Coopetition: group contest with an inverse proportional sharing rule

PRELIMINARY

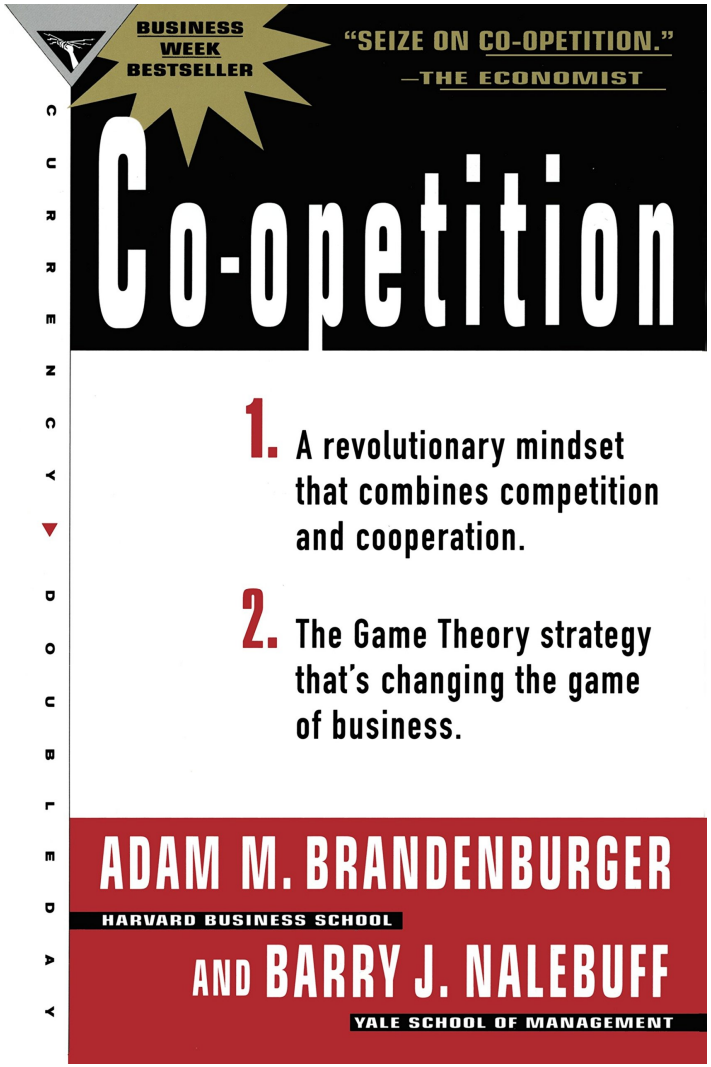
Hubert János Kiss - Alfonso Rosa-Garcia - Vita Zhukova

MTA KRTK KTI & ELTE - UCAM - UCAM

Universidad Autónoma de Madrid
12 December, 2018

Coopetiton= cooperation + competition (?)

- Cooperation and competition are two of the most studied phenomena in Economics.
- Most of the time they are investigated separately.
- Often, cooperation and competition are present simultaneously. Coopetition.
- Intense interest in management, less in Economics.
- Two examples: a non-economic and an economic.



Cycling

- Breakaway. Some cyclists in front of the peloton.
- They have to cooperate to make it to the finish line without being chased down. Cooperating = 'pulling', being in front and fighting air resistance. The others are sheltered.
- They compete, the glory is for the winner.
- The less you pull, the more power you will have to be the first.

Firms

- Group of firms cooperate (e.g. launch a marketing campaign) to enlarge the demand for their product. Cooperation = financing the campaign.
- On the enlarged market they compete to acquire the most customers.
- The less you contribute to the marketing campaign, the more resources you have to offer a better product / lower costs etc.
- Firms may team up for R & D and other common goals.

Putting cooperation and competition together

- In the IO example there are straightforward ways to do that.
  - Two stages. Firms start out with some (possibly heterogeneous) endowment. First stage: public goods game - demand curve shifts upwards in function of the contributions. Second stage: firms compete á la Cournot on the enlarged market. Less contribution to the public goods may imply lower production costs. We work on that.
- In many instances it is not so obvious how the model should be.
  - Brandenburger and Nalebuff do not write down any model.
  - Brandenburger and Stuart (ManSci, 2007): biform games with a cooperative and non-cooperative element.
  - No consensus model emerged.
- Our take on this issue in this paper:
  - We only assume that there is a resource constraint: the more cooperative you are, the less resources you have to compete.
  - We do not model this trade-off, but use the well-known *group contest* models and experiments to implement the idea. Literature on group contest is a good starting point and natural benchmark.

What do we do in this paper?

- We come up with a model of coopetition based on group contests. Two cases, we vary the strength of the trade-off between cooperation and competition. We solve it and provide theoretical predictions.
- We set up an experiment to test the predictions. To understand better participants' behavior we have them play not only the coopetition game, but also measure social attitudes, risk aversion, cooperativeness and competitiveness. We have hypotheses on how these may affect behavior. We test the theoretical predictions and the hypotheses on what affects behavior in coopetition.
  - We registered the experiment, so we have proof that hypotheses did not arise after the experiment.

Related literature

- Work in progress.
- Vast management literature. Drinks and bottling companies (Choi et al. 2010), the health-care sector (Gee, 2000; LeTourneau, 2004), insurance firms (Okura, 2007), port management (Song, 2003), the grocery industry (Kotzab and Teller, 2003), the tourism industry (von Friedrichs Grangsjo, 2003), the global steel industry (Gnyawali et al., 2006).
- Some Economics literature.
  - De Ngo and Okura (2008): how privatization affects cooperation and competition in a mixed duopoly market
  - Hattori and Yoshikawa (2013): very similar to the IO model seen before.
  - Antecedents in the history of economic thought. Work in progress.
- Not much in the experimental literature.
  - Devetag (2009) has a very different focus.
- Group contest literature - next slides.

Group contest - preliminaries and performance

- Two groups compete to win a prize v. (Competition on two levels: between and within group. Previous examples.)
- N_A / N_B players in group A / B.
- Players choose simultaneously and independently a level of effort (or contribution) x_{iA} and x_{jB}. Irreversible. Heterogeneous costs $c_{iA}(x_{iA})$ and $c_{jB}(x_{jB})$, for all $i = 1, ..., N_A$ and $j = 1, ..., N_B$.
- Performance of group A / B (X_A / X_B) is a function of all individual efforts. For instance,

$$X_A = f_A(x_{1A}, ...x_{1N_A}) \tag{1}$$

- The most widely used function assumes perfect substitution

$$f_A(x_{1A}, ...x_{1N_A}) = \sum_{i=1}^{N_A} x_{iA}. \tag{2}$$

  - Performance hinges on the *joint* effort of all individuals of the group. We use it as well

Group contest - cost, CSF

- We assume homogeneous linear costs: $c_{iA}(x) = c_{jB}(x) = x$ for all $i = 1, ..., N_A$ and $j = 1, ..., N_B$.
- The probability of winning the contest depends on the relative performance of the groups. A contest success function (CSF) determines the probability that group A wins the prize:

$$p_A(X_A, X_B) = \frac{(X_A)^r}{(X_A)^r + (X_B)^r} \tag{3}$$

- $r \geq 0$ represents the sensitivity of the probability of winning to the ratio of group performances.
  - Lottery case - $r = 1$. Higher performance $\Rightarrow$ higher winning probabilities. We use this case in both of our treatments.
  - Auction - $r = \infty$. The group with the highest performance wins the contest with certainty.

Group contest - sharing rule

- If group A wins the prize, player i receives a share

$$s_{iA}(x_{1A},...x_{N_A A}) = \frac{\alpha_A}{N_A} + (1-\alpha_A)\frac{x_{iA}}{\sum_{i=1}^{N_A} x_{iA}}. \quad (4)$$

- That is, a share α_A is split equally, and the rest $1-\alpha_A$ is divided according to relative effort.
- Egalitarian / proportional division occurs if $\alpha_A = 1$ / $\alpha_A = 0$.
- We add a new rule: *inverse proportional*

$$s_{iA}(x_{1A},...x_{N_A A}) = \frac{\frac{\max(x_{1A},...x_{N_A A})}{x_{iA}}}{\sum \frac{\max(x_{1A},...x_{N_A A})}{x_{iA}}}, \quad (5)$$

- for $x_{iA} > 0$.
  - For $x_{iA} = 0$, s_{iA} is not well-defined. By the logic of the rule, player i receives v if the other members contributed > 0 and shares the prize equally with those who also contributed zero.

Group contest - sharing rule cont'd

- Small example. Suppose a group with subjects A,B,C and D who made the following efforts 1,2,4 and 4, respectively.
  - Proportional: $\frac{1}{11}, \frac{2}{11}, \frac{4}{11}$ and $\frac{4}{11}$
  - Egalitarian: all would receive $\frac{1}{4}$ of the prize.
  - Inverse proportional rule gives four / two times as much share from the prize to subject A / B, than to subjects C and D who receive the same share, yielding: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ and $\frac{1}{8}$ respectively to subjects A, B, C and D.
- Inverse proportionality captures the idea of coopetition: the less I contribute, the more I receive from the prize (if my group wins).
- Even with egalitarian sharing there is tension between cooperation and competition, but with inverse proportionality we make it harsher.

Group contest - equilibrium, egalitarian case

- With perfect substitution in the performance function, homogeneous linear costs, a lottery CSF ($r = 1$), and equal group sizes ($N_A = N_B = N$), the expected payoff of a risk-neutral player i in group A is:

$$\pi_{iA}(x_{1A}, ...x_{NA}, X_B) = \frac{\sum_{i=1}^{N} x_{iA}}{(\sum_{i=1}^{N} x_{iA} + \sum_{j=1}^{N} x_{jB})} \frac{1}{N} v - x_{iA} \quad (6)$$

- Calculate FOC for members in group A and B, assume symmetric Nash equilibrium to get

$$x_{1A}^* = .. = x_{iA}^* = .. = x_{NA}^* = \frac{v}{4N^2} \quad (7)$$

Group contest - equilibrium, inverse proportional case

- Work in progress (more difficult than expected)
- With the same model choices, the expected payoff of a risk-neutral player i is:

$$\pi_{iA}(x_{1A},...x_{NA},X_B)=\frac{\sum_{i=1}^{N}x_{iA}}{(\sum_{i=1}^{N}x_{iA}+\sum_{j=1}^{N}x_{jB})}\frac{\frac{\max(x_{1A},...x_{NA})}{x_{1A}}}{\sum\frac{\max(x_{1A},...x_{NA})}{x_{1A}}}\upsilon-x_{iA} \tag{8}$$

- FOC with general s_{iA}

$$\frac{\partial\pi_{iA}}{\partial x_{iA}}=\frac{\sum_{j=1}^{N}x_{jB}}{(\sum_{i=1}^{N}x_{iA}+\sum_{j=1}^{N}x_{jB})^2}\frac{\partial s_{iA}(x_{1A},...x_{N_AA})}{\partial x_{iA}}\upsilon-1=0 \tag{9}$$

- If $\sum_{j=1}^{N}x_{jB}>0$, then the sign of the first term in the product depends on $\frac{\partial s_{iA}(x_{1A},...x_{N_AA})}{\partial x_{iA}}$.

Group contest - equilibrium, inverse proportional case cont'd

- Given the functional form of s_{iA}, FOC cannot be met if anybody from the group contributes more than the others.
- Alfonso's claim: The unique symmetric equilibrium has $x^*_{1A} = .. = x^*_{iA} = .. = x^*_{NA} = 0$

Group contest - take-away predictions and findings in the literature

- Prediction
  - We expect to see higher contributions in the egalitarian treatment, than in the inverse proportional treatment.
- Literature
  - **Overexpenditure**. With proportional or egalitarian sharing group contests lead to high individual effort and little free riding. Studies consistently find that average effort level (though often showing a declining pattern) is significantly higher than the equilibirum prediction. Sheremeta (2013) reports a median over-expenditure of 72%.
  - **Egalitarian vs. proportional**. The proportional sharing rule leads to higher individual efforts than the egalitarian rule. It is natural to expect that under the inverse proportional sharing rule individual efforts will be significantly lower than under the egalitarian rule.

Procedures

- Two sessions corresponding to the two treatments in July, 2018 in the laboratory of LINEEX (Valencia, Spain).
- In both sessions, there were 56 individuals. In the egalitarian / inverse proportional treatment 39.3% and 66.1% of the subjects were females.
- Sessions lasted about two hours and participants earned on average 18 Euros.

Group contest - details

- Five phases plus the questionnaire.
- In both treatments, phase 1 - group contest.
- Groups of four subjects were formed randomly and anonymously.
- 20 rounds. Groups were fixed for the 20 rounds and in each round a group played against another group and the rival changed in each round.
- At the beginning of each round, each subject received 1000 tokens to buy competition tokens for her group, one competition token costing one token. The tokens not used for buying competition tokens remained on the account of the subject.
- Subjects knew that the other members of the group started also with the same endowment and could buy competition tokens as well.

Group contest - details

- After each round, the amount of the competition tokens determined who wins the prize. Probability of winning was proportional to the total competition tokens of a given group divided by the competition tokens of both groups ($r = 1$). We explained that the probability of winning increased in the number of competition tokens.
- The winning group received a prize of 4000 tokens.
- Two treatments that differed in the way the prize was split within the winning group.
  - *Egalitarian* treatment: each member received the same amount of the prize (1000 tokens). Payoff in the winning group = tokens not used to buy competition tokens + 1000 tokens won as a prize.
  - *Inverse proportional* treatment: the less competition tokens a member of the winning group bought, the higher is her share from the prize. Payoff in the winner group = tokens not used to buy competition tokens + tokens won as a prize.
- Payoff in the loser group: only the amount of tokens not used to buy competition tokens.

Group contest - details

- In both treatments at the end of each round, each participant obtained the following information
  - the number of competition tokens that she bought;
  - the total number of competition tokens that the group accummulated;
  - the total number of competition tokens that the rival group accummulated;
  - which group won the contest in the given round;
  - the payoff in the round

Experiment - other phases

- Phase 2 - social value orientation to measure social attitudes. Payoff allocations between the subject and a co-player. Classification: altruists, prosocial, individualistic, competitive. ▸ Decisions
- Phase 3 - classic ($N = 4$, $MPCR = 0.4$) public goods game to measure cooperativeness. One-shot.
- Phase 4 - bomb risk elicitation task (Crosetto and Filippin, 2013) to measure risk preferences. ▸ Task
- Phase 5 - competitiveness measured á la Niederle and Vesterlund (2007) with four subphases. Slider task. Competitive vs. not competitive. ▸ Screenshot
- Both phases 2 and 3 capture social attitudes, and phases 2 and 5 measure competitiveness.
- With these measures we are able to see to which degree coopetitive choice can be explained by cooperativeness and competitiveness.

Experiment - payoffs

- No feedback in phases 2-5.
- Final payoff: the sum of two payoffs plus the show-up fee.
- Surely paid for their performance in phase 1 (the coopetitive game) and from the other 4 phases the computer picked randomly one.
- During the phases subjects earn tokens to be converted into Euros. Exchange rate changes between phases (to keep expected payoffs constant), but in any case more tokens imply more Euros.
- After the 5 phases there was a questionnaire (socio-demographics, biological features, cognitive abilities - CRT, Big5, self-esteem, happiness).
- After finishing the questionnaire subjects were paid in private.

Registration and hypotheses

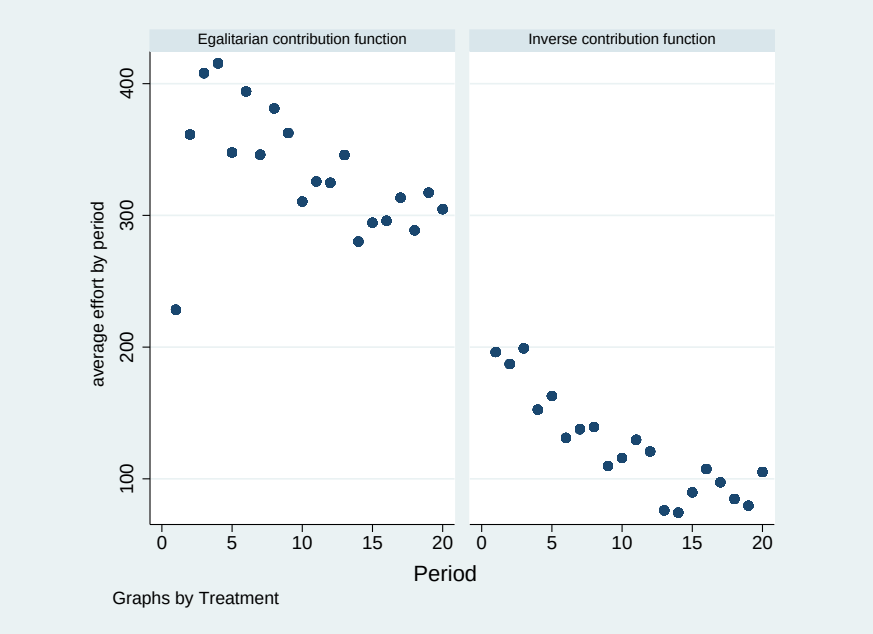
- We registered our experiment at Open Science Foundation (https://osf.io/93aus/) prior to running the experiment.
- We state the hypotheses as we registered them.
- **Hypothesis 1 (egalitarian vs. inverse proportional prize sharing)**: We expect that contributions to the group performance will be significantly lower in the treatment with inverse proportional prize sharing.
- **Hypothesis 2 (choice of contribution and social value orientation)**: We expect to see correlations between the classification according to social value orientation and contributions.
- **Hypothesis 3 (choice of contribution and risk aversion)**: We expect that the more risk averse an individual is, the less she contributes, *ceteris paribus*.

MTA KRTK KTI

Registration and hypotheses cont'd

- **Hypothesis 4 (choice of contribution and cooperativeness)**: Contribution in the coopetition task and in the public goods game are expected to correlate positively.
- **Hypothesis 5 (choice of contribution and competitiveness)**: There is competition on two levels. Groups compete against each other, but on the individual level there is a competition between the members of the same group. If the group competition motive dominates, then the individuals who are more competitive are expected to contribute more. If the competition on the individual level is stronger than the group competition, then we expect the opposite to happen. Hence, we expect to see an effect of competitiveness, but we do not have strong expectations on the direction.

Contributions - descriptives

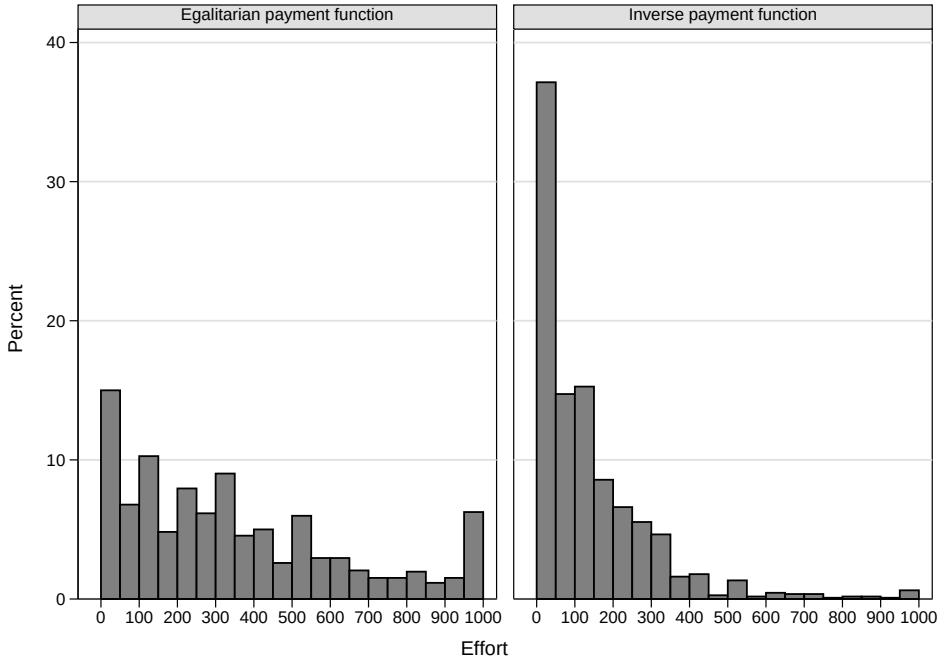


- Average effort in the egalitarian / inverse proportional treatment is 332.3 / 124.8.
  - The same averages over the 1. / 2. / 3. and last 5 rounds are 353.3 / 183.8 (92%) for the 1., 371 / 129.5 (186%) for the 2., 319.1 / 100.2 (218%) for the 3. and 303.8 / 92.3 (229%) for the last 5 rounds.

Contributions - descriptives cont'd

- Two-sample Wilcoxon ranksum test confirms what we see.
  - For all periods (except period 1) significant difference in the effort ($p<0.001$ in all cases).
  - If we pool all the efforts together, we observe a significant difference using the same test.
  - In both treatments there is a marked downward trend. However, even in the last 5 periods in the egalitarian treatment efforts are significantly higher than in the first 5 periods in the inverse proportional treatment (two-sample Wilcoxon ranksum test, $p<0.001$).

Contributions - histograms



- The Kolmogorov-Smirnov test rejects clearly ($p<0.001$) the equality of the effort distributions in the two treatments.
- Descriptives strongly suggests that there is a treatment effect.

Other tasks - descriptives

	Social Value Orientation (% of prosocial)	Risk tolerance (# of boxes)	Contribution in PGG (% of endowment)	Competitiveness (% of competitive)
Overall	58.9 (52.5 / 66)	45.9 (46.7 / 45)	27.6 (20.9 / 35)	48.2 (54.2 / 41.5)
Egalitarian	58.9 (45.5 / 67.6)	46.9 (45.9 / 47.5)	35.2 (24.6 / 42)	44.6 (50 / 41.2)
Inverse proportional	58.9 (56.8 / 63.2)	44.9 (47.2 / 40.5)	20 (18.7 / 22.4)	51.8 (56.8 / 42.1)

Performance in the other tasks. In brackets the first number corresponds to males and the second to females.

- The behavior that we observe in these games and tasks is in line with what has been found in the literature for Social Value Orientation and risk tolerance.
- Contribution in PGG is too low (usually 40-60 %). Declining pattern in coopetition may have effect. Effect is clearly different across treatments.
- There is some difference across treatments in competitiveness.

Correlations

Variables	Average Effort	Treatment (=1 if inverse prop.)	Prosocial (SVO)	Risk tolerance (BRET)	Contribution (PGG)	Competitiveness (=1 if competitive)
Average Effort	1.000					
Treatment (=1 if inverse prop.)	-0.562*** (0.000)	1.000				
Prosocial (SVO)	-0.065 (0.493)	0.018 (0.852)	1.000			
Risk tolerance (BRET)	0.096* (0.315)	-0.065 (0.497)	0.016 (0.864)	1.000		
Contribution (PGG)	0.404*** (0.000)	-0.318*** (0.001)	-0.149 (0.117)	0.169* (0.074)	1.000	
Competitiveness (=1 if competitive)	-0.077 (0.418)	0.071 (0.454)	-0.019 (0.846)	0.271** (0.004)	0.112 (0.240)	1.000
Observations	112	112	112	112	112	

P-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Pairwise correlations between behavior in the group contest and the subsequent games.

Correlations

- This correlation analysis gives some support to Hypothesis 1, 3 and 4.
  - There seems to be a treatment effect.
  - More risk averse subjects contribute less in coopetition.
  - Contribution in the public goods game is positively correlated with contribution in the group contest.
- However, behavior in the Social Value Orientation and competitiveness measured á la Niederle-Vesterlund do not seem to be associated with behavior in the group contest.

Regressions - Random effect panel models, Dep. var.: Effort, linear

	est1	est2	est3	est4	est5	est6	est7	est8
Treatment (Inverse vs. egalit.)	-207.470***	-174.360***	-115.141***	-45.286	-113.833***	-109.147***	-103.638***	-51.748
	(29.096)	(29.998)	(30.357)	(101.882)	(31.686)	(30.995)	(30.481)	(109.019)
Prosocial(SVO)		-7.978	-3.751	19.190	0.348	-5.331	-12.736	15.118
		(28.583)	(27.089)	(39.255)	(29.467)	(27.502)	(28.328)	(47.553)
Risk pref.s (Bomb task)		0.556	0.805	2.508*	1.061	0.754	0.505	1.904
		(0.979)	(0.927)	(1.407)	(0.954)	(0.937)	(0.947)	(1.582)
Contribution (PGG)		0.195***	0.182***	0.204***	0.161**	0.180***	0.174***	0.190**
		(0.064)	(0.061)	(0.072)	(0.064)	(0.062)	(0.064)	(0.083)
Competitiveness (Niederle et. al. 2007)		-31.252	-30.550	-92.325**	-8.735	-26.776	-34.127	-56.054
		(29.623)	(28.020)	(41.599)	(30.328)	(28.516)	(28.798)	(46.615)
Period			-4.005***	-4.736***	-3.990***	-4.009***	-3.991***	-4.725***
			(0.729)	(0.985)	(0.729)	(0.729)	(0.728)	(0.984)
Group's tot. effor (t-1)			0.046***	0.046***	0.046***	0.046***	0.045***	0.044***
			(0.010)	(0.012)	(0.010)	(0.010)	(0.010)	(0.013)
Rival's group tot. effor (t-1)			0.038***	0.034***	0.039***	0.038***	0.040***	0.037***
			(0.010)	(0.012)	(0.010)	(0.010)	(0.010)	(0.013)
Socio.demogr.s (9 var.s)	NO	NO	NO	NO	YES	NO	NO	YES
Cogn. ability (3 var.s)	NO	NO	NO	NO	NO	YES	NO	YES
Personality charact.s (7 var.s)	NO	NO	NO	NO	NO	NO	YES	YES
Constant	332.305***	255.457***	182.981***	125.841*	-166.340	138.749*	522.524**	312.247
	(20.574)	(52.736)	(54.789)	(76.141)	(436.257)	(79.504)	(214.301)	(581.125)
Observations	2240	2240	2128	2128	2128	2128	2128	2128

Standard errors in parentheses.Rnd Eff. Panel Linear Model. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Socio-demographics: Female, Age, Body Mass Index, Academ. degree, 2-4DR(left hand), Num. siblings, Breadwinner, Breadwin.'s employm., Work (hrs/week).

Cognitive ability: Reflective, (Ir)reflecitve, number of languages

Personality characteristics:Agreeableness, Conscientiousness, Extraversion, Neuroticism, Openness, Happiness (degree), Self esteem

Regressions - Random effect panel models, Dep. var.: Effort, linear

- We omitted interaction terms from the previous table. Generally they are not significant.
- The regression confirms the treatment effect (except specification 4 and 8, the ones with the interaction terms).
- Social Value Orientation has no predictive power.
- Risk attitudes have a consistently positive effect (more risk tolerance, higher effort), but is significant only in one specification.
- Contribution in PGG has a consistently strong and significant effect. Higher contributions in PGG go hand in hand with higher effort made in coopetition.
- Competitiveness is consistently negative, but only significant in one specification.

Regressions - Random effect panel models, Dep. var.: Effort, linear

- Period reflects the observed declining pattern.
- Own group's and rival group's total effort in the previous period has a positive and significant effect on effort. The magnitude of the effect is about the same.
- We really control for a lot of variables. None of them is significant in any specification at 5%.
- Same story with tobit specification.

Egalitarian treatment - Random effect panel models, Dep. var.: Effort, linear

	est1	est2	est3	est4	est5	est6
Prosocial(SVO)	14.538	18.886	21.142	1.064	6.994	-22.301
	(53.250)	(52.039)	(56.693)	(54.433)	(54.024)	(70.179)
Risk pref.s (Bomb task)	2.272	2.513	3.641*	2.658	1.474	1.874
	(1.912)	(1.866)	(1.886)	(1.910)	(1.934)	(2.222)
Contribution (PGG)	0.214**	0.203**	0.130	0.208**	0.206*	0.180
	(0.098)	(0.096)	(0.104)	(0.098)	(0.105)	(0.122)
Competitiveness (Niederle et. al. 2007)	-90.686	-92.320*	-42.011	-83.069	-83.490	-49.753
	(56.533)	(55.162)	(57.168)	(55.848)	(58.801)	(65.763)
Period		-4.737***	-4.734***	-4.737***	-4.728***	-4.723***
		(1.201)	(1.200)	(1.201)	(1.199)	(1.198)
Group's tot. effor (t-1)		0.045***	0.044***	0.045***	0.043***	0.041***
		(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Rival's group tot. effor (t-1)		0.035**	0.036**	0.035**	0.038**	0.039**
		(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Socio.demogr.s (9 var.s)	NO	NO	YES	NO	NO	YES
Cogn. ability (3 var.s)	NO	NO	NO	YES	NO	YES
Personality charact.s (7 var.s)	NO	NO	NO	NO	YES	YES
Constant	183.955*	126.035	-512.636	66.296	767.594*	819.887
	(97.639)	(100.110)	(814.750)	(141.081)	(413.176)	(1255.076)
Observations	1120	1064	1064	1064	1064	1064

Standard errors in parentheses.Rnd Eff. Panel Linear Model. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Egalitarian - Random effect panel models, Dep. var.: Effort, linear

- SVO seems to be very noisy, sign also changes.
- Risk tolerance: consistently positive (as hypothesized) and marginally significant in a specification.
- Contribution in PGG has consistently the expected effect, but is not always significant.
- Competitiveness is consistently negative and once significant. More competitive individuals á la Niederle-Vesterlund seem to be competitive within the group and not on the between-group level.
- Period, group's / rival's total effort has the same effect (even in magnitude) as before.
- Tobit model tells the same story, though there the effect of contribution in PGG is always significant.

Inverse proportional treatment - Random effect panel models, Dep. var.: Effort, linear

	est1	est2	est3	est4	est5	est6
Prosocial(SVO)	-6.262	0.263	-4.784	2.640	-5.371	-6.752
	(24.061)	(19.804)	(21.052)	(21.104)	(24.030)	(29.834)
Risk pref.s (Bomb task)	-0.623	-0.310	-0.070	-0.393	0.115	0.239
	(0.781)	(0.642)	(0.672)	(0.682)	(0.734)	(0.811)
Contribution (PGG)	0.168**	0.150***	0.210***	0.156***	0.137**	0.166**
	(0.070)	(0.057)	(0.066)	(0.060)	(0.064)	(0.083)
Competitiveness (Niederle et. al. 2007)	14.812	17.208	-6.470	19.604	29.428	8.763
	(23.542)	(19.311)	(21.626)	(20.391)	(22.383)	(27.011)
Period		-2.731***	-2.772***	-2.761***	-2.878***	-2.873***
		(0.829)	(0.831)	(0.830)	(0.831)	(0.834)
Group's tot. effor (t-1)		0.055***	0.054***	0.054***	0.050***	0.050***
		(0.013)	(0.013)	(0.013)	(0.014)	(0.014)
Rival's group tot. effor (t-1)		0.053***	0.052***	0.053***	0.052***	0.052***
		(0.013)	(0.013)	(0.013)	(0.013)	(0.014)
Socio.demogr.s (9 var.s)	NO	NO	YES	NO	NO	YES
Cogn. ability (3 var.s)	NO	NO	NO	YES	NO	YES
Personality charact.s (7 var.s)	NO	NO	NO	NO	YES	YES
Constant	114.791***	71.792**	-314.673	68.252	-7.698	-390.727
	(37.604)	(35.592)	(329.742)	(58.003)	(170.420)	(454.581)
Observations	1120	1064	1064	1064	1064	1064

Standard errors in parentheses.Rnd Eff. Panel Linear Model. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Inverse proportional - Random effect panel models, Dep. var.: Effort, linear

- No consistent effect of SVO and risk tolerance.
- Contribution in PGG has consistently positive and significant effect.
- Interestingly, competitiveness is almost always positive (but never significant), the opposite of what we saw in the egalitarian treatment. More competitive individuals á la Niederle-Vesterlund seem to contribute more. Competitiveness between groups seems to be more important here.
- Period, group's / rival's total effort has the same effect (even in magnitude) as before.

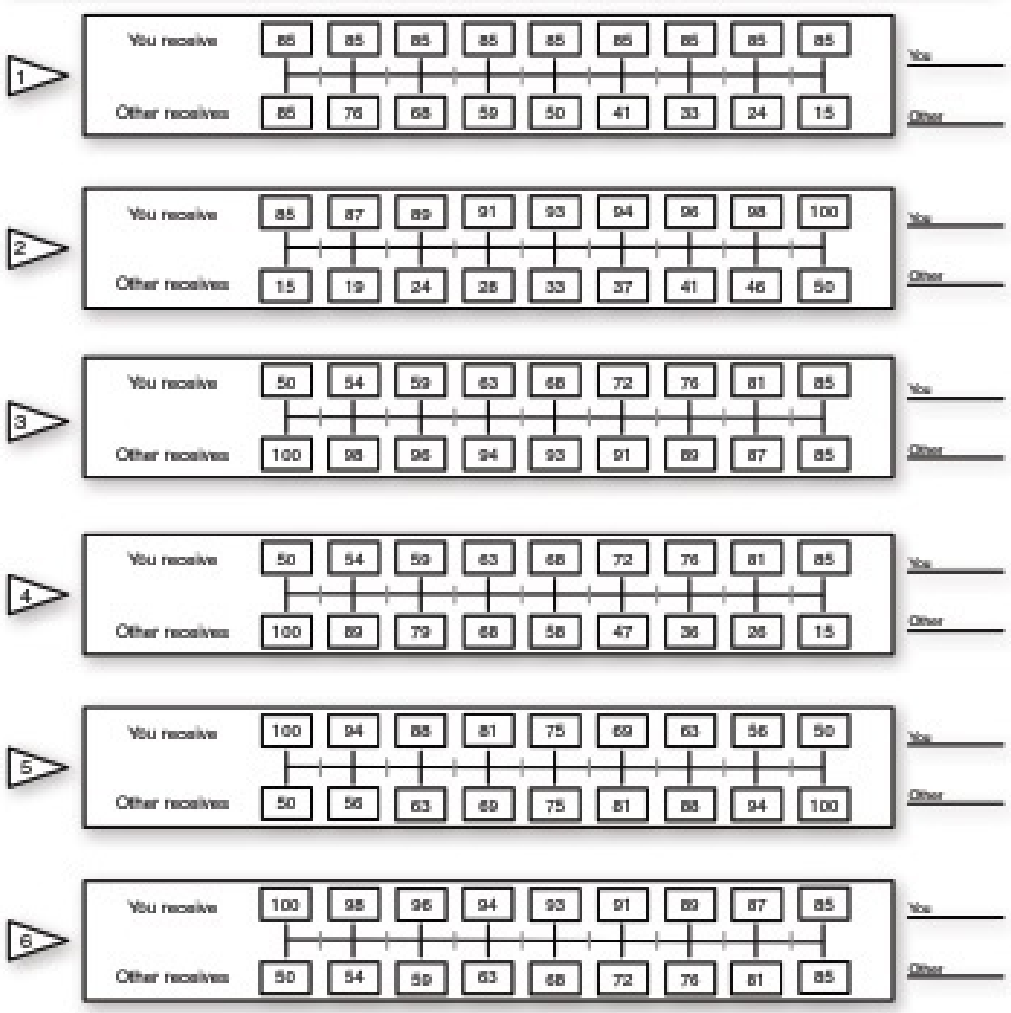
Conclusions

- We propose a model of coopetition based on group contest. Idea: resource constraint implies trade-off between cooperation and competition. We vary the harshness of the trade-off (egalitarian vs. inverse proportional sharing).
- We provide predictions and test them in the lab.
- We find a strong (?) treatment effect.
- Cooperativeness (measured as contribution in PGG) is strongly correlated with behavior in the group contest, but social value orientation, risk aversion and competitiveness á la Niederle-Vestrelund do not have predictive power.

Gracias por vuestra atención!

Social Value Orientation

back



Bomb risk elicitation task

back

- En un almacén hay 100 cajas numeradas del 1 al 100. En una de estas cajas se esconde una bomba. En las 99 cajas restantes hay dinero (cada una de estas cajas contiene). En principio, no sabes dónde está la bomba, pero sabes que puede estar en cualquier lugar con la misma probabilidad.
- Tu tarea en esta fase consiste en elegir cuántas cajas quieres sacar del almacén. Las cajas están numeradas y serán recogidas en orden numérico (empezando por la caja número 1). Así, si quieres recoger 20 cajas, se recogerán todas las cajas numeradas del 1 al 20. Si decides recoger 57 cajas, se recogerán todas las cajas del 1 al 57.
- Al finalizar esta fase el ordenador elegirá un número al azar para determinar en qué caja está colocada la bomba. Si la bomba está entre las cajas que has sacado del almacén, entonces no ganarás nada en esta fase del experimento. Si, por el contrario, la bomba no está entre las cajas que has sacado del almacén, entonces podrás abrir estas cajas, recibiendo 0.10 Euros por cada una de ellas.

Slider task

back