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« Do Malevolent Leaders Provoke Conflict? An Experiment on the Paradox of the Plenty »

Klarizze PUZON

Marc WILLINGER

DR n°2014-10

Unite de Formation et de Recherche d'Economie
Avenue Raymond DUGRAND C.S. 79606
3 4 9 6 0 MONTPELLIER Cedex 2

E-mail : lameta@lameta.univ-montp1.fr
web : www.lameta.univ-montp1.fr

Université Montpellier 1 · agro Montpellier Ecole Nationale Supérieure Agronomique · CNRS Centre National de la Recherche Scientifique · INRA

Do malevolent leaders provoke conflict? An experiment on the paradox of the plenty

Klarizze Puzon* and Marc Willinger†

September 7, 2014

Abstract

Using a laboratory experiment, we study the impact of a sudden increase in the common-pool size on within-group fighting, i.e. the paradox of the plenty. We also consider the role of leader behavior in avoiding this paradox. In the first stage, a randomly chosen leader of the group determines how much of the common-pool resource to protect from second-stage conflict. In the next stage, each group member allocates his private endowment between working or fighting for a share of the unprotected resource. We consider two treatments: anarchy (consisting of the second stage only) and leadership. We find that the existence of institutions is not always better than anarchy. This is aggravated when resource size is higher. It is only when leaders are benevolent, i.e. they chose the strongest resource protection in the first stage, that group conflict (income) is reduced (goes up). When leaders are malevolent, i.e. they chose weak resource protection, outcomes are worse than those under anarchy.

Keywords: paradox of the plenty, conflict, leadership, natural resources, laboratory experiments, contests.

JEL Codes: C72, C91, D72, P48, Q33.

*LAMETA, Universite Montpellier I, Avenue Raymond Dugrand 34960 Montpellier, France. +33632695094. klarizze.puzon@feem.it

†LAMETA, Universite Montpellier I, Avenue Raymond Dugrand 34960 Montpellier, France. +33434432519. willinger@lameta.univ-montp1.fr

1 Introduction

Why are some resource-rich countries such as Norway and Botswana more successful, while others (e.g. Sierra Leone and Congo) perform badly? This "paradox of the plenty", i.e. the observation that countries who experience a sudden increase in natural resources tend to develop less, has been analyzed by Sachs and Warner (1995). Arguing that Sachs and Warner used endogenous measures of resource abundance, recent studies dispute the empirical credibility of this paradox (Brunnschweiler and Bulte, 2008). Brunnschweiler and Bulte found that subsoil resource wealth has a positive impact on development. Nonetheless, Poelhekke and van der Ploeg (2010) contradict these findings and argued that Brunnschweiler and Bulte's resource measure is endogenous. Furthermore, bad outcomes due to sudden resource abundance seems therefore conditional on institutional quality (Mehlum et al, 2006). Theoretical literature about the relation between resource abundance and institutional quality can be categorized as either based on centralized or decentralized mechanisms. The literature based on decentralized mechanisms predicts that resource abundance weakens property rights, and intensifies conflict incentives among private agents (Wick and Bulte, 2006). Meanwhile, centralized mechanisms focus on the inefficient allocation decisions by the ruling elite, e.g. using natural resource wealth for wasteful investment like bribes (Robinson et al., 2006). Caselli and Cunnigham (2009) even argued that the existence of the paradox depends on leader behavior, e.g. if he is lazy, then he allocates less on productive activities.

Using a laboratory experiment, our main objective is to study the paradox of the plenty from a behavioral perspective. The advantage of experiments compared to other types of empirical studies, is that experiments allow to isolate the role of a single variable of institution, all other things equal. This removes the issue of endogeneity discussed in the econometric studies above. Empirical findings based on non-experimental data are also often difficult to interpret as observed variability is attributable to many causes. For instance with respect to the paradox of the plenty, unobservable historical dimensions of different countries are not controlled and endogeneity problems may arise. Furthermore, extreme environments in which the paradox of the plenty fades away or is amplified may be difficult to observe in real-world settings. Experimental methodology can be a complementary tool that provides additional insights into the relation between the resource abundance and institutional design.

In our experiment, therefore, we investigate the following questions: Does sudden resource abundance intensify conflict? If so, does the existence of a institutional leadership always lead to better group outcomes? Or, is the efficiency of institutions dependent on leader behavior? We use a modified two-stage version of Hodler's (2006) and Wick and Bulte's (2006) conflict models. The first (second) stage reflects centralized (decentralized) mechanisms of the "paradox of the plenty". In the first stage, a randomly chosen leader of the group determines how much of the resource to protect from second-stage conflict. In the next stage, each group member decides to allocate his private endowment, e.g. time, between working or fighting for a share of the unprotected resource. Because institutional protection is costless and does not benefit leaders, theoretical predictions indicate that he should choose the strongest protection. Consequently, this reduces incentives to fight for the resource.

We considered two treatments. Specifically, we compare a situation where no institution regulates the potential protection of the resource (call it "anarchy") to a situation where a member of the group decides unilaterally about the level of protection. In line with Caselli and Cunningham (2009), we categorize leader behavior depending on the level of protection that he choses. The leader can set either three levels of resource protection: none, weak, and strong. We qualify these choices respectively as "anti-social", "malevolent", and "benevolent". We found that "anti-social" and "malevolent" leadership does not differ from anarchy. It is only when the leader is "benevolent" that within-group conflict is significantly reduced.

Several researchers have conducted experiments on conflict that are related to ours. In Durham et al. (1998), subjects are paired and choose the allocation of their endowment between production and predatory appropriation. Productive investment determines total income and appropriative investment determines how this total income is distributed. They noted that players tend to allocate a positive amount towards appropriation. Another related study is that of Duffy and Kim (2005) which introduced a government agent that selecst how much producers have to spend in protecting their resources. The decision on how much to allocate on defense is taken away from players. Players then have to choose whether they want to be either producers (and spend the government-imposed level of defense) or predators, but not both. It was observed that the existence of a government provides incentive to produce. While Durham et al. (1998) and Duffy and Kim (2005) both investigate the existence of anarchy in a laboratory setting, their models are different from ours. In our model, gains from private production are kept by players, i.e. it is not contested. What they fight for is an external prize, e.g. common-pool resource. Unlike Duffy and Kim (2005), our model also provides a more comprehensive link between leader behavior and conflict outcomes. Only the amount of protected resource is set by the leader. Furthermore, there are no restrictions as to how much group members invest in fighting. This strategy allows us to compare the efficiency of leadership compared to anarchy. Finally, as this experiment provides a complementary investigation on the paradox of the plenty, we also contribute to the empirical literature on stake size and cooperation. Except for Puzon and Willinger (2014) who focused on the role of voting rights in rent-seeking games, almost all studies found that stake size does not affect group behavior in distribution (Carpenter et al., 2005) and social dilemma games (Kocher et. al., 2008). To date, however, no study has investigated the interaction between stake size and leadership in conflict games. In the end, we found that malevolent leadership fails to eliminate conflict especially when the resource at stake is high.

The remainder of this paper is structured as follows. In Section 2, we present a conflict game where resource size is endogenously chosen by the leader. Section 3 describes the experimental procedures. Section 4 discusses the results. Finally, Section 5 concludes.

2 Theoretical framework

We model a game of conflict a la Wick and Bulte (2006) and Holder (2006) between n symmetric, risk-neutral players. By including an institutional protection stage, we extend these contest models on the paradox of the plenty. Since the game takes place in two sequential stages, we solve it by backward induction. In the first stage, the leader of each group determines the fraction $\lambda = [0, 1]$ of resource protected from conflict. This fraction λ of the resource R is equally shared by the n members of the group. In the second stage, each member of the group fights over the remaining, unprotected resource

In the conflict stage, each player i has an endowment $E_i = W_i + F_i$ which he invests either to production W_i, or to fighting for a share of the resource F_i. The production technology is linear, i.e. each investment unit is multiplied by $\alpha > 0$. Player i's payoff from production, Π_{iF} , is computed as: $\Pi_{iW} = \alpha W_i + \lambda \frac{R}{n}$, $i = 1, ..., n$, $0 < \alpha < \infty$. Given other players' decisions, the expected payoff from fighting is given by: $\Pi_{iF} = p_i(1 - \lambda)R$ where p_i is a contest function determining the share of the unprotected resource that player i obtains. The contest function is formulated such that the player who invests relatively more efforts in fighting gets a larger share of the unprotected resource. If nobody invests in fighting, each one receives an equal share. This contest function is defined as:

$$p_i = \begin{cases} \frac{F_i}{\sum F_i}, & \sum F_i \neq 0, \\ \frac{1}{n}, & \sum F_i = 0 \end{cases}.$$

Each player i chooses F_i to maximize his total expected income, given F_{-i} the sum of the fighting efforts of the other players $-i$:

$$max_{F_i} \Pi_i = \Pi_{iW} + \Pi_{iF} = \alpha W_i + \lambda \frac{R}{n} + p_i(1-\lambda)R$$
$$= \alpha(E_i - F_i) + \lambda \frac{R}{n} + p_i(1-\lambda)R$$

Assuming that all players decide simultaneously, the symmetric Nash equilibrium level of allocation to fighting is: $F^N = (\frac{n-1}{An^2})(1-\lambda)R$. At the group level, fighting is $nF^N = (\frac{n-1}{An})(1-\lambda)R$. An increase in the resource, R, leads to more conflict. Nonetheless, this effect can be crowded-out by stronger protection λ. Under non-cooperative play, each player gets $\Pi^N = \alpha E + [1-(\frac{n-1}{n})(1-\lambda)]\frac{R}{n}$.

Prediction 1a: *Groups fight more when the size of resource R is high, or when the level of protection λ is weak.*

Prediction 1b: *The negative effect of a high resource R can be compensated by a stronger protection level λ.*

Proof: Derivative and cross-derivatives of F^N with respect to R and λ.

Before choosing investments to fighting, assume there is an additional stage where one member of the group (i.e. the leader) can endogenously determine the amount of resource to protect. This fraction of the resource is shared equally among all members of his group. The preferred level of resource protection λ maximizes:

$$max_{\lambda}\ \Pi^N = \alpha E + [1-(\frac{n-1}{n})(1-\lambda)]\frac{R}{n}$$

It is easy to see that income is maximized when $\lambda = 1$. If protection is feasible, then the Nash equilibrium group fighting coincides with the optimum (i.e. $nF = 0$). Players have no incentive to fight as the level of unprotected resource is negligible. Prediction 2 summarizes these findings.

Prediction 2: *If leaders can choose the level of resource protection λ, then they set the highest feasible level. Fighting incentives become negligible.*

Proof: Derivative of $\Pi^N$with respect to λ.

3 Procedures and predictions

The experiment was designed to investigate the interplay among leader behavior, resource abundance, and group conflict. Each session involved up to 18 subjects randomly assigned to groups of three. Subjects remained in the same group for the whole session. We considered two treatments: anarchy (no institutions) and leadership (e.g. with government). In the anarchy treatment (control), there is no possibility to protect the resource. In the leadership treatment, a fraction of the resource can be protected from conflict. Consistent with the environment of a "resource boom", the size of the common-pool was "low" at 100 points in the first sequence. In the second sequence, it is multipled by two ("high" at 200 points).

For the anarchy treatment, subjects' main task was to allocate their endowment between a private activity (Activity M) and a collective activity (Activity R). They were told that each token invested in Activity M was worth 5 points, while the number of points received from their investment in Activity R depended on the their own investment and the other members' investments. It was made clear that the fraction of the unprotected resource that a subject would receive was determined according to the following rule: "you investment in activity R over the total investment of your group in activity R". In each decision round, subjects disposed of an endowment of 20 tokens that they had to allocate between activity R and activity M.

For the leadership treatment, there was an additional stage. Before the investment task above, one randomly chosen group member determined how much of the points in the common account in activity R should be protected and shared by all members. Three different levels of protection were possible: $\lambda \in \{0, 0.3, 0.7\}$. The strongest level of protection considered is 70%. We chose the highest protection at less than 100% to reflect the fact that property rights are rarely perfect (Chichilnisky, 1994). Nevertheless, 70% protection is high enough to exhibit its disparities with weak protection (30%) and non-protection (0%). This also allows us to find a link between protection and fighting decisions, i.e. does conflict always decrease with institutional protection?

The following parameters were chosen for the experiment: $n = 3$,$R \in \{100, 200\}$, $\alpha = 5$, $E = 20$ and $\lambda \in \{0, 0.3, 0.7\}$. Based on the theoretical model, the predictions are shown below in Table 2. With these, leaders are expected to choose $\lambda = 0.7$. Consequently, this should lead to an aggregate investment of 4 (8) tokens to conflict when $R = 100(200)$.

INSERT TABLE 1 HERE.

Upon their arrival, subjects were told that the session consists of two sequences with 10 rounds each. They initially received written instructions and check-up questionnaires for the first sequence only[1]. However, the instructions mentioned that they would play a second sequence shortly after the first one, and that at the end of the experiment one of the two sequences would be randomly selected to be paid. Overall, the experimental design allows for both within-group analysis (resource size) and between-group analysis (institutions). With subjects earning approximately 23 euros, a total of four sessions were conducted at the LEEM- LAMETA (University of Montpellier, France). Table 1 summarizes the number of groups and subjects for each treatment.

INSERT TABLE 2 HERE.

4 Experimental results

This section presents the results of the experiment. The first part explores the impact of resource size on group conflict. The second part investigates the role of leader behavior on conflict outcomes.

4.1 Does resource abundance intensify conflict?

We first examine the existence of the paradox of the plenty. Does a sudden increase in the resource lead to more within-group conflict?

[1]These materials written in French can be found in the Appendix.

Result 1: On average, a higher level of resource increases within-group conflict.

Support 1: Table 3.

INSERT TABLE 3 HERE.

Table 3 compares the impact of resource size on aggregate fighting efforts. Sign-rank tests show that a higher resource level always significantly increase within-group conflict in both the anarchy (p-value of 0.003) and leadership (p-value of 0.004) treatments. Under anarchy, investment to fighting increases by 10 points of the 60-point group endowment. In the presence of leadership, there is an approximately 6-point increment. This results leads us to further explore Result 2.

Result 2: On the aggregate, fighting is less intense in groups with leaders than under anarchy.

Support 2: Tables 3 and 4.

INSERT TABLE 4 HERE.

Rank-sum tests in Table 3 indicate that groups under some form of leadership are, on the aggregate level, better-off than those who are not. Meanwhile, Table 4 presents panel regressions exploring the interaction between resource size and institutional type. When the resource is low, groups governed by leaders fight 6 points less than those under anarchy. Both the significant regression coefficients and Wald test (p-value of 0.00) provide support. This result is not surprising because there is a possibility to protect the resource in the leadership treatment. Only a fraction of the resource is fought for in the second stage. In contrast, under anarchy, there is no possibility of protection and all of the resource is always fought for. Nontheless, results are less clear-cut when the resource is high. While regressions indicate that there is also a 6-point differential between anarchy_high and leader_high, results for the Wald test show that the coefficients for these variables are not significantly different (p-value of 0.178). Because of this, when there is sudden abundance in the resource, we tentatively hypothesize that the existence of leadership might not always lead to better outcomes.

4.2 Is malevolent leadership worse than anarchy?

Findings in the previous section indicate that, regardless of the institutional type, resource abundance always leads to more within-group conflict. But, does the mere existence of institutions automatically imply better group outcomes, i.e. less intensity of group conflict? Or are results dependent on the quality of leadership? These are the questions we attempt to investigate in this section.

Figure 1 presents average group investment to fighting over time. Recall that the resource is low (high) for rounds 1-10 (11-20). Groups are categorized into three types according to the protection level chosen by the leader: anti-social (0% protection), malevolent (30% protection) and benevolent (70% protection). These are compared with those under anarchy and the Nash prediction. From a theoretical perspective, as they gain nothing from choosing 70% protection and doing so is costless, leaders are predicted to be benevolent. Nonetheless, on the average, this is not what is observed.

As can be seen, regardless of the resource size and leader behavior, groups tend to over-invest with respect to the prediction. This is also the case even if 70% protection is chosen. Another interesting observation is that leadership is only better than anarchy if it is benevolent. If the leader is either malevolent or anti-social, group conflict is similar to that when there is no protection under anarchy. While theory suggests that 30% protection should lead to less conflict than 0% protection, this is not what is observed. The graph implies that malevolent and anti-social leadership may sometimes be worse than anarchy, i.e. mean group investment to fighting is higher even if property rights are present. We further explore this finding in the statistical tests below.

INSERT FIGURE 1 HERE: Quality of leadership and group conflict.

Result 3: Malevolent leadership does not reduce conflict. Only benevolent leadership, i.e. $\lambda = 0.7$, leads to more efficient group outcomes. This is especially the case when the resource is high.

Support 3: Tables 5, 6, and 7.

INSERT TABLES 5, 6, AND 7 HERE.

With anarchy as the baseline, Table5 shows the impact of leader behavior on group fighting investment. When the resource is low and the highest protection level of 70% is chosen, groups fight 10 points less than when there is no opportunity to protect, i.e. no governance under the anarchy treatment. Even anti-social leadership, i.e. 0% protection is chosen, leads to less group fighting when the resource is low. What is interesting is that 0% protection is more effective than 30% protection when the resource is low, i.e. the variable for malevolent leadership is insignificant. Even if the 30% protection is chosen, within-group fighting does not decrease compared to anarchy. Results get worse when the resource is high. In particular, leadership institutions only become effective when it is benevolent. If leaders choose protection levels lower than 70%, conflict outcomes does not significantly differ from the anarchy treatment where 30 out of 60 group tokens are invested to fighting.

These aggregate results are supported by individual fighting data in Table 6. Fighting investments are analyzed by subject type (i.e. leader vs. non-leaders) and by resource size. With all individual observations in the anarchy treatment as baseline, we compare fighting investments in Stage 2 given the level of resource protection chosen by the leader in Stage 1. When the resource is high, only 70% protection leads to significantly lower fighting than anarchy. This is true for both leaders and non-leaders. In particular, individual investment to fighting goes from approximately 10 tokens under anarchy to merely 3 tokens when the leader is benevolent. Thus, these individual results may explain the aggregate ineffectiveness of lower protection in decreasing conflict when the resource is relatively abundant. Indeed, only the strongest feasible protection level is effective in decreasing incentives to fight. Meanwhile, when the resource level is low, the same observation applies for subjects assigned as leaders. Except when 70% protection is implemented, subject assigned as leaders invest 6 tokens regardless of the extent of protection. In contrast, non-leaders always fight significantly less. Even if the leader chose 0% protection, non-leaders invest relatively less in fighting (3 tokens) than subjects experiencing anarchy (6 tokens). Furthermore, when the resource is low, the discrepancies between non-leader and leader investments explain why conflict is more intense under malevolent than anti-social leadership. When 30% protection is chosen, leaders invest 7 tokens as opposed to non-leaders' average investment of 4 tokens. This difference is not observed for other protection levels. When 0% (70%) protection is selected, both subject types have fighting investments of 5 (3) tokens.

Finally, we complement these results for within-group conflict with data on income. Define $\Pi_{Total} = n\Pi$ as the group income. Our measure of relative inefficiency is denoted as $INEFF^{PREDICT} = \frac{\Pi^{70*}_{Total} - \Pi^{\lambda}_{Total}}{\Pi^{70*}_{Total}}$. Furthermore, we define Π^{70*}_{Total} as the socially efficient (Nash predicted) group income. This leads us to $\Pi^{70*}_{Total} = 380$ and $\Pi^{70*}_{Total} = 460$ if $R = 100$ and $R = 200$, respectively. Taking all of these into account, Table 7 presents the effect of leader behavior on the deviation from the predicted, efficient income level. Again with anarchy as baseline (19%), when the resource is low, benevolent leadership leads to just a 5-percent deviation from the efficient income level. Looking at the results for the anarchy treatment when the resource is high, deviation from the optimum income increases to 23%. Thus, under anarchy, a higher resource size leads to greater group inefficiency. In constrast, results indicate that benevolent leadership reduces the deviation from the optimum income is nearly zero when the resource is high. In contrast, when leadership is weak (i.e. either 0% or 30% is chosen), the deviation from the efficient group income is not significantly different from 23%.

5 Final remarks

We conducted a laboratory experiment investigating the existence of this so-called "paradox of the plenty" from a behavioral perspective. In the first stage, a randomly chosen member of the group (the "leader") determines how much of the resource to protect from conflict. In the next stage, each group member decides how to allocate his private endowment between working and fighting for appropriation of the unprotected resource. We observed that when the resource is high, benevolent leadership leads to the opposite result of the anarchy treatment, i.e. less intense group conflict. The paradox can thus be avoided if if the leader chose the highest resource protection level. However, the mere existence of institutions does not always reduce inefficiency as compared to anarchy. Institutional protection do not always reduce incentives to fight for the resource. If leader behavior is malevolent, i.e. he chose weak resource protection, group outcomes are worse than those under anarchy. Thus, our experiment provides strong complementary evidence to the argument of Caselli and Cunningham (2009). Leader behavior, indeed, has an integral role on the relationship among resource abundance and group outcomes. Finally, our laboratory experiment has potential extensions. For example, one may modify the second stage in such a way that the leader, depending on his choices in the second stage, gains an advantage in the second stage. Another possibility is exploring the role of leader behavior in conflict resolution, e.g. if they have monopoly over the resource, are leaders willing to provide transfers to avoid subsequent conflict with non-leaders? Finally, differences between earned versus randomly assigned leadership may also be considered (Kimbrough and Sheremeta, 2014). These are all parts of the authors' future research agenda.

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Tables

Table 1: Number of independent groups and subjects per treatment

Treatment	Anarchy (control)	Leader	Total
Groups	11	12	23
Subjects	33	36	69

Table 2: Theoretical predictions on group fighting efforts

λ, protection	None: $\lambda = 0$	Weak: $\lambda = 0.3$	Strong: $\lambda = 0.7$
R, resource size			
Low: $R = 100$	14	9	4
High: $R = 200$	27	19	8

Table 3: Mean impact of resource size and institutions on within-group conflict

Institutions	Anarchy (control)	Leader (treatment)	Rank-sum (p-value)
Resource size	(mean,sd)		(p-value)
Low	18.46	10.73	0.0011
	4.17	4.75	
High	29.48	16.02	0.003
	4.77	6.17	
Rounded-up mean difference	11	6	0.0267
# of groups	11	12	
Sign-rank (p-value)	0.003	0.004	

Table 4: Impact of resource size and institutions on within-group conflict

RE-GLS: Regression with robust s.e. clustered across groups

Dep var: Group fighting

	All		periods 10-11	
	Coef.	Std. Err.	Coef.	Std. Err.
anarchy_low (base)	18.463***	1.228	15.363***	1.341
anarchy_high	11.018***	1.685	9.727***	2.950
leader_low	-7.738***	1.822	-6.613***	2.561
leader_high	-2.446	2.136	3.803	3.976
R-sq	0.413		0.337	
obs	460		46	
grps	23		23	
rounds	20		2	
Wald test (p-value)				
anarchy_low= leader_low	0		0	
anarchy_high= leader_high	0		0.178	
anarchy_high= leader_low	0.004		0.153	
leader_low=leader_high	0.004		0.002	

***1%, **5%, *10% significance

Table 5: Impact of leader behavior on within-group conflict

RE-GLS: Regression with robust s.e. clustered across groups

Dep var: Group fighting

	Low		High	
	Coef.	Std. Err.	Coef.	Std. Err.
anarchy (base)	18.463***	1.233	29.481***	1.410
anti-social leader	-4.502**	1.953	-2.450	2.967
malevolent leader	-2.744	2.535	-3.980	3.063
benevolent leader	-10.954***	1.724	-18.345***	1.753
R-sq	0.309		0.606	
obs	230		230	
grps	23		23	
rounds	10		10	

***1%, **5%, *10% significance

Table 6: Impact of leader behavior on individual conflict investment by type

RE-GLS: Regression with robust s.e.

Dep var: Individual fighting

Low resource	Leaders only		Non-leaders only	
	Coef.	Std. Err.	Coef.	Std. Err.
anarchy (base, all)	6.154***	.247	6.154***	.247
anti-social leader	-1.190	.988	-1.350**	.682
malevolent leader	1.285	.894	-2.334***	.670
benevolent leader	-4.676***	.353	-3.147***	.427
R-sq	0.141		0.086	
obs	450		570	
High resource	Leaders only		Non-leaders only	
	Coef.	Std. Err.	Coef.	Std. Err.
anarchy (base, all)	9.827***	.235	9.827***	.234
anti-social leader	-.865	1.284	-.884	.926
malevolent leader	-1.243	1.494	-.702	.964
benevolent leader	-6.424***	.425	-6.028***	.347
R-sq	0.249		0.282	
obs	450		570	

***1%, **5%, *10% significance

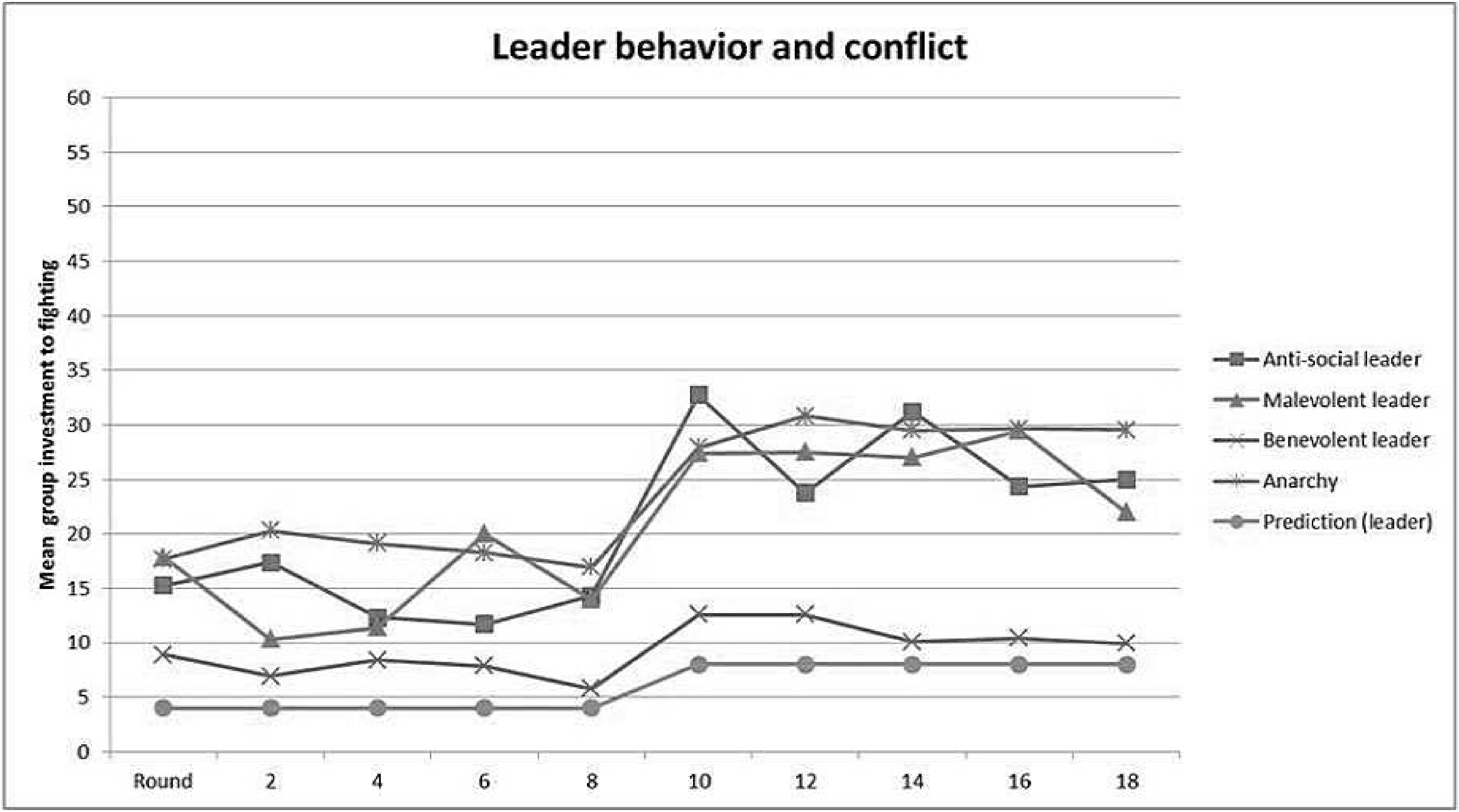
Table 7: Impact of leader behavior on income inefficiency

RE-GLS: Regression with robust s.e. clustered across groups

Dep var: Relative deviation from the efficient group income

	Low		High	
	Coef.	Std. Err.	Coef.	Std. Err.
anarchy (base)	0.190***	0.016	0.233***	0.015
anti-social leader	-0.059**	0.025	-0.026	0.032
malevolent leader	-0.0361	0.033	-0.043	0.033
benevolent leader	-0.144***	0.022	-0.199***	0.019
R-sq	0.309		0.606	
obs	230		230	
grps	23		23	
rounds	10		10	

***1%, **5%, *10% significance



Leader behavior and conflict
Mean group investment to fighting
60
55
50
45
40
35
30
25
20
15
10
5
0
Round
2
4
6
8
10
12
14
16
18
Anti-social leader
Malevolent leader
Benevolent leader
Anarchy
Prediction (leader)

Documents de Recherche parus en 2014

Contact :

Stéphane MUSSARD : mussard@lameta.univ-montp1.fr