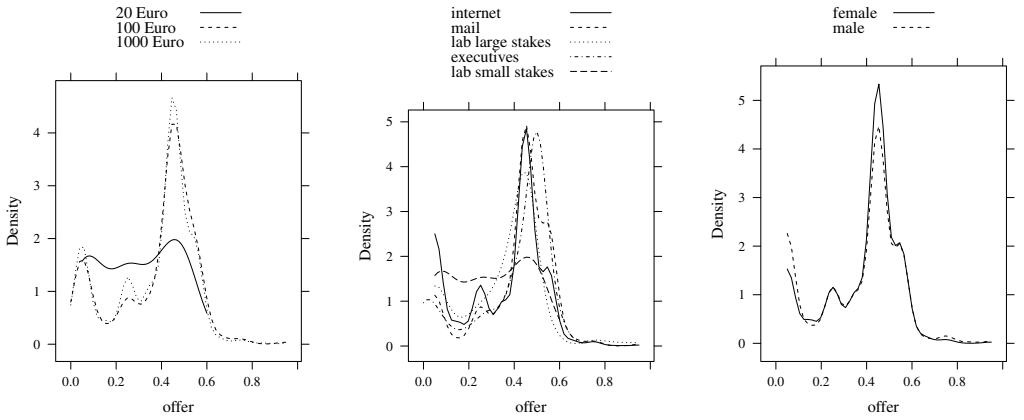
Appendix - online material

Figure 6 Densities for relative offers



The left graph compares estimated densities of offers for different amounts to be distributed. The graph in the middle shows estimated densities of offers for different scenarios. The graph on the right compares densities of offers for female and for male participants.

A Estimation results

Offers: To extend the analysis of section 3 we estimate the following random effects model[15]:

$$\frac{\text{offer}}{\text{amount}} = \beta_1 \cdot d_1 + \beta_{1000€} \cdot d_{1000€} + \beta_{\text{age}} \cdot \text{age} + \beta_{\text{Internet}} \cdot d_{\text{Internet}} + \\ + \beta_{\text{lab}} \cdot d_{\text{lab}} + \beta_{\text{male}} \cdot d_{\text{male}} + \nu_i + \epsilon_{ik} \quad (1)$$

where the dummy $d_{1000€}$ is one if the amount is 1000€ and zero otherwise, the dummy d_{Internet} is one for participants who submitted their strategy through the Internet and zero otherwise, the dummy d_{lab} is one for participants in the lab, and the dummy d_{male} is one for male participants and zero otherwise. ν_i is a random effect for each participant and ϵ_{ik} is a random effect for the individual offer. Estimation results for this and some related specifications

[15] All estimations of random effects models are based on `lme4-0.999375-42`.

are shown in Table 2.[16] Alternative models where age enters as a polynomial of second or higher degree do not lead to a significant change in the estimation results. Also, when we add a dummy for white collar workers to equation (1) or to the following equations (2) and (4) we do not find a significant effect nor a substantial change in the estimated coefficients.

Estimation results in Table 2 confirm what we see in Figures 3 and 4: offers increase significantly with age and male participants offer significantly less than female participants (in line with Eckel & Grossman, 1998, 2001, who rely on dictator experiments and ultimatum games).[17]

The effect of the medium of participation, Internet or postal mail (see also Figures 2 and 4), is highly significant. Even when we control for age, offers on the Internet are significantly smaller and closer to the game theoretic solution behavior based on material opportunism (in line with Güth *et al.*, 2003).

Increasing the pie size by a factor of ten decreases the relative offer by 1.6%. This is only a small amount and only weakly significant in some specifications.

Running the experiment in the lab decreases the relative amount by a small and for all specifications insignificant amount. This is in line with Figure 4.

Rejections: We estimate the rejection probability as a function of age and other explanatory variables. Since we see in the left part of Figure 4 older people having more pessimistic expectations than young ones we include expectations as an explanatory variable in the following random effects model:

$$P(\text{reject}) = \mathcal{L}\Big(\beta_1 \cdot d_1 + \beta_{1000€} \cdot d_{1000€} + \beta_{\text{lab}} \cdot d_{\text{lab}} + \beta_{o^E} \cdot o^E + \beta_{\text{age}} \cdot \text{age} + \\ + \beta_{1000€ \times \text{lab}} d_{1000€} d_{\text{lab}} + \beta_{\text{Internet}} \cdot d_{\text{Internet}} + \beta_{\text{male}} \cdot d_{\text{male}} + \nu_i\Big) \quad (2)$$

[16] All the estimations shown in Tables 2–5 include only data from the newspaper experiment and the lab experiment with high stakes since we know age and gender neither for the business executives nor for the lab data of Gehrig *et al.* (2007).

[17] More basically, one can control for the idiosyncratic testosterone level of male participants (see Burnham, 2007).

	1	2	3	4	5
(Intercept)	0.324^{***}	0.326^{***}	0.374^{***}	0.413^{***}	0.390^{***}
	$[0.295; 0.353]$	$[0.292; 0.360]$	$[0.312; 0.436]$	$[0.319; 0.507]$	$[0.332; 0.447]$
1000€	-0.016^{*}	-0.016^{*}	-0.016^{*}	-0.017	-0.017
	$[-0.030; -0.001]$	$[-0.030; -0.001]$	$[-0.030; -0.001]$	$[-0.034; 0.001]$	$[-0.034; 0.001]$
age	0.002^{***}	0.002^{***}	-0.000	-0.001	0.001
	$[0.002; 0.003]$	$[0.001; 0.003]$	$[-0.003; 0.002]$	$[-0.006; 0.003]$	$[-0.001; 0.002]$
internet	-0.046^{***}	-0.047^{***}	-0.046^{***}	-0.047^{***}	-0.049^{***}
	$[-0.064; -0.028]$	$[-0.067; -0.028]$	$[-0.065; -0.027]$	$[-0.071; -0.023]$	$[-0.073; -0.026]$
male	-0.020^{*}	-0.020^{*}	-0.021^{*}	-0.014	-0.076^{*}
	$[-0.037; -0.002]$	$[-0.036; -0.003]$	$[-0.038; -0.004]$	$[-0.034; 0.007]$	$[-0.136; -0.015]$
lab		-0.006	-0.012	-0.020	-0.017
		$[-0.043; 0.031]$	$[-0.050; 0.026]$	$[-0.060; 0.021]$	$[-0.059; 0.025]$
age^2			0.000	0.000	
			$[-0.000; 0.000]$	$[-0.000; 0.000]$	
whiteCollar				-0.013	-0.010
				$[-0.043; 0.017]$	$[-0.039; 0.019]$
age × male					0.002^{*}
					$[0.000; 0.003]$
indep.obs.	817	817	817	603	603
N	1634	1634	1634	1206	1206

TABLE 2: Random effects estimation of equation 1

Confidence intervals and p-values are based on a parametric bootstrap with 1000 replications. The estimations in Tables 2–5 do not include data on business executives, since there we neither know age nor gender.

Table 3 Random effects estimation of equation 2

	β	σ	z	p value	95% conf	interval
(Intercept)	-8.94	4.17	-2.15	0.0319	-17.1	-0.772
lab	-14.1	250	-0.0567	0.9548	-503	475
1000€	-1.34	0.388	-3.46	0.0005	-2.1	-0.584
expOffer	-1.57	2.1	-0.751	0.4527	-5.68	2.53
age	0.0182	0.0677	0.27	0.7875	-0.114	0.151
Internet	-0.102	2.35	-0.0433	0.9655	-4.72	4.51
male	0.444	2.2	0.202	0.8400	-3.87	4.76
1000€ × lab	14.3	249	0.0574	0.9542	-474	503

$\mathcal{L}$ is the standard logistic function and o^E is the expected relative offer. Estimation results are shown in Table 3. The only significant factor is the size of the pie: participants are less likely to reject a share of a large (1000€) pie than a share of a small (100€) pie.

Eckel & Grossman (2001) find more rejections by males in ultimatum games. In our study we find with 0.444 a positive, but insignificant male effect. The effect of lab is with -14.1 negative but not significant.

Expected offers: Similar to equation (1) we explain expected relative offers o^E:

$$o^E = \beta_1 \cdot d_1 + \beta_{1000€} \cdot d_{1000€} + \beta_{\text{age}} \cdot \text{age} + \beta_{\text{Internet}} \cdot d_{\text{Internet}} + \\ + \beta_{\text{lab}} \cdot d_{\text{lab}} + \beta_{\text{male}} \cdot d_{\text{male}} + \nu_i + \epsilon_{ik} \quad (3)$$

Table 4 shows estimation results for equation (3) in column 1 as well as estimation results for an augmented version where we also include own offers. Both specifications find male participants to be more optimistic—significantly so once we control for offers. Also both specifications find participants in the lab to be significantly more pessimistic.

Expected rejection rates: As in equation (2) we explain expected rejection rates (elicited as "expected average frequencies" in the experiment) with a logistic regression with random effects. Since the rejection by another

Table 4 Random effects estimation of equation 3 for expected offers

	1	2
(Intercept)	0.331^{***}	0.181^{***}
	$[0.296; 0.366]$	$[0.148; 0.215]$
1000€	-0.015^{*}	-0.008
	$[-0.031; -0.000]$	$[-0.021; 0.004]$
age	0.002^{***}	0.001
	$[0.001; 0.002]$	$[0.000; 0.001]$
internet	-0.047^{***}	-0.025^{*}
	$[-0.067; -0.027]$	$[-0.042; -0.008]$
lab	-0.056^{**}	-0.053^{**}
	$[-0.093; -0.019]$	$[-0.086; -0.021]$
male	0.005	0.014^{*}
	$[-0.012; 0.023]$	$[-0.001; 0.030]$
offer		0.458^{***}
		$[0.414; 0.502]$
indep.obs.	817	817
N	1634	1634

Confidence intervals and p-values are based on a parametric bootstrap with 1000 replications.

person can not depend on the own expectation equation 4 does not contain the expected offer o^E.

$$P(\text{reject}) = \mathcal{L}\Big(\beta_1 \cdot d_1 + \beta_{1000€} \cdot d_{1000€} + \beta_{\text{lab}} \cdot d_{\text{lab}} + \beta_{1000€\times\text{lab}} d_{1000€} d_{\text{lab}} + \beta_{\text{age}} \cdot \text{age} + \beta_{\text{Internet}} \cdot d_{\text{Internet}} + \beta_{\text{male}} \cdot d_{\text{male}} + \nu_i\Big) \quad (4)$$

We show results in Table 5. As in the comparison of actual with expected offers in equation (1) and (3), also estimation results for actual and expected rejection rates in equations (2) and (4) yield similar results. Correctly, participants expect smaller rejection rates when stakes are higher. Expected rejection rates are smaller in the lab, but not significantly so.

Table 5 Random effects estimation of equation 2 for expected rejection rates

	β	σ	z	p value	95% conf	interval
(Intercept)	-1.34	0.247	-5.44	0.0000	-1.83	-0.859
age	0.00584	0.00433	1.35	0.1782	-0.00266	0.0143
Internet	0.0386	0.139	0.278	0.7811	-0.234	0.311
lab	-0.443	0.386	-1.15	0.2513	-1.2	0.314
1000€	-0.369	0.127	-2.89	0.0038	-0.618	-0.119
male	-0.167	0.125	-1.33	0.1828	-0.413	0.0788
1000€ × lab	-0.142	0.563	-0.252	0.8009	-1.24	0.961

B Implementation of the experiment:

- The lab experiment with small stakes is described in Gehrig *et al.* (2007).

- The instructions to the newspaper experiment were published on Saturday, 6 September 2008, and on Saturday, 13 September by the Ostthüringer Zeitung (Gera, Germany) as part of their weekend supplement. You find a translation of these instructions below in section B.1.

  In the newspaper article readers would find a link to a web-page. This page repeated the instructions and (on the same page) contained a form which would allow readers to enter their decisions and which was very similar to the decision form in the newspaper.

  The 40 participants who were selected randomly for payment all received a letter at the end of October 2008. They were asked for their bank and their account number. Then their earnings from the experiment were transferred to their bank account. In one case where this was not possible the participant was paid by cheque.

- The lab experiment with high stakes was run in the laboratory of the MPI in Jena on 30. May 2011 and on 1. June 2011. Participants from the subject pool of the MPI and the University were invited via ORSEE (Greiner, 2004) and could register for the experiment over the Internet. All participants who arrived in time for the experiment would get a

show-up fee of 2.50€ before the experiment started. Then they would read the instructions (see section B.1). Thereafter they would enter their decisions on the computer. The 8 participants who were selected randomly for payment were informed on 2 June 2011 via email and received a letter from the MPI until mid June. As in the newspaper experiment their earnings from the experiment were transferred to their bank account.

- The experiment with business executives was done in a pencil and paper format. A translation of the instructions is shown in section B.2.

B.1 Translation of the instructions for the newspaper and lab experiment

[[newspaper:]] As a reader of the Ostthüringer Zeitung you can participate in this experiment which is jointly organised by the Max-Planck-Institut for Economics and the Friedrich-Schiller-University Jena as a contribution to "Jena. Stadt der Wissenschaft 2008".
How can you participate? One possibility is to complete the entire decision form below and send it by mail to the publisher of the Ostthüringer Zeitung. You can also visit our Internet page http://www.kirchkamp.de/ja-nein/ and complete the decision form there.

[[lab:]] This experiment is jointly organised by the Max-Planck-Institut for Economics and the Friedrich-Schiller-University Jena.

What is going on in this experiment? Two participants can divide either 100€ or 1000€. One of them, let us call him X, can can propose how to divide the available amount. The other, we will call him Y, can agree, i.e. say "yes", or disagree, i.e. say "no", not knowing which division has been proposed by X. "Yes" means that the amount is divided as proposed by X, "no" means that both participants get nothing. When X decides on how to divide the amount he does not know whether Y says "yes" or "no". When Y decides on whether to say "yes" or "no", he does not know how the amount is divided by X.

Let us look at an example: We can divide the amount of 1000€. The X-participant demands 450€ for himself and offers 550 € to the Y-participant. If Y has said "yes", then

Y receives exactly 550€ and X receives the demanded 450 €. If Y has said "no", then the X- and Y-participant receive both zero €.

As we do not know yet, whether you, if you participate in the experiment, belong to the

[[newspaper:]] 40 | *[[lab:]]* four

randomly selected participants which are paid according to their decisions and the rules that we described above, you have to make decision both the position of the X and the position of the Y. Hence, for the position of the X you have to choose a division of the 100€ and the 1000€. For the position of the Y you have to choose "yes" or "no" for each of the two amounts.

Among all decisions

[[newspaper:]] 40 | *[[lab:]]* four

will be selected randomly.

[[newspaper:]] Twenty | *[[lab:]]* Two

of these will be used for the position of the X and Y, respectively. Hence, we form

[[newspaper:]] 20 | *[[lab:]]* two

pairs of one X and one Y each. Also the position of X and Y is chosen randomly for each participant.

[[newspaper:]] Ten | *[[lab:]]* One

of these pairs will divide 100€,

[[newspaper:]] the remaining 10 pairs | *[[lab:]]* the other pair

will divide 1000 €.

[[newspaper:]] Hence, we will pay at most 11 000€.

Regardless whether you participate by postal mail or by Internet, it is important that you complete the entire decision form. The 40 participants that are selected will be selected only from the submissions where the entire decision form has been completed.

Please make now your decision for both positions that you can have in the experiment:

[[lab:]] Hence, we will pay for the four selected participants at most 1 100€.

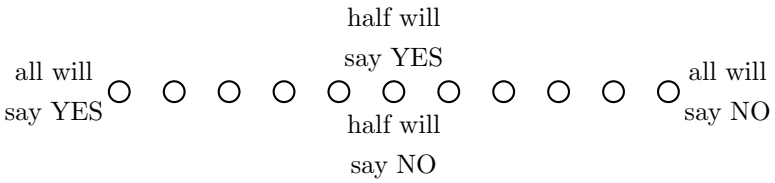
At the end of the experiment you will be informed via email whether you belong to the four selected participants. The divided amount will be, according to your decision, transferred to your account.

In a few minutes you can make your decisions on the computer screen for both roles that you can have in the experiment:

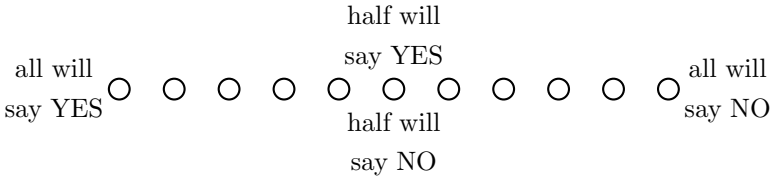
In the newspaper and in the lab the following two sections "You are an X participant" and "You are a Y participant" were presented (horizontally) side by side, X on the left, Y on the right. Participants who completed the form on the Internet would find both sections on one page, just below the instructions, first X and then Y.

You are an X participant

- How, do you think, will the other Y participants decide when the amount is 100 €? Please tick *one* of the following circles.



- How, do you think, will the other Y participants decide when the amount is 1000 €? Please tick *one* of the following circles.



- When 100€ are divided (Please tick *one* of the following circles)...

You demand	5	15	25	35	45	55	65	75	85	95	€
	○	○	○	○	○	○	○	○	○	○	
You offer to Y	95	85	75	65	55	45	35	25	15	5	€

- When 1000€ are divided (Please tick *one* of the following circles)...

You demand	50	150	250	350	450	550	650	750	850	950	€
	○	○	○	○	○	○	○	○	○	○	
You offer to Y	950	850	750	650	550	450	350	250	150	50	€

You are a Y participant How, do you think, will the other X participants behave?

- When 100€ are divided (Please tick *one* of the following divisions)...

they demand	5	15	25	35	45	55	65	75	85	95	€
	○	○	○	○	○	○	○	○	○	○	
they offer to Y	95	85	75	65	55	45	35	25	15	5	€

- When 1000€ are divided (Please tick *one* of the following divisions)...

they demand	50	150	250	350	450	550	650	750	850	950	€
	○	○	○	○	○	○	○	○	○	○	
they offer to Y	950	850	750	650	550	450	350	250	150	50	€

- Your 1st decision: When 100€ are divided (Please tick *one* of the following possibilities)

○ I accept the decision of X.

○ I refuse the decision of X.

- Your 2nd decision: When 1000€ are divided (Please tick *one* of the following possibilities)

  ○ I accept the decision of X.

  ○ I refuse the decision of X.

[[For the lab experiment the following section was presented on a separate screen. In the newspaper and also on the web form this section was on the same page as the previous sections.]]

If you are among the 40 selected participants, we also need your name and your address

- Name: .....
- Address: .....

  .....

  .....

  The following fields are optional:

- Age: .....
- Profession: .....
- Sex: male ○ / ○ female

B.2 Translation of the instructions for the experiment with business executives

You are an X participant

Question: How probable (in %) is in your opinion a "yes" of the Y-participant if the amount is 100€ and 1000€.

Your answer: If the amount is 100€ I expect a "yes" with a probability of... %. I expect a "no" with a remaining probability of... %.
If the amount is 1000€ I expect a "yes" with a probability of... %. I expect a "no" with a remaining probability of... %.

Your first decision: When 100€ are divided,

- I demand...€ for me and
- I offer Y exactly...€

(please enter only integer €-amounts between 5 and 95. The sum of both amounts must be 100€.)

Your second decision: When 1000€ are divided,

- I demand...€ for me and
- I offer Y exactly...€

(please enter only integer €-amounts between 5 and 995. The sum of both amounts must be 1000€.)

You are a Y participant

Question: How much, do you think, will the other X participant offer you when 100€ or 1000€ can be divided?

Your answer: I expect to be offered...€ when 100€ are divided (please enter only integer €-amounts between 5 and 95.)
I expect to be offered...€ when 1000€ are divided (please enter only integer €-amounts between 5 and 995.)

Your first decision: When 100€ are divided, I accept ☐ or I refuse ☐. (Please tick only one box, and only the one you prefer!)

Your second decision: When 1000€ are divided, I accept ☐ or I refuse ☐. (Please tick only one box, and only the one you prefer!)