Courant Research Centre

'Poverty, Equity and Growth in Developing and Transition Countries: Statistical Methods and Empirical Analysis'

Georg-August-Universität Göttingen
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Discussion Papers

No. 135

Conditional cooperation among the poor: a new profile?

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February 2013

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Conditional cooperation among the poor: a new profile?

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February 12, 2013

Abstract

On the basis of a conditional contribution experiment conducted in Benin and Uganda, we argue that a conditional u-shaped profile exists, at least in poor communities. Under this profile, individuals invest considerably in public goods when nobody else does, reduce their commitment in reaction to positive group participation and turn into conditional cooperators after a threshold of others' participation is reached. For the understanding of the dynamics of repeated cooperation the implications of this group of u-shaped cooperators might be important.

Keywords: *Conditional cooperation, Public goods, Experiments, sub-Saharan Africa*

1 Introduction

Public-good experiments in both developed and developing countries have shown a large amount of cooperation (Andreoni, 1995; List, 2004; Carpenter et al.,2004; Gachter et al., 2004) even though standard economic theory would have predicted free-riding behavior. A common explanation for this deviation from rationality is the presence of conditional cooperators (Keser and Winden, 2000; Brandts and Schram, 2001) who align their contributions with the contributions of others.

The inability to distinguish between *pessimistic* conditional cooperators with low expectations about others' contribution (Kocher et al., 2008) and pure free-riders in traditional public-good games has motivated the development of a refined elicitation method, the strategy vector method (Fischbacher et al., 2001; Fischbacher and Gaechter, 2010), which maps individual contributions conditional on others' contributions. Conducted at the University of Zurich, the initial application of this method resulted in approximately half of the participants behaving as weak conditional cooperators, not matching completely others' contributions, i.e. their response function had an angle of less than 45 degrees. Around 30% of the participants were free-riders while the remaining participants were split between a "*hump-shaped*" profile (14%) and other (7%), mixed, profiles. The hump-shaped profile displays an internal threshold: contributions positively follow others' contributions up to a certain level beyond which contribution levels steadily decrease.

Recognizing the importance of these results for the understanding of collaboration in repeated interactions, several recent papers have replicated the original experiment in other socio-economic contexts with slight variations in the marginal per capita return (MPCR) and group size: Fischbacher et al. (2001) and Fischbacher and Gaechter (2006) in Switzerland (group of 4 people, MPCR of 0.4), Herrmann and Thoeni (2009) in Russia (group of 4 people, MPCR of 0.3), Kocher et al. (2008) in the US, Austria and Japan (group of 3 people, MPCR of 0.6) and Rustagi et al. (2010) in Ethiopia (group of 2 people, MPCR of 0.75).

While each replication of the strategy vector model yielded a specific distribution of the four types originally defined by Fischbacher et al. (2001), all studies maintained those four profiles for the sake of comparison, with the consequence of a varying, and in many cases large, "Others" group (see Table 1). We conducted conditional cooperation experiments in rural Benin and in urban Uganda. We contend that - at least in our sample in these two developing countries - there exists a significant but previously unidentified profile: an "inverse hump-shape" to borrow from Fischbacher et al. (2001) which we name hereafter the "u-shape" profile. Under this profile, participants start with high contributions when they know that others' participation is close to zero. They

Table 1: Distribution of contribution profiles in the literature

Experiments	Free-riders	Conditional cooperators	Hump shape	Others
Fischbacher et al. (2001)	30%	50%	14%	**7%**
Fischbacher and Gaechter (2006)	22.9%	55%	12.1%	**10%**
Hermann and Thoeni (2009)	6.3%	55.6%	7.5%	**30.6%**
Kocher et al. (2008)	8.3%(US)	80.6%(US)	0%(US)	**11.1%(US)**
	22.2%(A)	44.4%(A)	11.1%(A)	**22.2%(A)**
	36.1%(J)	41.7%(J)	11.1%(J)	**11.1%(J)**
Rustagi et al. (2010)	11.5%	45.6%	3%	**37.7%**

decrease their contribution until a threshold of others' contribution is reached, beyond which they behave as (weak) conditional cooperators. Due to its backstop nature, the implications of this profile may prove important for the understanding of repeated cooperation - at least among poor communities. This "new" profile emphasizes the influence of economic variations and social norms in shaping the form and distribution of conditional contribution profiles. Moreover, this profile might also be present in the "Others" category of previous replications of Fischbacher et al. (2001), which may justify a re-examination of the existing classification of contribution profiles.

The paper is structured as follows. In Section 2 we describe our experimental design as well as the data. Section 3 discusses the results and Section 4 concludes and gives an outlook for further research.

2 Experimental design and data

Our experimental design borrows heavily from the linear public-good game of Ledyard (1995)

$$E - c_i + \frac{1.5}{5}\left(\sum_{j=1}^{5} c_j\right) \tag{1}$$

where c_i denotes individual's i contribution to the public good and E is the initial endowment of each individual. We chose groups of five people and a MPCR of 0.3 to maintain a collective incentive close to Fischbacher et al. (2001). First, each individual had to privately indicate his or her contribution level c_i dependent on others' hypothetical average contribution levels c_j. The conditional contribution games were followed by a one-time unconditional public-good game, i.e. participants had no information about others' contribution levels, involving 5 players and real pay-offs. Both, the con-

ditional and unconditional contributions of each participant remained unknown to the group and were recorded individually and privately, ensuring that reputation concerns are not contaminating the results. Moreover, experiments were preceded by an extensive explanation and an initial game with mock money to ensure proper understanding. After the mock experiment, the interviewers ensured that each participants understood the dynamics behind group cooperation (including individual and group pay-offs and the concept of free-riding). If not, they re-explained the game and played another mock game. The experiments were administered by locals who spoke the native language.

Our experiments are a slight modification of the original strategy vector method to account for observed experimental fatigue of poor populations when participating in the linear conditional public-good games. Instead of collecting conditional responses from participants for 20 points of others' average contribution levels as in most of the existing literature, we limited conditional responses to three (Benin) and four (Uganda) points across the group's possible contribution distribution, including both no and full contribution of others. This approach allows us to map all known cooperation profiles (see Section 3 and Annex 2) while limiting the cognitive fatigue induced by repeating long sequences of almost similar questions.

In Benin, the experiments were conducted in 12 randomly selected villages of the central region of Collines. In each village, 10 individuals were randomly selected (based on complete household listings) and grouped randomly into groups of five (for a total of 120 individuals and 24 groups, or three times the size of the Fischbacher et. al (2001) sample). Participants first had to play the conditional game individually, followed by a non-strategic game within a group of five. The endowment was set at 500 FCFA (about 1 Euro), which is equivalent to the daily (un-skilled) labor rate in rural Benin. Responses for conditional cooperation were reported for no contribution of others (0 FCFA), a median contribution of others (250 FCFA) and full contribution of others (500 FCFA). In Uganda we randomly selected 6 slums out of 300 documented slums of the capital Kampala. In each slum, 4 groups of 5 randomly selected individuals (based on geographic household sampling) were created. In total, 120 individuals were involved in the experiments. Players were endowed with 3,000 UgSh (about 1 Euro), with the group's average contribution fixed at 0, 1000, 2000 and 3000 UgSh.

Benin and Uganda belong to the group of least developed countries, with a GDP per capita of US$ (PPP) 1500 in Benin and US$ (PPP) 1200 in Uganda (WDR, 2011). Given that we sampled from rural villages in Benin and slums in Uganda, these GDP figures certainly represent an upper bound of the per capita income of the populations studied. Most of the individuals participating in the experiments were men (79% for Uganda vs. 64% for Benin), with an average age of 33 years for Uganda and 44 years

for Benin. As expected, the population from the slums of the capital of Uganda were more educated, with 20% of the sample having secondary education, in comparison to only 2% of the sample in rural Benin.

3 Results

Table 2: Distribution of contribution profiles for Benin and Uganda

	Benin (N=120)	Uganda (N=120)	
	Distribution	Distribution (three points)	Distribution (four points)
Free-riders	0%	0%	0%
Altruists	5%	23%	25%
Conditional cooperators	61%	33%.	31%
Hump-shape contributors	6%	8%	9%
U-shape contributors	**22%**	**29%**	**32%**
Others	6%	7%	3%

Considering that the conditional response function of individuals was mapped on a restricted domain, we are unable to elicit the different profiles using the Spearman rank correlation. Instead, profiles were elicited by an inspection of the conditional contribution levels at each point of others' contribution. The altruistic profile had a flat sequence (no increase or decrease from the initial value) and strictly positive amounts.[1] Free-riders had also a flat sequence but a zero or very limited contribution (less than 5% of the entire endowment). Hump-shaped contributors had a sequence of one increase in contribution (from the first point to the second), followed by a decrease in contribution (from the second to the third). (Weak) conditional cooperators have no decreasing amounts between points and at least one strict increase. Finally, the u-shape, being the opposite of the hump shape, sees an initial contribution reduction followed by conditional cooperation. Annex 1 shows the conditional contribution profiles of all players of the Benin sample (the Ugandan sample can be obtained from the authors upon request).

Table 2 shows that the detected profiles and their shares within the population are quite similar for rural Benin and urban Kampala. We observe (i) the existence of the same types of profiles, (ii) the absence of free-riders in both cases, but instead (iii) the existence of a considerable share of altruists. At this stage of research, we hypothesize that contribution profiles being collected by local interviewers and not through the anonymity of computers could have prevented free-riding behavior and increased the

[1] We decided on a value of 5% of the total endowment to separate free-riders from altruistic profiles.

share of altruists (Haley and Fessler, 2005). Eliciting social preferences of poor population groups with limited education, this limitation is, however, not avoidable (see also Rustagi et al., 2010).

Most importantly, we find a comparable share of u-shaped profiles, representing about a fourth of all participants in the two countries. For Uganda, this result is robust to the specification of the profile identification (three versus four points). At least for the developing countries we analyzed, this "new" cooperation profile is too well-defined and too large to remain in an "Others" group. Considering the limited number of experiments of this nature in developing countries - the exception being Rustagi et al. (2010) - and the known differences in preferences between industrialized and developing countries (Barr and Genicot, 2008, Greig and Bohnet, 2009, Ligon and Schechter, 2012), this result indicates that cooperation profiles should not be limited to a profile typology identified among highly educated and well-off populations. Moreover, it might be possible that this profile is also present in the "Others" category of previous replications of Fischbacher et al. (2001) considering its significant share in the total sample of other studies: on average 15% in Kocher et al. (2008), 30.6% in Herrmann and Thoeni (2009), and 37.7% in Rustagi et al. (2010). Only Fischbacher et al. (2001) have a small "Others" group (7%), which explains why the composition of this group was historically neglected.

We are aware that we do not study the same number of conditional contribution points as existing literature. We are, however, confident that our "simplified" approach does not miss or inaccurately depict conditional profiles. Past experiments have shown that individuals are not erratic in their conditional contribution decisions and tend to contribute along a limited number of simple structures of cooperation (free-riding, altruism, (weak) conditional cooperation, and hump-shape) that rule out purely random decisions - except for a very limited number of participants. Against this background a three (or four)-point observation method (with zero, median and full contributions of others) can perfectly depict the same tendencies. We simply loose the notion of weak/strong cooperation from the Spearman rank correlation.

In fact, our methodology would only lead to divergent (and potential false) profiles if randomness (or noise) is highly prevalent giving too much weight to outliers within a three-point detection method. We reject this assumption on three counts. First, the share of u-shaped profiles in both samples would imply a very large share of random contributors (since only certain outliers would be identified as u-shaped profiles), which is very unlikely. Second, in Annex 2 we test our detection methodology on the observed conditional contributions of Fischbacher et al. (2001). We find an almost identical categorization of profiles. For the 44 individual profiles analyzed in Fischbacher

et al. (2001), we only find two contribution profiles that would have been classified differently if only three points would have been observed instead of 20 conditional contribution points (and applying the Spearman rank correlation). Third, if we assumed that randomness is a real observational issue, 20 points are also not enough to rule out erratic noise between points. Along this line, we also reject the idea that the number of measured points has an endogenous influence on conditional cooperation decisions. We therefore conclude that different profiles exist in different contexts, driven by social and economic idiosyncrasies, and detected by our samples of poor populations in the villages and slums of developing countries.

While understanding the motivations behind u-shaped cooperation is not the scope of this paper, we propose two possible explanations as venues for future research. First, some individuals may display a form of "warm-glow" that is exacerbated by being the sole or main contributor. Second, some individuals might (secretly) contribute when nobody else does as a statement of how the group should behave, as a lesson instrument for the community. Such a cooperation profile could be more prevalent in developing countries, where communities might need to develop such social norms to be able to provide public goods through private actions when weak governments fail to do so (Ostrom, 2000; Banerjee et al, 2007).

Apart from individual or social motivations behind this new profile, the simple existence of u-shaped cooperation could have important implications for our understanding of cooperation in repeated public-good games and/or situations. While theory posits the progressive decline of cooperation as a result of free-riders and weak conditional cooperators, the existence of a group of contributors of "last resort" (as well as the existence of pure altruists) may provide a backstop whereby contribution levels remain strictly positive even in dynamic cooperation. It is already clear from other unconditional public-good experiments in developing countries that cooperation is much more prevalent than in industrialized countries (Cardenas and Carpeter, 2008) and that social cooperation is the norm and not the exception (Greig and Bohnet, 2009), but more research is certainly needed here.

4 Conclusion

The results of our experiments clearly show the existence of a previously unobserved cooperation profile: the u-shape. Individuals invest considerably in public goods when nobody else does, reduce their commitment in reaction to positive group participation and turn into conditional cooperators after a threshold of others' participation is reached. While this profile might already have existed in the "Others" category of previous experiments, it is, to the best of our knowledge, the first time that it has been clearly

identified. Its important share in our sample may justify its inclusion in future studies of (conditional and unconditional) collective cooperation - at least among the poor and/or developing countries. At the very least, it calls for additional replications to assess if the profile is a specific behavior of very poor communities or something more prevalent across samples that calls for an expanded list of cooperation profiles. Moreover, considering that our results also differ significantly for other profiles, with a considerable share of altruists, a multiplication of the experiments initiated by Fischbacher et al. (2001) in various geographic, economic and framing contexts seems to be necessary to understand the (varying) nature of social cooperation.

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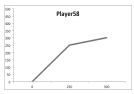
Annex 1: Detail of the profiles for the Benin sample (n=120)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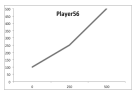
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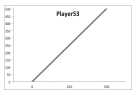
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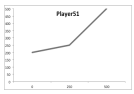
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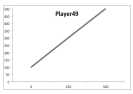
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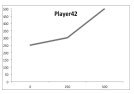
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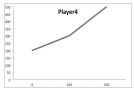
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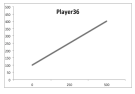
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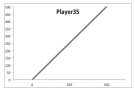
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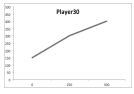
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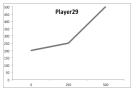
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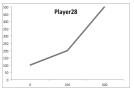
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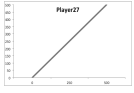
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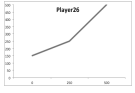
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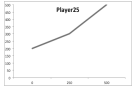
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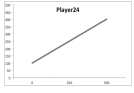
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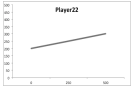
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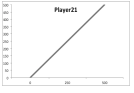
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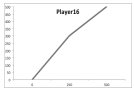
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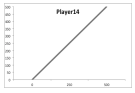
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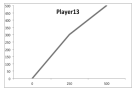
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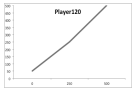
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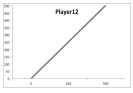
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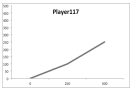
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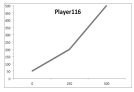
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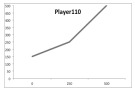
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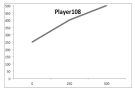
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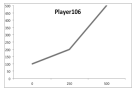
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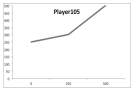
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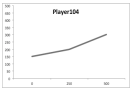
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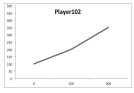
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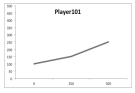
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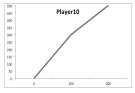
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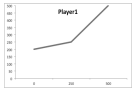
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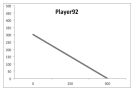
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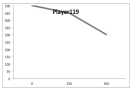
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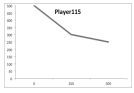
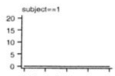
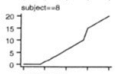
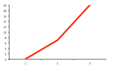
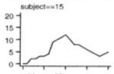
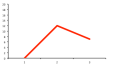
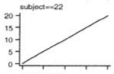
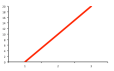
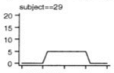
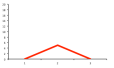
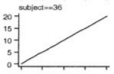
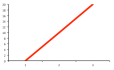
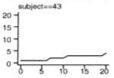
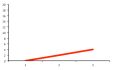
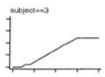
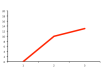
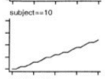
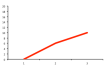
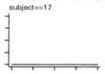
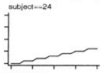
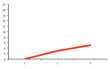
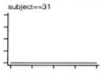
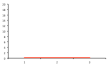
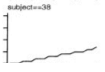
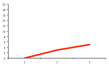
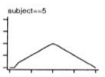
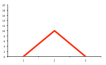
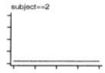
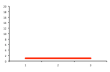
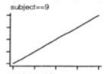
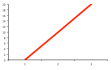
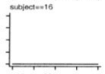
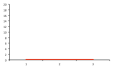
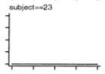
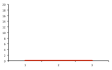
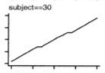
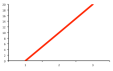
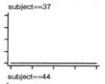
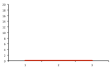

Player115

Annex 2: Comparison of profile identification from Fischbacher et al. (2001) using the three-point method

Fischbacher el al. (2001)		Gheyssens and Günther	
Display	Profile	Display	Profile
	Free-rider		Free-rider
	Conditional		Conditional
	Hump-shape		Hump-shape
	Conditional		Conditional
	Hump-shape		Hump-shape
	Conditional		Conditional
	Conditional		Conditional

Fischbacher el al. (2001)		Gheyssens and Günther	
Display	Profile	Display	Profile
	Conditional		Conditional
	Conditional		Conditional
	Free-rider		Free-rider
	Conditional		Conditional
	Free-rider		Free-rider
	Conditional		Conditional
	Hump-shape		Hump-shape

Fischbacher el al. (2001)		Gheyssens and Günther	
Display	Profile	Display	Profile
	Free-rider		Free-rider
	Conditional		Conditional
	Free-rider		Free-rider
	Free-rider		Free-rider
	Conditional		Conditional
	Free-rider		Free-rider
	Other		U-shape
	Conditional		Conditional
	Conditional		Conditional

Fischbacher el al. (2001)		Gheyssens and Günther	
Display	Profile	Display	Profile
	Free-rider		Free-rider
	Conditional		Conditional
	Conditional		Conditional
	Free-rider		Free-rider
	Conditional		Conditional
	Conditional		Conditional
	Hump-shape		Hump-shape
	Free-rider		Free-rider
	Hump-shape		Hump-shape

Fischbacher el al. (2001)		Gheyssens and Günther		Fischbacher el al. (2001)		Gheyssens and Günther	
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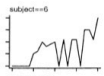
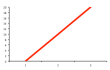
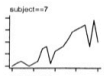
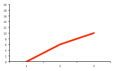
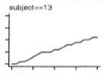
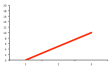
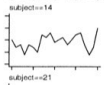
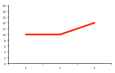
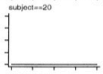
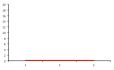
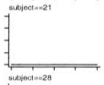
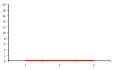
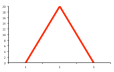
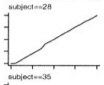
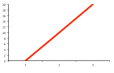
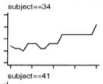
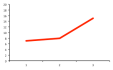
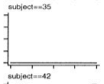
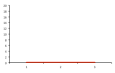
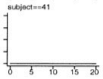
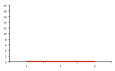
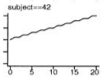
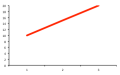
	Conditional		Conditional		Conditional		Conditional
	Conditional		Conditional		Other		Conditional
	Free-rider		Free-rider		Free-rider		Free-rider
	Hump-shape		Hump-shape		Conditional		Conditional
	Conditional		Conditional		Free-rider		Free-rider
	Free-rider		Free-rider		Conditional		Conditional