. Under this hypothesis and considering our simplified definition of fairness, we show that the less developed a country, the fairer its inhabitants. Our results suggest that this effect is due rather to differences in what proposers are willing to give in the absence of fear of rejection than to variation in fairness norms across different countries.

As interesting as the result may be, it relies on rather bold assumptions: we assume that UG offers are representative of fairness norms in a given country or population. Indeed, it is reasonable to suppose that UG offers are not simple predictions of recipients' MAO but also include a safety margin in addition to the proposer's guess as to the recipient's MAO. In particular, different people from different countries or societies might have different levels of risk aversion, implying that the UG offer may not be a suitable proxy for fairness norms in a given society. Supposing that the aforementioned hypotheses do not hold, our results can still be interpreted in the narrow sense that the fairness hypothesis of Forsythe et al. (1994) is rejected in highly developed countries while it is not for the least developed country of our database.

Overall, our results do not seem to be in line with Montesquieu's famous thesis of "doux commerce", that the involvement in market interactions tends to pacify relations with others. Neither do they support the virtuous side of markets regarding fairness defended by Paganelli (2013). In a more developed country, market integration supposedly makes subjects more sensitive to fairness. The subject has nevertheless long been debated. Authors such as Marx insist on the negative impact of commercial interactions on the moral foundations of society.¹³ Moreover, in a complex society, where life is regulated and protected almost exclusively by large and anonymous institutions (the constitution, laws, social security, big companies, etc.), close relationships with others may become less frequent and less necessary. In more developed societies, individuals know that social security will provide them with some protection in the event of severe illness or if their home is destroyed by fire. So, what is the purpose of maintaining good relations with others? Things are completely different in traditional (small) societies, where life-changing events require the help of relatives, friends, but also other acquaintances.

¹³For further details on this debate, see Hirschman (1982) and the summary for example in Ensminger (2004).

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Appendix A

Table 6: Estimated offers of non-economist subjects for an average amount at stake, non strategic settings, non-double blind, *in the lab*, equation (2) with $se(\hat{\gamma}) = 0$

	Minimum macro. development	Maximum macro. development
Ultimatum	46.75% (39.77% - 53.74%)	45.72% (41.19% - 50.25%)
Dictator	35.62% (31.17% - 40.00%)	21.29% (18.47% - 24.10%)
F-test of difference between ultimatum and dictator offer	10.064**	121.78***
	Minimum account penetration	Maximum account penetration
Ultimatum	45.55% (38.08% - 53.02%)	46.04% (42.36% - 49.72%)
Dictator	36.32% (31.93% - 40.72%)	24.14% (21.93% - 26.36%)
F-test of difference between ultimatum and dictator offer	6.250**	157.67***
	Ease of doing business, last rank	Ease of doing business, first rank
Ultimatum	46.05% (39.42% - 52.68%)	46.04% (42.35% - 49.72%)
Dictator	36.71% (32.20% - 41.21%)	23.63% (21.36% - 25.40%)
F-test of difference between ultimatum and dictator offer	6.725**	160.930***

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%
5% prediction confidence intervals in parentheses.

Table 7: Estimated offers of non-economist subjects for an average amount at stake, non strategic settings, non-double blind, *in the field*, equation (2) with $se(\hat{\gamma}) = 0$

	Minimum macro. development	Maximum macro. development
Ultimatum	42.66% (36.39% - 48.94%)	41.63% (35.45% - 47.81%)
Dictator	40.83% (37.16% - 44.51%)	26.50% (21.90% - 31.10%)
F-test of difference between ultimatum and dictator offer	0.340	18.482***
	Minimum account penetration	Maximum account penetration
Ultimatum	41.74% (34.80% - 48.68%)	42.23% (37.56% - 46.91%)
Dictator	42.60% (38.63% - 46.56%)	30.42% (26.98% - 33.86%)
F-test of difference between ultimatum and dictator offer	0.058	20.102***
	Ease of doing business, last rank	Ease of doing business, first rank
Ultimatum	42.15% (36.26% - 48.03%)	42.13% (37.21% - 47.05%)
Dictator	41.35% (37.68% - 45.00%)	28.27% (24.36% - 32.18%)
F-test of difference between ultimatum and dictator offer	0.069	21.195***

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%
5% prediction confidence intervals in parentheses.

Appendix B

Table 8: List of countries included in the meta-analysis

Country	Ease of doing business	Account penetration
Australia	13	99
Bolivia	147	42
Canada	20	99
Chile	55	63
China	80	79
Colombia	51	39
Denmark	2	100
Dominica	95	54
Ecuador	114	46
Egypt	126	14
Fiji	84	
France	28	97
Germany	14	99
Ghana	111	41
Guinea	161	7
Honduras	101	31
India	131	53
Indonesia	106	36
Israel	49	90
Italy	44	87
Jamaica	65	78
Japan	32	97
Kenya	113	75
Mexico	45	39
Netherlands	27	99
New Zealand	1	100
Nigeria	170	44
Papua New Guinea	133	7
Paraguay	102	
Peru	53	29
Qatar	74	
Russia	36	67
Slovakia	30	77
Slovenia	30	97
South Africa	72	70
Spain	33	98
Sweden	9	100
Switzerland	29	98
Taiwan	80	91
Tajikistan	130	11
Tanzania	144	40
Thailand	46	78
United Kingdom	6	99
United States	7	94
Zimbabwe	157	23

List of studies included in the meta-analyses

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