Fairness Dominating Human Behavior in Ultimatum Bargaining Game

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Abstract: In 2013, we conducted an international field experiment on human behavior in South Africa and Germany. For this ulitmatum bargaining game, an inheritance of 12,000 ZAR (1,000 EUR) had to be split up. Three randomly selected participants slipped into the roles of the beneficiaries: Andy had the right to propose the distribution of the inheritance. Berta could either accept or reject the proposal. Carlos had no rights at all. As proposer, a large majority opted for an equal split. This was followed by the two power coalitions with 19% of the votes. Less than 4% opted for the proposal of homo oeconomicus (10,000-1,000-1,000 ZAR). Statistically significant differences in behavior exist between Germans and South Africans. In general, inequality aversion is much stronger among South Africans. While two thirds of South Africans propose an equal split, less than half of the Germans do. Gender as well as economic education also help to explain the internaitonal differences in behavior.

Keywords: Ultimatum Bargaining Game, International Field Experiment, Fairness, Rational Behavior

Introduction

In December 2013, we conducted an international research project on human behavior and decision making. We invited all students and employees of Stellenbosch University (South Africa) and the University of Applied Sciences Kaiserslautern (Germany) through the internet as well as the general public via social networks and two regional newspapers to participate in a so-called Ultimatum Bargaining Game.[1] For a better reflection of the diversity of the South

[1] In addition to students & employees of Stellenbosch University (30.000) and the University of Applied Sciences Kaiserslautern (6.000), individual classes at the University of Western Cape, University of Cape Town and the University of the Incarnate

African population, we also conducted field experiments in the township of Kayamandi as well as in the Coloured neighborhood of Idasvallei - both belong to the municipality of Stellenbosch.[2]

The inheritance of aunt Luise in the amount of 12,000 ZAR – approximately 1,000 EUR - had to be split up. Three randomly selected participants slipped into the roles of the beneficiaries – Andy, Berta and Carlos. Due to the will of aunt Luise, the inheritance was to be divided up according to the following rules: Andy had the right to propose the distribution of the 12,000 ZAR. Berta could either accept or reject this proposal. She therefore had the right to veto Andy's proposal. If Berta accepted Andy's proposal, the total amount would be partitioned according to the proposed distribution. If Berta rejected Andy's proposal, none of the three would receive any funds. The whole amount would all go to charity. In our experiment, three other beneficiaries were to be selected. Carlos could neither influence the proposal nor its acceptance or rejection. Andy's role as proposer was auctioned off, as all participants had been asked to place a bid for their right of proposing.

We extended this basic version of the experiment by including a variation, in which the role of the proposer was to be selected randomly – but only after the proposer had decided on his proposal. The division of the actual funds was based on the basic version of our three-person ultimatum bargaining game.

We were hoping that this research project would provide answers to the following questions:

(1.) What role does fairness and rationality play, when people have to make a decision on splitting up a considerable amount of funds?

(2.) How do participants evaluate different kind of proposals – again taking fairness and rationality into account?

(3.) Are there significant differences in human behavior between South Africans and Europeans?

What does economic theory tell us? Basic microeconomic theory in decision making usually assumes that economic agents behave rationally – no matter if they are employees, managers or politicians. The concept of a rational decision maker is called Homo Oeconomicus. The decision maker aims to maximize his financial wealth or personal utility. Though, past eco-nomic experiments – in the

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Word (Texas) had been invited. The regional newspapers were Rheinpfalz and Pfälzischer Merkur with circulations of app. 5,000 each.

[2] Two field workers were trained to conduct the survey in their neighborhood. For Kayamandi, the questionnaire had been translated into Xhosa. Funding for the project was provided by University of Applied Sciences Kaiserslautern (ZAR - South African Rand, EUR - Euro). The project had been approved by the ethic committees of Stellenbosch University.

field and in the laboratory – have shown, that many participants behave in a reciprocal way (Homo Reciprocans). They honor friendly behavior and punish non-cooperative behavior. Sometimes, they are even willing to accept financial losses when punishing non-cooperative behavior. In our experiment, they would loose their proposed share of inheritance. The weight of the financial loss depends on the individual economic situation of each participant.

1 Characteristics of participants

A total of 1,139 individuals participated in our ultimatum bargaining game. This is the highest rate of participation for our internet experiments so far. The majority of participants (69 %) are South Africans - most of them members of Stellenbosch University, more than a quarter are Germans (*Figure 1*). The remaining five percent are mainly from Austria, Switzerland and the United States. On average, the participants are 29 years of age – the youngest being 8, the oldest 73. Due to the fact that roughly 60 percent of our participants are still studying at a university, average age level is relative low. One third of all participants has a background in business or economics. Compared with previous studies, the share of female participants is relatively high (40 %).

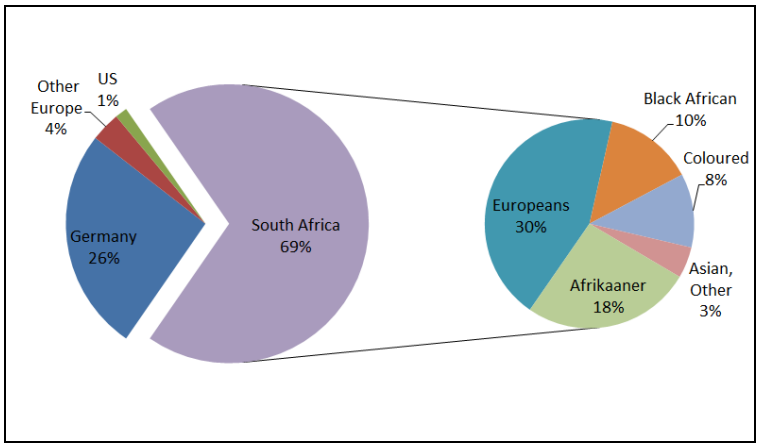

Figure 1
Nationality of 1,138 participants as well as population groups for South Africans

There are several differences in characteristics of participants from Germany (Europe) and South Africa: lower rate of women in Germany (33% vs. 46%), higher share of students in South Africa (70% vs. 50%) as well as more business majors/economists in Germany (47% vs. 34%). In addition to our experiment, everyone participated in a simple test of intelligence. Also, they were asked to

describe their personal risk preference as well as their religious affiliation. Average South Africans are more religious, while underperforming in the cognitive reflection test.[3] Internationally, there are no obvious differences in risk proneness or aversion.

More than two thirds of the South African participants classified themselves as White, whereas Coloureds and Black Africans (Xhosa, Zulu) were almost evenly represented. The distribution in population groups closely resembles the current membership structure of Stellenbosch University (students & employees). Due to persistent differences in educational attainment and the household's unequal income distribution, studying at Stellenbosch University with annual tuition fees of on average 36,000 ZAR (2,800 EUR) is often inaccessible for the large majority of South African High School graduates. As Afrikaans is still the major mode of lecturing in most of the Bachelor programs, the language proficiency provides another stepping stone into Stellenbosch University. Based on the population characteristics of our South African participants their self-reporting on income levels is strongly skewed towards the highest quintile (see *Appendix*).

2 List of proposals and decision making by all participants

Andy and Berta had to choose from eighteen different proposals. First, each participant had to select one proposal in his or her role as Andy. Afterwards, they slipped into the role of Berta. Here, they had to decide to either accept or reject each of the individual eighteen proposals. We made use of the acceptance rate for each proposal to calculate the expected payoff for Andy. Four proposals - e.g. 2,000-4,000-6,000 ZAR - did not find a single proposer.

Andy - the proposer (all participants)
By far, most of our participants - more than 60 % - proposed a fair and equal split of 4,000 ZAR for each of the beneficiaries. The second most important proposals were the so-called power coalition(s) with 11 % and 9 % of the votes: Andy and Berta both profit from agreeing bilaterally on a reduced inheritance for Carlos, as the latter neither has a right to propose nor a right to veto a proposal. Only 3.6 % of our participants proposed a split up that allocates the highest possible payoff (10,000 ZAR) towards Andy, while Berta and Carlos receive only 1,000 ZAR. This is the proposal that reflects a profit maximizing homo oeconomicus the

[3] Shane (2005). All participants should describe their risk proneness on a scale of 1 (risk averse) to 5 (risk prone) as well as for their religious affiliation (from 1 = atheist to 5 = active member of a denomination). On average, South Africans were statistically significant more religious than Germans (3.7 vs. 2.4).

closest.[4] Based on their different roles, it is not very surprising that the average financial sum proposed for Andy is higher than for Carlos - though this time by only 16 % as the majority of the participants voted for an equal split.

All Participants n = 1,138	Andy's choice	Andy's proposals for split up			Berta's reaction		expected payoff for Andy (ZAR)
		Andy	Berta	Carlos	accept	reject	
	0,26%	**0**	**6000**	**6000**	63%	37%	0
	0,00%	**2000**	**4000**	**6000**	50%	50%	1,000
	0,53%	**2000**	**5000**	**5000**	67%	33%	1,340
	0,18%	**2000**	**6000**	**4000**	66%	34%	1,320
	0,00%	**4000**	**2000**	**6000**	23%	77%	920
	0,09%	**4000**	**3000**	**5000**	34%	66%	1,360
Equal Split	61,25%	**4000**	**4000**	**4000**	96%	4%	3,840
	5,01%	**4000**	**5000**	**3000**	72%	28%	2,880
	2,55%	**4000**	**6000**	**2000**	64%	36%	2,560
	0,00%	**6000**	**1000**	**5000**	16%	84%	960
	0,26%	**6000**	**2000**	**4000**	19%	81%	1,140
	3,51%	**6000**	**3000**	**3000**	34%	66%	2,040
	8,52%	**6000**	**4000**	**2000**	48%	52%	2,880
Power Coalition	10,90%	**6000**	**5000**	**1000**	50%	50%	3,000
	0,00%	**8000**	**1000**	**3000**	14%	86%	1,120
	0,35%	**8000**	**2000**	**2000**	19%	81%	1,520
	2,99%	**8000**	**3000**	**1000**	23%	77%	1,840
Homo Oeconomicus	3,60%	**10000**	**1000**	**1000**	14%	86%	1,400
average inheritance per person in ZAR		***4,278***	***4,037***	***3,685***			

Table 1
Choice of proposals and acceptance ratios

Berta – with veto power (all participants)

As Berta, almost all participants accepted an equal split. For the power coalition the rate of acceptance dropped to 50 %, while the proposal linked to the concept of homo oeconomicus is rejected by 86 % of our participants. This is quite irrational, as Berta relinquishes an inheritance worth 1,000 ZAR – for the sake of rebuffing

[4] Previous ultimatum bargaining games usually resulted in higher shares for homo oeconomicus: e.g. 9 % in a newspaper experiment by a German national weekly Die Zeit with more than 5,000 participants (Güth et al. 2007), 14 % of 381 participants in Piazolo (2007) and 9 % of 509 participants in Piazolo (2010). All of these participants were predominantly German. In our sample, 6 % of the European participants opted for the most rational approach.

Andy's extremely unfair proposal. All of the proposals for which Berta receives only 3,000 ZAR or less, are rejected by more than two thirds of all participants. Equal split carries the highest expected payoff (3,840 ZAR). Even though its' acceptance rate is low, the expected payoff for Andy is still the second highest in the case of the power coalition (3,000 ZAR).

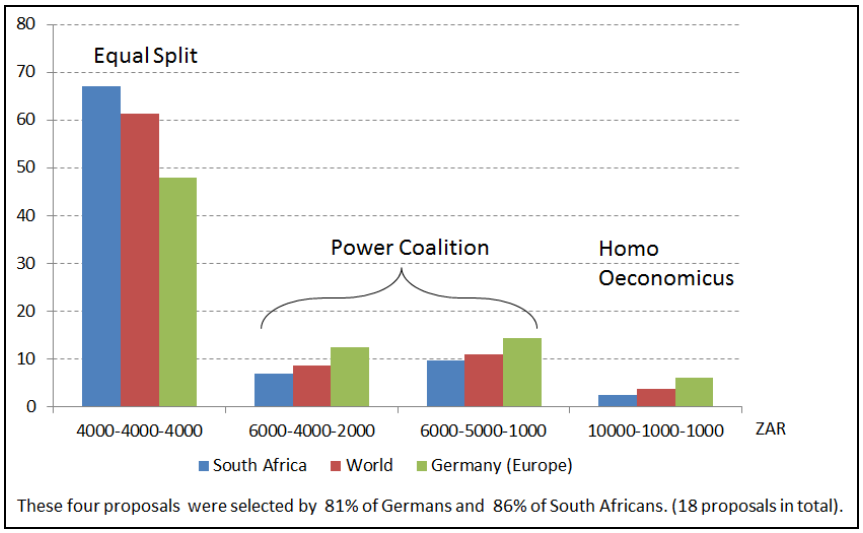

Figure 2
Andy's proposals for splitting up an inheritance of 12,000 ZAR (beneficiaries: Andy - Berta - Carlos)

3 Different international perceptions - South Africans versus Germans

In their role as proposers, the South Africans selected the equal split at a significantly higher rate than their German or European counterparts (67 % vs. 48 **%** in ***Figure 2***). Females also prefer the equal split – and more South Africans are women, but this cannot explain the large discrepancy fully. Every fourth German participant proposed one of the two power coalition(s), while 6 % of them suggested the wealth maximizing version of homo oeconomicus. For South Africans, this rate is a mere 2.5 %.

Andy's proposals for the three beneficiaries vary significantly between South African and German participants. South Africans are much more equality minded than their German counterparts. But are they more fairness-oriented or just more realistic concerning the vetoing power Berta?

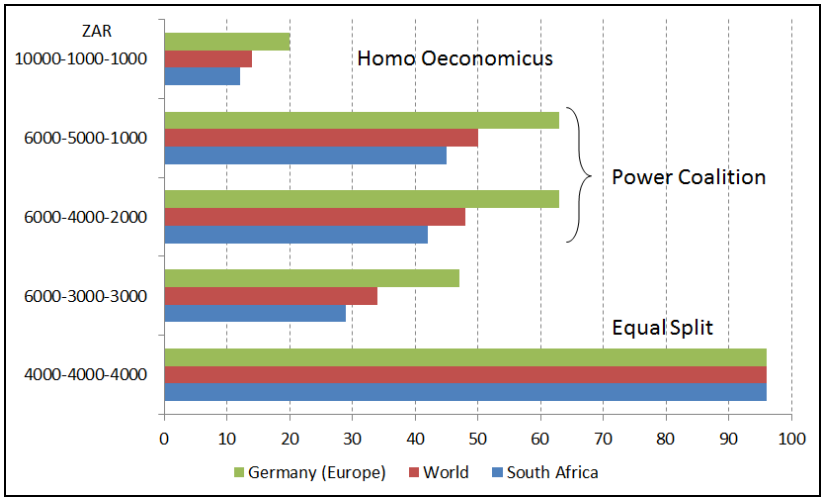

Figure 3
International comparison of Berta's acceptance ratios (proposals for Andy-Berta-Carolos in %)

High inequality aversion of South Africans

In their role as accepting or rejecting Berta, only 160 of all participants (14 %) did accept all of the eighteen proposals. This would have given them at least 1,000 ZAR - instead of relinquishing these funds and receiving nothing at all. For participants that suggested the homo oeconomicus right from the beginning this acceptance rate is more than 90 %.

One fifth of the German participants took rational decisions by accepting all of the proposals, while South Africans showed a high aversion against a very unequal distribution of the inheritance. Only 12 % of them would accept the 10,000-1,000-1,000 ZAR proposal. Even the two power coalitions did not find a majority among South Africans (*Figure 3*). Due to these low South African acceptance rates, the expected payoff for the equal split (3,840 ZAR for Andy) is substantially above the ones for the power coalitions (2,700 ZAR).

Homo oeconomicus is accepted by 20 % of the Germans. Its expected payoff for Andy (2,000 ZAR) is still way below the amounts for some of the other options: Due to the acceptance rate of 63 % for the power coalitions their expected payoffs are within reach compared to the one for equal split (3,780 ZAR vs. 3,840 ZAR). In our previous internet & newspaper experiments (Piazolo 2007, 2010), expected payoffs for the power coalitions had always exceed the one for equal split.[5]

[5] With additional econometric research we plan to analyze the influence of the possible "racial" component of the within South African behavior.

4 Random Selection of the proposer - International gap is levelling out

In the second version of our experiment, the participants were asked to make the same decisions. Though, none of the three beneficiaries would know in advance, which role they play, when the inheritance is to be split up. So, the proposer – Andy – does not know in advance, if he will benefit from his proposal. He might end up as Berta or even as Carlos. Due to this change in conduct, we expect the rate of proposal for an equal split to increase substantially. The empirical data in *Table 2* underlines our expectations. Now, 85 % of all participants propose the equal split - a rise of 24 percentage points!

ALL (n = 1138) South African (n = 788) German (n = 336)	Inheritance of 12,000 ZAR			World		South Africans		Germans (Europeans)	
	Andy	Berta	Carlos	Proposer Andy	Berta accept	Proposer Andy	Berta accept	Proposer Andy	Berta accept
Equal Split	**4000**	**4000**	**4000**	84,9%	97%	88,0%	97%	76,6%	96%
	4000	**5000**	**3000**	1,9%	62%	1,5%	57%	3,0%	74%
	6000	**3000**	**3000**	3,0%	44%	2,2%	37%	5,0%	59%
	6000	**4000**	**2000**	2,6%	37%	1,9%	32%	3,8%	49%
Power Coalition	**6000**	**5000**	**1000**	2,5%	29%	1,8%	24%	3,8%	41%
Homo Oeconomicus	**10000**	**1000**	**1000**	1,4%	15%	1,0%	12%	2,1%	22%
World - average inheritance per person in ZAR	***4.258***	***3.943***	***3.799***						

Table 2

Choice of proposals and international acceptance ratios (randomly selected proposer)

At same instance, the intercontinental differences in proposal rates for equal split decline substantially from 19 to 11 percentage points. The reason is the marked difference in decision making by the German (European) participants: previously 48 % of the Germans opted for equal split, when randomly selected 77 % of them do. Therefore, the average inheritance per person is equalized further more: the difference between Andy and Carlos drops from 593 ZAR to 459 ZAR (last row of *Table 1 & 2*).

The acceptance rates for Berta do not change significantly. Germans still accept an unequal distribution of inheritance more often than their South African counterparts. For both subsets of participants the highest expected payoff for Andy remains with equal split. Though, for Germans, the second highest expected payoff is 3,540 ZAR for the 6,000-3,000-3,000 ZAR proposal. Compared to our

first version, now Germans seem to punish an unfair treatment of (powerless) Carlos – compared to the power coalition(s).

In spring 2014, we randomly selected three representative participants as potential beneficiaries for the 12,000 ZAR. Due to the international make-up, one German (European & rest of the world) and two South Africans were chosen. The role of proposer was based on the individual bids for Andy. The second highest bidder slipped into the role of the vetoing Berta. If Berta rejected the proposal of Andy, three new participants were randomly selected.

In contrast to our previous experiments, our Berta's vetoed the chosen proposal of Andy in three successive rounds. Therefore, nine participants did not receive any cash payment due to the vetoing power of Berta. Exotically, for the first three selected participants a South African Berta rejected even an equal split! The split up of the inheritance was finally successful, in the fourth round only.

With his bid of 2,000 ZAR, Kevin O. (GER) became the proposing party. He suggested an equal split. Mao W.-R. (SA) accepted his proposal, while Lauren d.T. (SA) equally participated. As the inheritance was reduced by 50 % of the bid, 3,000 ZAR remained in Germany and 4,000 ZAR were transferred to South Africa each.

5 Conclusions

We registered more than 1,140 participants. This is more than twice as many than in our previous internet & newspaper experiments (Piazolo 2007, 2010). The ultimatum bargaining game was offered during a sabbatical at Stellenbosch University, South Africa. For a better representation of the various South African population groups, we conducted a limited field survey in the township of Kayamandi as well as in Idasvallei (Stellenbosch). Thereby, we included housholds without access to the internet. In contrast to the German participants, the chance of receiving up to 10,000 ZAR should have been a relative strong incentive to participate for South Africans.

In their role of proposer (Andy) a large majority of 61 % of all participants opted for an equal split (4,000 ZAR each). This was followed by the two power coalitions (6,000 - 5,000-1,000 ZAR & 6,000-4,000-2,000 ZAR) with 19 % of the votes. Less than 4 % of all participants opted for the wealth maximizing proposal of homo oeconomicus (10,000-1,000-1,000 ZAR). In general, the participants were willing to relinquish part of their inheritance by an average bid of 1,870 ZAR for the position of the proposer Andy.

When having to accept or reject each of the eighteen different proposals (Berta), the notions of fairness and inequality aversion dominated decision making. Every

pro-posal, which result in 3,000 ZAR or less for Berta, was rejected by 66 % to 76 % of the participants. These individuals relinquish transfer payments, rather than accepting an unequal distribution of inheritance. Only every seventh participant behaved fully rational by accepting each of the eighteen proposals.

Statistically significant differences in behavior do exist between Germans and South Africans. While two thirds of South Africans propose an equal split, slightly less than half of the Germans do. More than 25 % of the Europeans opted for one of the two power coalitions. Their average bid for the role of proposer was also substantially higher: 2,300 ZAR versus 1,700 ZAR by South Africans.

Our analysis so far has shown that aversion against inequality in splitting up the inheritance of 12,000 ZAR is much stronger among South Africans than Germans. Though, additional characteristics influencing the behavior of participants need to be looked into by a more detailed analysis in the future. Age, gender, household income, religiousness, risk aversion, education attainment are among those characteristics of interest.

In many cases economic theory assumes rational economic agents. In our three-person ultimatum bargaining game this is the homo oeconomicus distribution for the proposer. Though, considering the inequality aversion of South African participants in their role as vetoing power (Berta), South African might be "super-rational" by suggesting equal split as proposers, since the expected payoff is the highest for the fair (even) distribution of funds.[6]

The moment the role of the proposer is randomly allocated to one of the three beneficiaries, the international gap between Germans and South Africans is almost closed. In this second version of the experiment, equal split is proposed by an average of 85 % of all participants. More than three quarters of Europeans vote for this distribution.

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Appendix

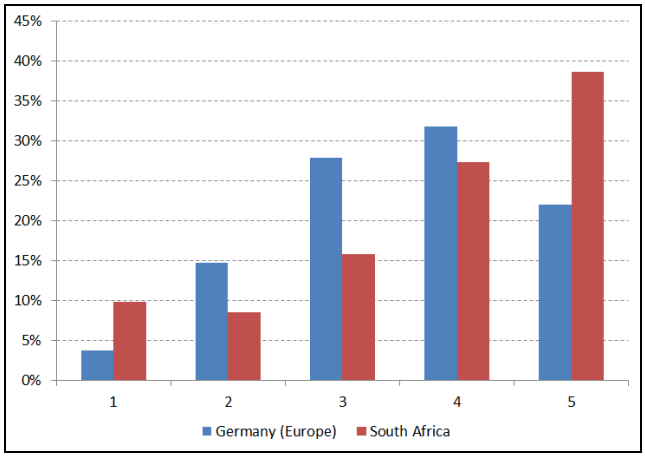

Figure 4
Self-Reporting on Participants Household Income (Quintiles)

Lowest Income Quintile	21 % - 40 %	41 % - 60 %	61 % - 80 %	Highest Income Quintile
1	2	3	4	5
monthly (GER):				
up to €1,299	€1,300 - €1,999	€2,000 - €2,899	€2,900 - €4,199	€4,200 and above
annual (SA):				
up to R21,399 [R13 app. €1]	R21,000 - R35,750	R35,751-R61,624	R61,625-R142,083	R142,084 and above