

The Origin of Wealth Matters: Equity norms trump equality norms in the ultimatum game with earned endowments

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Abstract

We conduct an ultimatum game with three treatments: one in which endowments are earned through a real effort task (answering spelling questions under time pressure), one in which endowments are awarded through lotteries, and a standard ultimatum game with exogenously provided wealth. When subjects earn the money at stake, the modal response ceases to be an equal split, as proposals anchor around comparative earnings and these proposals are statistically different from those observed in the other treatments. Moreover, roughly half of lower earners propose keeping less than 50% of the pot for themselves. We argue that these results are best explained by Bicchieri's account of norms and that equity, rather than equality, becomes the dominant norm in ultimatum bargaining when endowments are earned.

Keywords: Ultimatum Game, Norms, Equity Theory, Inequity Aversion,
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1. Introduction

1 Why is the most frequent division in the ultimatum game a 50/50 split? We
2 argue this norm of equal division is an result of unearned endowments. If players
3 have no prior claims on the money at stake, then an equal split makes sense as
4 a default norm. However, if players earn the wealth at stake in an ultimatum
5 game, this provides criteria for a different norm of division, one which rewards
6 comparative inputs.

7 According to Bicchieri and Muldoon [1], norms are defined by “shared ex-
8 pectations about what should or should not be done in different types of social
9 situations.” Norms thus involve both normative beliefs – beliefs about what
10 is the right thing to do – as well as normative expectations – “the belief that
11 enough other people think we ought to obey the norm in that situation, and
12 may even be willing to sanction us in a positive or negative way depending on
13 our choice to obey or contravene the norm [2].” The role of expectations is
14 important because this differentiates norms from mere behavioral patters that
15 are widely practiced, such as brushing one’s teeth in the morning [1]. These
16 sorts of habits do not depend on whether others adopt them as well. Norms,
17 however, generally operate under conditions where it is not in the immediate
18 interest of an individual to conform to the norm on his or her own. Rather,
19 the rationale for conforming to a norm rests on the expectation that others
20 will understand and conform to the norm as well and that failing to live up to
21 such expectations invites sanction. Bicchieri also acknowledges that norms can
22 be internalized, leading individuals to adopt them as default rules even in the
23 absence of expected compliance by others. However, such defaults are liable to
24 be abandoned if the cost of conformity proves to be excessive.

25 One of the key insight’s of Bicchieri and Zhang [3] is that obeying fairness
26 norms is not the same thing as having a “preference for fairness.” Rather, the
27 content of norms can be diverse, and norms are conditional upon context and
28 common expectations. As evidence for their norm based account Bicchieri and
29 Zhang [3] cite early ultimatum studies by Hoffman et al. [4] and Hoffman and

30 Spitzer [5] that documented lower offers to respondents when the right to be
31 a proposer was awarded through a contest. Likewise, Werner Güth notes in
32 his recent survey of 30 years of ultimatum game research that early studies
33 suggested that when subjects could earn the right to be the proposer this led
34 to unequal divisions [6], which he attributed “entitlement effects.” However,
35 more recently, Demiral and Mollerstrom [7] reported being unable to replicate
36 an entitlement effect when the right to be a proposer was awarded based on
37 performance on an arithmetic task.

38 Bicchieri and Zhang [3] contend that the diverse behavioral changes docu-
39 mented in variations of the ultimatum game cannot be explained by a simple
40 account of preferences or endowment effects. Bergh [8] and Binmore and Shaked
41 [9] have likewise criticized theories of bargaining that fail to account for contex-
42 tual factors that are likely to influence social norms. A norm based theory, on
43 the other hand, can explain a wide range of behavioral variations if a change in
44 the context of a game elicits a different, salient norm.

45 We argue that the stable observed norm of equality in ultimatum bargaining
46 – the fact that the modal offer observed in the canonical game is a 50/50 split
47 [10, 11] – is an result of unearned endowments. It makes sense for equal division
48 to be the default norm when neither party has produced more than another.
49 However, if participants earn the money that is to be divided, we expect that this
50 will change the division norm to one that privileges comparative contributions.

51 This prediction is consistent with a growing literature that has investigated
52 how earned endowments influence behavior in canonical games. Consistent with
53 basic intuitions of equity theory (Adams [12], Adams [13], Walster et al. [14])
54 – that individuals should be rewarded in proportion to their contributions –
55 studies have found that subjects who have earned their endowments give at much
56 lower levels than subjects who do not, and recipients who have demonstrated
57 merit are given more [15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25].

58 We conduct a simple experiment to investigate whether the process of earn-
59 ing the endowments at stake in ultimatum bargaining changes play in a manner
60 consistent with a change in norms. Specifically, we examine the influence that

61 three different types of endowment have on ultimatum bargaining. In one con-
62 dition, subjects earn the money that is at stake in an ultimatum game through
63 a real effort task (answering spelling questions under time pressure); in a second
64 condition, subjects win money via a lottery that is then placed at stake in an
65 ultimatum game; and in a third condition, subjects simply play a conventional
66 ultimatum game with exogenously provided wealth. This design allows us to dis-
67 tinguish the well-documented “endowment effect” [26], which may arise when
68 subjects first receive money from a lottery, from the effects of wealth earned
69 through a real effort task.

70 We find that when subjects earn the wealth at stake in an ultimatum game,
71 the modal response ceases to be the even split that is observed in the canon-
72 ical version of the game. Rather, players tend to use comparative earnings as
73 an anchor point for their proposed divisions. Moreover, this effect is distinct
74 and significantly greater than the anchor created by the endowment effect when
75 subjects simply win money via a lottery. Few subjects in the earned condition
76 propose an equal split, while a majority propose a division within \$1 of initial
77 earnings, which is significantly greater than in the lottery condition. Unsurpris-
78 ingly, higher earners are more likely to propose keeping their original earnings
79 than lower earners. However, roughly half of lower earners propose keeping less
80 than 50 percent of the money for themselves.

81 Overall, our results suggest that earned endowments change the norms of
82 the ultimatum game in a manner consistent with a norm based model of social
83 preferences proposed by Bicchieri and Zhang [3] and the conjectures of Bergh [8]
84 and Binmore and Shaked [9]. However, in order to understand how norms are
85 perceived and enforced, more work is needed to disentangle the degree to which
86 changes in proposer behavior are driven by a change in what proposers believe
87 to be fair versus a strategic responses to changes in what a proposer expects a
88 receiver to believe to be fair. Either way, we find that earned endowments change
89 the results of ultimatum bargaining in the manner expected by the introduction
90 of equity as a relevant norm.

2. Experimental Design

91 Our central hypothesis is that when subjects earn the wealth at stake in the
92 ultimatum game through a real effort task, this will change their behavior in a
93 way that is consistent with norms changing. Rather than viewing an equal split
94 as an obvious criterion of fairness, subjects will view the proportion that each
95 individual contributed to the pot as a relevant criterion of fairness and this will
96 influence offers accordingly. Proposers will make offers that reflect the input of
97 both subjects, either because proposers believe this to be fair or because pro-
98 posers think that receivers believe this to be fair and are thus willing to punish
99 lower offers (or some combination of the two). Note that both of these dynam-
100 ics are encompassed by Bicchieri’s account of norms, which concerns changes
101 in preference as well as strategic considerations, building upon the insight that
102 norms are constituted by expectations about other people’s behavior and per-
103 ceptions. In either case, the empirical implication will be the same and we
104 should witness significantly more divisions at or close to earnings.

105 Our strategy for investigating the relevance of earned wealth for ultimatum
106 bargaining is straightforward. We randomly place subjects into one of three
107 different versions of the ultimatum game: the Earned Income Treatment, the
108 Lottery Treatment, and a Standard Ultimatum Game.³ In every treatment
109 subjects were first presented with a series of 100 spelling tasks. In the Earned
110 treatment, subjects were told that they would receive 25 cents for each correct
111 answer, while in the Lottery and Standard treatment subjects were told that
112 the tests were to judge their English proficiency. To ensure comparable endow-
113 ment levels across treatment groups, the endowments received by Lottery and
114 Standard treatment subjects were randomly matched to correspond with earn-
115 ings generated by the outcome of pairs in the Earned Treatment. This provides
116 a counterfactual between subjects who had identical endowments, such that
117 the only difference was how those endowments were earned. Assignment across

³More details can be found in the appendix.

118 treatments was randomized and double blind and the design is between-subject,
119 not within-subject. Furthermore, whether the high or low earner in a given pair
120 was chosen to be the proposer was randomized as well.

121 A total of 360 subjects participated in this experiment, which was conducted
122 at the Harvard Decision Science Laboratory. Subjects were recruited through
123 the laboratory's study pool, which draws a diverse range of participants from
124 the local community. The majority of participants were not students. Summary
125 statistics of participant demographics are reported in Table A1 of the appendix.

126 The three treatment groups allow us to compare the results of the canonical
127 game with the effects of earned wealth while controlling for any endowment
128 effect. In particular, this design allows us test the following hypotheses:

129 **H1: New Norm for Divisions** - Consistent with previous literature, we will
130 observe a 50/50 split as the modal proposal in the Standard Ultimatum Game.
131 However, an equal division will not be the modal proposal in the Earned In-
132 come Treatment, because comparative earnings will serve as the dominant norm
133 for division. Overall, we predict that the Earned Income Treatment will yield
134 significantly fewer proposals for equal divisions than the Standard Ultimatum
135 Treatment and Lottery Treatment and, in comparing the Earned Income Treat-
136 ment with the Lottery Treatment, rewarding earned inputs will trump aversion
137 to inequality.

138 **H2: Higher Earners Keep More** - Higher earners in the Earned Income
139 Treatment will, on average, propose keeping more than 50% of the available pot
140 of money for themselves and this amount will be greater than higher winners in
141 the Lottery Treatment.

142 **H3: Lower Earners Keep Less** - Lower earners in the Earned Income Treat-
143 ment will, on average, propose keeping less than 50% of the available pot of
144 money for themselves and this amount will be less than low winners in the
145 Lottery Treatment.

146 **H4: Higher Earners Care More About Earnings** - The effects of earning
147 considerations on higher earning and lower earning proposers will be asymmet-
148 ric, with higher earners more likely to favor a distribution that corresponds to

149 comparative earnings, while lower earners are more likely to favor an equal split.

3. Results

150 We find strong evidence that earning wealth alters the decisions of partici-
151 pants within the ultimatum game. Most subjects in the Earned Income Treat-
152 ment anchor their proposals around the initial income distribution rather than
153 an equal split. This is true whether we compare the subjects in the Earned In-
154 come Treatment to the Lottery Treatment or to the Standard Ultimatum Game
155 Treatment and is robust to different specifications of the underlying analysis.

H1: New Norm for Divisions

156 Table 1 shows our main findings through simple means of key characteristics
157 across the different treatment groups. While the average amounts offered by
158 each group are similar, the types of offers differ across treatments. Consistent
159 with previous literature, the modal offer in the Standard Ultimatum Game is
160 a 50/50 split (62% of offers). An equal split is likewise the most frequent of-
161 fer in the Lottery Treatment (50% of offers). However, in the Earned Income
162 Treatment we witness a 50/50 split less than a third of the time (32% of offers).
163 Compared to the two control groups, this difference is significant based on a χ^2
164 test.⁴ Moreover, 41% of proposals made by those in the Earned Income Treat-
165 ment correspond exactly to the distribution of earnings, which is significantly
166 more than the 21% of proposals made in the Lottery Treatment that correspond
167 to the initial distribution of winnings.

168 If we expand our analysis of offers corresponding to initial earnings to include
169 offers within \$1 of initial earnings, the power of the earnings benchmark becomes
170 more evident. 62% of offers in the Earned Income Treatment are anchored to

⁴Note that because total earnings could add up to an odd number and subjects could only propose divisions in whole dollar amounts, we categorize a 50/50 split as the total amount of money available divided by two +/- 50 cents. However, even if we discard half of our data and examine only pairs that had evenly divisible earnings, the results still hold and are reported in Table A2 of the appendix.

Table 1: Ultimatum Game: Simple Means

	Treatment			T-Test/ χ^2 p-value	
	Earned Income	Lottery	Standard	Earned v. Lotto	Earned v. All
# of Subjects	116	124	120		
Mean Group Earnings	\$29.48	\$28.71	\$29.28	0.73	0.68
Mean Amount Offered by Proposer	\$13.48	\$12.56	\$13.56	0.84	0.71
Avg Amount Offered (% of Endowment)	45%	44%	47%	0.67	0.48
Rejection Rate	7%	10%	5%	0.58	0.91
% of Offers With a 50/50 Split	32%	50%	62%	0.06	0.00
% of Offers at Initial Earnings	41%	21%		0.02	
% of Offers Within \$1 of Initial Earnings	62%	32%		0.00	
Avg Earnings by High Earner	\$16.74	\$16.57		0.80	
Avg Offer by High Earner (% of Endowment)	38%	44%		0.08	
Avg Earnings by Low Earner	\$12.22	\$11.50		0.61	
Avg Offer by Low Earner (% of Endowment)	53%	44%		0.02	
Avg Absolute Difference Between Offer & Initial Earnings (% of Endowment)	6.73%	15.22%		0.00	

171 initial earnings, while only 32% of offers are anchored to initial winnings in the
 172 Lottery Treatment. Finally, we can examine the degree to which offers deviate
 173 from initial earnings/winnings. The average absolute difference between offers
 174 and initial earnings is only 6.73% of the total money available in the Earned
 175 Income Treatment, which is significantly lower than the 15.22% in the Lottery
 176 Treatment.

177 Figure 1 illustrates the stark contrast between the behavior of proposers in
 178 the Earned Income versus the Lottery Treatment, plotting the kernel densities
 179 of the difference between the proposer's offer and the initial distribution for the
 180 Earned Income and Lottery Treatment groups. On the x-axis positive numbers
 181 mean that the proposer kept more money for themselves, while negative numbers
 182 mean the proposer gave money away compared to the initial income distribution.
 183 We can see that the dotted line, representing the Earned Income treatment, has
 184 an extremely large spike centered around 0, which corresponds to splitting the
 185 money according to the initial income distribution, while the Lottery Treatment
 186 is flatter and more dispersed.

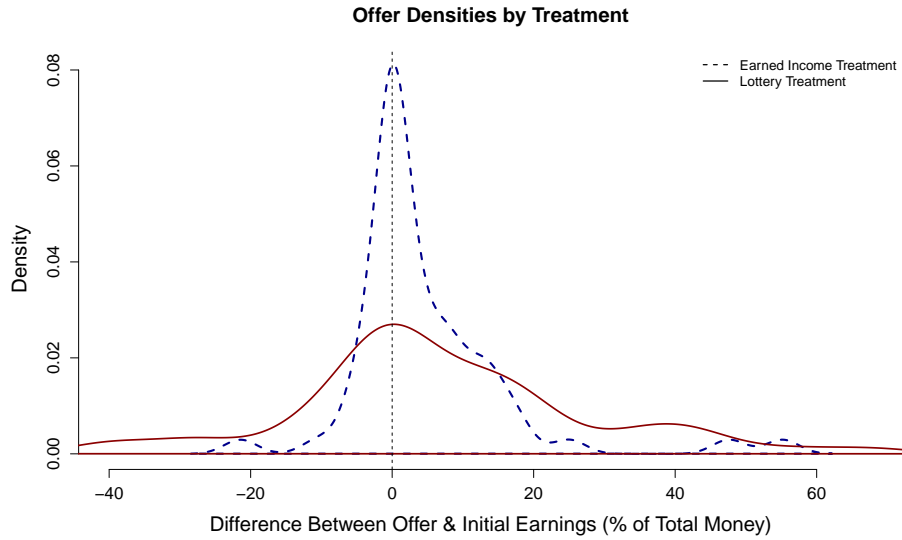


Figure 1: Distribution Compared to Initial Earnings

187 One potential concern with our initial analysis is how it treats cases in which
 188 subjects earned within one dollar of one another, as an equal split could be
 189 considered to be consistent both with a desire to achieve equality as well as a
 190 desire to reward contributions. Table 2 recreates our earlier analysis of means
 191 excluding these ambiguous cases. The results are stronger. Those in the Earned
 192 Income Treatment are less likely to offer a 50/50 split than in the Lottery
 193 Treatment (22% vs 47%, $p=.006$), and much more likely to offer the initial
 194 income distribution (32% vs 15%, $p=.036$) or very close ($\pm \$1$) to the initial
 195 income distribution (56% vs 27%, $p=.003$). Moreover, the deviation between
 196 initial earnings/winnings and proposals remains significantly different (7.81%
 197 vs 16.62%, $p=.001$).

198 Finally, to make sure that our results are robust to potential imbalances
 199 in background characteristics between participants in the different main treat-
 200 ments, we run a series of simple regressions models presented in the appendix

Table 2: Ultimatum Game: Excluding Ambiguous Income Distributions

	Treatment			T-Test/ χ^2 p-value	
	Earned Income 100	Lottery 110	Standard 120	Earned v. Lotto	Earned v. All
# of Subjects					
% of Offers With a 50/50 Split	22%	47%	62%	0.01	0.00
% of Offers at Initial Earnings	32%	15%		0.03	
% of Offers Within \$1 of Initial Earnings	56%	27%		0.00	
Avg Earnings by High Earner	\$16.88	\$16.44		0.54	
Avg Offer by High Earner (% of Endowment)	37%	44%		0.05	
Avg Earnings by Low Earner	\$11.57	\$10.86		0.65	
Avg Offer by Low Earner (% of Endowment)	53%	44%		0.04	
Avg Absolute Difference Between Offer & Initial Earnings (% of Endowment)	7.81%	16.62%		0.00	

201 in Table A3.⁵

202 Note that the addition of "Ability" as a control - which measures perfor-
 203 mance on the initial spelling test - helps address a possible concern about selec-
 204 tion on ability. Although assignment to be proposers is random, it is theoret-
 205 ically possible that high earners (who performed well on the spelling test) may
 206 act differently than low earners (who performed poorly on the spelling test) due
 207 to differences in some latent cognitive ability, rather than their earnings. While
 208 both high and low earners appear to respect the same norm, any behavioral
 209 differences due to ability would not be well controlled in the other two treat-
 210 ments, where assignment to high or low conditions is random with respect to
 211 ability. However, since all subjects take the same initial test, we can control for
 212 ability. Doing so has substantially no effect on coefficients or standard errors
 213 and the main effects remain strong, suggesting that our results are not driven
 214 by differences in ability. Future research could confirm this by employing a real
 215 effort task that has no relationship with cognitive ability to assign earnings.
 216 However, to the degree that earnings and cognitive ability are related in many
 217 real world scenarios, our experimental design may actually be better suited to

⁵The models exclude ambiguous income distributions to assure that equal and earnings-proportional splits are distinguishable

218 yield insights that are externally valid.

219 In our regression models, we first check if participants who earn their money
220 care less about equality than participants who were randomly awarded their
221 money in a lottery. To test this we use a logistic regression to examine whether
222 subjects in the Earned Income Treatment propose equal divisions at lower rates
223 than those in the Lottery Treatment. As we would expect, subjects in the
224 Earned Income Treatment are less likely to offer an equal split of the earnings
225 compared to the Lottery Treatment ($\beta=-1.25$, $p=0.01$).

226 Next we investigate if participants who earn their money care more about
227 rewarding inputs than participants who were randomly awarded their money
228 in a lottery. We first test this using a logistic regression where the dependent
229 variable is one if the offer is exactly the initial income distribution, and zero
230 otherwise. Here, the findings are in the expected direction, however not signif-
231 icant at conventional levels ($\beta=0.75$, $p=0.18$). However, this conceptualization
232 of “reward” is fairly narrow, since it treats an offer within \$1 of the initial earn-
233 ings the same as an offer \$20 away from initial earnings. Therefore we expand
234 the operationalization of equity in two ways: by looking at +/- \$1 of initial
235 earnings and by looking at the absolute difference between initial earnings and
236 the offer. We can see from Table A3 that subjects within the Earned Income
237 Treatment are more likely to display both of these broader conceptualizations
238 of equity ($\beta=1.08$, $p=0.02$ for +/- \$1 and $\beta=-6.43$, $p=0.02$ for absolute dif-
239 ference). Importantly, these findings are not only statistically significant, but
240 also substantial. Participants who earn income are 26% less likely to offer a
241 50/50 split and 25% more likely to offer a split within \$1 of initial earnings
242 when compared to subjects in the Lottery Treatment while controlling for other
243 covariates.

244 Overall, we find extensive support for our main hypothesis. When subjects
245 first earn the money at stake in an ultimatum game, the modal proposal ceases
246 to be an even split, while the initial income distribution serves as the most
247 influential norm for proposals.

Table 3: Average Proposed Percentage of Total Money Kept by Treatment and Earnings
T-Test:

	Earned	Lottery	Earned v Lottery
Higher Earner	63.15%	56.26%	0.05
Lower Earner	46.92%	56.31%	0.04
T-Test: High v Low	0.00	0.99	

H2: Higher Earners Keep More & H3: Lower Earners Keep Less

248 Although we find strong support for the influence of earnings, considerations
 249 of economic self-interest could lead to asymmetric responses, with lower earners
 250 more incentivized to view an equal division as normative and higher earners
 251 more incentivized to view comparative earnings as normative. In Table 3 and
 252 Table 4 we examine how higher and lower “earners” behave, both within and
 253 between the Earned and Lottery Treatments. Consistent with our predictions
 254 in H2 and H3, in the Earned Income Treatment high earners propose keeping
 255 significantly more than 50% for themselves (63.15%) while low earners on av-
 256 erage keep *below* 50% (46.92%) for themselves ($p < .001$). Moreover, these rates
 257 are significantly more (and less, respectively) than those observed in the Lottery
 258 Treatment ($p = .05$, $p = .04$), where there is no difference between the behavior
 259 of high and low winners. We further confirm these results using difference in
 260 difference tests for H2 and H3, which are reported in A4 of the appendix.

H4: Higher Earners Care More About Earnings

261 In the main experiment, we also see in Table 4 that the average difference
 262 between earnings and offers made by high earners is much smaller than with
 263 low earners. However, this difference in the Earned Income Treatment is not
 264 statistically significant ($p = .101$), providing only weak support for the hypothesis
 265 that higher earners care more about rewarding inputs than low earners (H4).

266 The phenomenon that moderates the strength of this result is notable: 48%
 267 of low earners in the Earned Income Treatment proposed keeping *less* than 50%
 268 of the money for themselves. It is unclear whether they did so because they
 269 believed this was a fair outcome, or whether they believed that an equal split

Table 4: Average Difference Between Earnings and Offer in Percentage of Total Money by Treatment and Earnings

	<u>Earned</u>	<u>Lottery</u>	T-Test: Earned v Lottery
Higher Earner	1.23%	-7.00%	0.02
Lower Earner	10.54%	21.54%	0.02
T-Test: High v Low	0.10	0.00	

270 was likely to be viewed as unfair and rejected by a receiver. In either case, it
 271 contradicts a point prediction made by Fehr and Schmidt [27] in their discussion
 272 of inequity aversion, namely that “a proposer will never offer more than 50% of
 273 the pie in the ultimatum game.”

274 Although offers above 50% are occasionally observed, these have been at-
 275 tributed to misunderstandings, trembling hands, or extremely rare altruistic
 276 subjects or cultures (e.g. Henrich et al. [11] documented offers above 50% in
 277 two small-scale tribes); and Fehr and Schmidt are correct that offers above 50%
 278 have not been observed as a systematic/significant phenomenon in the tradi-
 279 tional ultimatum game. However, comparing low earners in the Earned Income
 280 Treatment to low winners in the Lottery Treatment, the low earners propose less
 281 than 50% for themselves at significantly higher rates than low winners (47.8%
 282 vs 17.9%, $p=.02$). Moreover, even if we pool together high and low earners (thus
 283 diluting the effect by half) to compare overall rates with the Standard Ultima-
 284 tum Treatment, significantly more subjects in the Earned Treatment propose
 285 keeping less than half of the pot for themselves (19.6% vs 6.7%, $p=.037$).

4. Conclusion

286 When ultimatum game participants earned the wealth at stake through a real
 287 effort task, their proposals were significantly different from the equal divisions
 288 widely observed in canonical ultimatum games. The influence of earned wealth
 289 was also significantly greater than the influence of the endowment effect created
 290 by prior lottery winnings. We have argued that the process of first earning
 291 endowments shifted the division norm from one of equality to one based on

292 equity, in the manner predicted by Bicchieri and Zhang’s (2008) account of
293 norm based utility functions and the basic tenants of equity theory.

294 These results suggest two larger sets of insights and questions. First, these
295 findings reinforce the value of investigating how unearned endowments may
296 influence certain kinds of experiments. To the degree that the origins of en-
297 dowments shape fairness considerations and other norms, different sorts of en-
298 dowments could elicit different sorts of behaviors. Indeed, as Bergh [8] argues,
299 “When it comes to describing and explaining fairness behavior, the case when
300 money appears like manna from heaven should reasonably be considered a spe-
301 cial case, rather than a typical one.”

302 Second, in contexts where endowments are arbitrary, equal division of wealth
303 appears to be a compelling norm. However, in contexts where procedures create
304 a sense of entitlement to resources that are contributed in different amounts, the
305 norm of equity appears to trump the norm of equality, at least in the ultimatum
306 game. These results complement Engelmann and Strobel’s (2010) finding that
307 inequality aversion has little explanatory power when it is inconsistent with
308 other norms of fairness (in their case, the norm of reciprocity).

309 However, the precise mechanism through which the norm of equity shapes
310 bargaining in the ultimatum game remains unclear. To what degree are pro-
311 posers offering divisions based on earnings because they fear that more self-
312 serving offers, even if an equal division, would be rejected? And to what degree
313 have proposers internalized the norm of offering earnings as a fair division, such
314 that they would do so even absent the threat of punishment? More work needs
315 to be done to disentangle these motives. However, the overall effect of the equity
316 norm in the ultimatum game with earned wealth is clear, and it exemplifies the
317 interaction of normative beliefs and expectations that characterizes Bicchieri
318 and Muldoon’s (2014) account of norms.

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Appendix to “The Origin of Wealth Matters: Equity norms trump equality norms in the ultimatum game with earned endowments”

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A1. Tables

Table A1: Summary Statistics of Main Experiment

	Statistic	Earned Income	Lottery	Standard*
Group Earnings	Mean	\$29.48	\$28.71	\$29.28
	Std. Dev.	6.26	7.36	6.87
Age	Mean	32.3	34.3	30.8
Gender	Male	56	65	46
	Female	59	59	60
Income	Under \$25,000	26	30	27
	\$25,000 to \$49,999	17	27	14
	\$50,000 to \$74,999	21	23	19
	\$75,000 to \$99,999	24	10	7
	\$100,000 to \$124,999	10	7	9
	\$125,000 to \$149,999	20	8	8
	Over \$150,000	18	19	22
Political Ideology	Extremely Liberal	19	15	13
	Liberal	44	48	48
	Slightly Liberal	12	19	14
	Moderate	26	28	23
	Slightly Conservative	15	11	5
	Conservative	0	0	0
Give to Charity	Extremely Conservative	2	1	3
	No	46	46	33
	Yes, Many Times	18	23	22
Religion	Yes, Once or Twice	52	55	51
	Catholic	24	27	21
	Jewish	5	10	6
	None	45	45	40
	Other	20	25	20
Race	Protestant	22	17	19
	Asian	23	31	25
	Black	19	24	16
	Hispanic	10	10	9
	Other	6	12	10
	White	58	47	46

* Due to computer malfunction we lost survey responses for 13 subjects in the Standard Ultimatum treatment

Table A2: Ultimatum Game Analysis: Even Group Earnings Only

	Treatment		T-Test/ χ^2 p-value Earned v. Lotto
	Earned Income	Lottery	
# of Subjects	52	52	
Mean Group Earnings	\$30.54	\$28.38	
Mean Amount Offered by Proposer	\$14.19	\$11.40	
Avg Amount Offered (% of Endowment)	46%	40%	
Rejection Rate	8%	12%	0.65
% of Offers With a 50/50 Split	31%	58%	0.05
% of Offers at Initial Earnings	31%	8%	0.04
% of Offers Within \$1 of Initial Earnings	54%	27%	0.05
Avg Earnings by High Earner	\$17.07	\$16.16	0.44
Avg Offer by High Earner (% of Endowment)	40%	41%	0.81
Avg Earnings by Low Earner	\$12.27	\$11.71	0.82
Avg Offer by Low Earner (% of Endowment)	55%	39%	0.03
Avg Absolute Difference Between Offer & Initial Earnings In % of Total Money	6.57%	19.16%	0.00

Table A3: Regressions: Equal Divisions and Earnings Divisions

	Logit			OLS
	Dummy: Equal Split (1)	Dummy: Initial Income (2)	Dummy: Initial Income +/--\$1 (3)	Absolute Difference: Initial Income & Offer (4)
Earned Income Treatment	-1.251 (0.505)	0.752 (0.543)	1.084 (0.447)	-6.431 (2.731)
Ability	-0.00743 (0.0114)	-0.00813 (0.0133)	-0.000275 (0.0113)	-0.215 (0.0684)
Male	0.261 (0.491)	-0.536 (0.573)	-0.292 (0.461)	2.304 (2.834)
Age	0.0224 (0.0173)	-0.0182 (0.0219)	-0.0243 (0.0178)	-0.0264 (0.101)
Charity	-0.165 (0.508)	0.665 (0.603)	0.420 (0.478)	-5.466 (2.898)
Not Liberal	-1.511 (0.953)	0.460 (1.046)	-0.0842 (0.882)	-2.869 (5.338)
Ideology	0.241 (0.348)	0.0633 (0.404)	0.129 (0.339)	-0.166 (2.056)
Income	-0.0691 (0.132)	0.144 (0.136)	0.00662 (0.119)	-0.759 (0.724)
Religious	0.0753 (0.537)	-0.609 (0.606)	-0.143 (0.502)	2.360 (2.988)
White	0.890 (0.533)	0.588 (0.560)	0.270 (0.484)	-2.132 (2.932)
Constant	0.134 (1.300)	-1.349 (1.554)	-0.116 (1.272)	33.15 (7.703)
Observations	104	104	104	104
Log-Likelihood	-57.28	-47.93	-63.39	-409.6
R ² /Pseudo R ²	0.154	0.128	0.0964	0.263

Standard errors in parentheses

A2. Experimental Details

In the Earned Income Treatment, subjects were first presented an opportunity to earn money by correctly answering difficult spelling questions under time pressure. Subjects were told that they would receive 25 cents for every question answered correctly. After playing a practice round, subjects proceeded to play five “live” rounds of the spelling task (20 questions in a 90 second round). The words varied in difficulty, but the tests were generally hard and most subjects answered less than 60% correctly in the given time period. Following the spelling tests, subjects were told how many questions they answered correctly and how much money they earned. Then, each subject was informed that the money he or she earned would be placed in a “community pot,” which he or she would then make decisions about, along with another player. Both players then learned how much each of them had earned and contributed to this pot. They were told that one of them would be randomly chosen to be the proposer in the ultimatum game and then proceeded to play the canonical ultimatum game. This approach is similar to the strategy employed by Frohlich et al. [19] in their seminal article examining the effects of earned wealth in the dictator game. Throughout the paper, we refer to this as the “earned wealth” condition, and the language of “earnings” was employed in the experimental protocol with subjects. Whether subjects believe that earning money through success on spelling tests is a legitimate arbiter of “merit” or “desert” is an open question. However, to the degree that subjects do interpret earnings as genuinely meritorious, we expect that this would strength any effects of this treatment.

It is important to note that the subjects were paired with a partner in a different room, interacting only through computer screens, and every attempt was made to guaranteed they would not meet face to face (they were invited to leave at different times, etc.). In half of the treatments higher earners were chosen to be the proposers and in half of the treatments lower earners were chosen to be the proposers, but assignment to different treatments was randomized and subjects had no knowledge of which treatment they were in (or of the existence of other treatments).

In the Lottery Treatment, subjects were asked to answer the same spelling tests as in the Earned Treatment, but told that this was an exercise that would help us judge their English proficiency. There was no mention of money. Following the spelling tests, subjects were told that they were being provided a virtual “lottery ticket” and then asked to press a button to “scratch” the ticket and reveal their winnings. Although subjects were told nothing about the possible values of these tickets, in fact they corresponded to the earnings of subjects in prior Earned Income Treatments such that each pair in the Lottery Treatment would be randomly matched with a pair in the Earned Income Treatment. After a subject learned how much he or she had won in the lottery, he or she then learned how much the person they were paired with had won. Their earnings were combined into community pot for them to play the ultimatum game.

In summary, the Lottery Treatment was almost identical to the Earned Income Treatment, except that the spelling tests had no relationship to money and the money that subjects did receive prior to playing the ultimatum game was, from their perspective, a chance payout from a virtual lottery ticket. This design allows us to compare the proposals of subject pairs with identical initial and overall wealth, who differ only with respect to whether the wealth was earned or randomly won. This enables us to distinguish the effects of earned wealth from endowment effects.

Lastly, in the Standard Ultimatum Game subjects again answer spelling questions at the outset, having been told that this exercise is to help assess English language skills. Then subjects participate in the standard ultimatum game with an endowed common pot of money as in the canonical design. Like in the Lottery Treatment, the total amount that a pair of subjects are endowed with was randomly matched with the total earnings of a pair from the Earned Income Treatment. The instructions delivered to players via the informed consent form and the computer interface are posted online as supporting information.

A3. *Additional Difference in Difference Test for H2 and H3*

Table A4: Difference Between Higher & Lower Earners Depending Upon Treatment Type
Dependent variable:

	% of Endowment Kept		
	(1)	(2)	(3)
Earned Treatment	-0.974 (2.910)	-9.384 (4.042)	-7.364 (4.154)
High Earner	7.678 (2.908)	-0.0487 (3.874)	0.528 (3.986)
Earned Treatment × High Earner		16.28 (5.623)	13.64 (5.992)
Ability			0.0801 (0.0800)
Male			0.655 (3.070)
Age			0.0821 (0.109)
Charity			-7.629 (3.143)
Not Liberal			7.357 (5.938)
Ideology			-2.536 (2.244)
Income			-0.130 (0.789)
Religious			4.860 (3.256)
White			-3.309 (3.209)
Constant	52.52 (2.462)	56.31 (2.714)	45.81 (9.016)
Observations	105	105	104
R ²	0.0643	0.136	0.237

Standard errors in parentheses

A4. Additional Experiment with Endowment Effects

For the purpose of ruling out any confounding from wealth effects related to the magnitude of stakes, we also ran an additional version of the Earned Income Treatment at Duke University’s Interdisciplinary Behavioral Research Center Lab, which likewise recruits from the surrounding community (94 subjects total). This version was identical to the Earned Income Treatment except that, rather than being told that they would receive 25 cents for every question answered correctly, subjects were simply told that their earnings would be reflective of their performance in the spelling tests. This was indeed the case. However, unbeknownst to the subjects, we calibrated their earnings based on a total endowment of \$40 available to each group. Thus, if one subject answered $\frac{26}{100}$ questions correctly while their partner answered $\frac{54}{100}$ questions correctly, the first subject would earn \$13 and the second subject would earn \$27. Crucially, subjects had no knowledge of the \$40 constraint, and the earnings they received accurately reflected their comparative skills.

The rationale for this design is that it standardizes the pot of money available to all groups and precludes wealth effects that might lead subjects to act differently in response to different stakes. For example, a pair of subjects who earn \$4 and \$6 respectively might consider the dilemma of division differently than a pair that earned \$21 and \$23 respectively. In both cases, the earnings of subjects diverge by only \$2, but there is a \$34 difference in the total amount of money at stake. Moreover, in cases where there is at least one very high earner in a pair, this will have the effect of increasing the stakes, and thus people who are most skilled will likely face higher stakes dilemmas on average.

Previous research has established that stakes matter in ultimatum games, although these effects are generally not observed until the stakes become very high (e.g. months worth of wages). When stakes are extraordinarily high, experimenters have been able to induce more low proposals [29]. Given that our maximum possible stake (\$50 in the main experiment) is well below the levels at which stake effects have been documented, we do not expect that the results of our main experiment will be confounded by these effects. This design

Table A5: Replication of Earned Ultimatum with Standardized Pot: Simple Means
Earned Income

	Replication Treatment
# of Subjects	94
Median Group Earnings	\$40
Median Amount Offered by Proposer	\$19
Average Amount Offered (% of Endowment)	48%
Rejection Rate	2%
% of Offers With a 50/50 Split	38%
% of Offers at Initial Earnings	49%
% of Offers Within \$1 of Initial Earnings	60%
Average Initial Earnings of High Earners	56.9%
Average Proposal of High Earners	54.4%
Average Initial Earnings of Low Earners	40.7%
Average Proposal of Low Earners	47.7%
Avg Absolute Difference Between Offer & Initial Earnings (% of Endowment)	4.5%

enables us to verify that. Moreover, it provides us an opportunity to confirm that our main result replicates in an independent sample, further strengthening our findings.

This experiment, which was conducted in a different lab (Interdisciplinary Behavioral Research Center at Duke University), replicates and confirms the main results of our core experiment with regard to the earned treatment. A table of summary statistics describing this population is contained in the appendix, and table A5 reports the main findings. Overall, the modal proposal is for players to keep exactly what they had earned, with about half (49%) of the proposers offering this division, which is again a significantly higher rate than we observe in the Lottery Treatment ($p=.002$). The difference between the proportion that propose within \$1 of earnings in the replication experiment (60%) compared to the Lottery Treatment (32%) is likewise significant ($p=.004$), and corresponds almost exactly to the rates found in the main experiment (62% vs 32%).

Regarding H2 and H3, we observe a similar pattern, as higher earners pro-

posed keeping 54.45% of the pot for themselves, while lower earners proposed keeping 47.75% for themselves, and this difference was likewise significant (t-test, $p=.037$). Moreover, comparing the proportion of the pot that they earn to the proportion that they propose keeping for themselves, high earners on average propose keeping 2.53% less, while lower earners propose keeping 7.05% more.

Finally, with regard to proposals from lower earners, we again witness a similar pattern with 66.7% of lower earners proposing less than half of the pot for themselves, which is significantly more than in the Lottery Treatment ($p<.001$). Pooling both high and low proposers, the overall rate (27.6%) is likewise significantly greater than the Standard Ultimatum Game Treatment ($p=.003$).

Table A6: Summary Statistics of Experiment Testing Magnitude of Endowment

	Statistic	Earned Income Replication Treatment
# of Subjects		94
Group Earnings	Constant	\$40
High/Low Diff in Earnings	Mean	\$6.48
% of Offers	With a 50/50 Split	38%
	At Initial Earnings	49%
	Within \$1 of Earnings	60%
Proposed % of Money Kept	Higher Earners	54.5%
	Lower Earners	47.8%
Age	Mean	27.1
Gender	Male	39
	Female	55
Income	Under \$25,000	18
	\$25,000 to \$49,999	17
	\$50,000 to \$74,999	16
	\$75,000 to \$99,999	17
	\$100,000 to \$124,999	9
	\$125,000 to \$149,999	5
	over \$150,000	12
Political Ideology	Extremely Liberal	5
	Liberal	30
	Slightly Liberal	17
	Moderate or Middle of the Road	22
	Slightly Conservative	15
	Conservative	0
Give to Charity	Extremely Conservative	5
	No	24
	Yes, Many Times	27
Religion	Yes, Once or Twice	43
	Catholic	14
	Jewish	6
	None	30
	Other	22
Race	Protestant	22
	Asian	22
	Black	13
	Hispanic	3
	Other	3
	White	53