

Determinants of anti-social punishment: An experimental study of Kavango timber users

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Abstract: The forest savannah of the Kavango Region in the North-East of Namibia is one of the few remaining resources of wood for a country that is threatened by deforestation. We used a standard public goods experiment framed as a task to extract timber from a commonly owned forest with the possibility to punish each other to analyse determinants of antisocial punishment (i.e. the sanctioning of people who cooperate). Especially, the result of Herrmann et al. (2008) suggests that cross-cultural differences exist and that the efficiency of the punishment rule depends on strong social norms of cooperation. First results suggest that antisocial punishment (ASP) occurred in Kavango as well. We highlight the role of revenge (and to lesser degree of dominance) for ASP and combine our finding with ethnographic evidence on envy and spite in the society.

Key words: Public goods; Southern Africa; Antisocial punishment; revenge; dominance; Natural resource protection strategies.

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Introduction

Widely accepted research has highlighted the importance of pro-social punishment (PSP) to sustain beneficial norms of cooperation among unrelated individuals even in one-shot interactions (Fehr & Gächter 2000). Pro-social or altruistic punishment is defined as the act of incurring personal costs in order to punish a norm violator without obtaining any personal benefits. In repeated games personal benefit may arise from punishing since it might constrain selfish behaviour of others and lead to greater group efficiency and higher earnings of the co-operators. Thus, when people are asked to choose among a laboratory ‘world’ with or without punishment people select into the one with punishment (Ostrom, et al. 1992; Rockenbach & Milinski 2006).

Recently attention has been directed to the phenomenon of *antisocial* punishment (Herrmann, et al. 2008; Nikiforakis 2008). In a study undertaken in 15 different countries Herrmann et al. documented the widespread occurrence of antisocial punishment (ASP) which is being described as ‘the sanctioning of people who behave prosocially’ and hence means the punishing of co-operators by the free-riders. Herrmann et al.(2008) find that the success of co-operation strongly depends on the absence of antisocial punishment. Seeking for explanations they have investigated properties of the setting such as weak norms of civic cooperation¹ and a weak rule of law² in a country as drivers to predict antisocial punishment. They conclude, that “understanding ASP is especially of relevance for the debate about social capital and in particular a literature [Ostrom 1990, Ostrom et al. 1994] that argues that informal sanctions often substitute for formal enforcement mechanisms if these are lacking or not working well [by saying that] ... the fact that antisocial punishment is negatively correlated

¹ According to Herrmann et al. (2008:1365) ‘norms of civic cooperation are expressed in people’s attitudes to tax evasion, abuse of the welfare state, or dodging fares on public transport (i.e. taken from WVS: The statements are (i) “Claiming government benefits to which you are not entitled”, (ii) “Avoiding a fare on public transport”, and (iii) “Cheating on taxes if you have a chance”). They are all situations that can be modelled as public goods problems. The stronger norms of civic cooperation are in a society, the more free riding might be viewed as unacceptable and the more it might be punished in consequence. The flip side of the argument is that cooperators, who behave in a normatively desirable way, should not get punished; strong norms of civic cooperation might act as a constraint on antisocial punishment’.

² The Rule of Law indicator measures “the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence”. ‘The strengths of the rule of law in a society might also have an impact on anti-social punishment. If the rule of law is strong, people trust the law enforcement institutions, which are being perceived as being effective, fair, impartial and bound by the law. Revenge is shunned. If the rule of law is weak the opposite holds. Thus the rule of law reflects how norms are commonly enforced in a society’ (Ibid.)

with the strength of the rule of law and also with cooperation levels suggests that the quality of the formal law enforcement institutions and informal sanctions are complements (rather than substitutes).” While we certainly agree to the importance of ASP and find the cross country variation interesting we remain sceptic about their implication.³ Already Ostrom (1990) pointed to the fact that central authorities might undermine local level efforts to build up a functioning decentralized management system (and thus that both complements each other). More importantly it might well be that with weak law enforcement and low civic norms external punishment might be even worse than informal group-based punishment. Indeed, that is what we find in our setting (Pröpper & Vollan in prep.). In this paper we focus on micro determinants of antisocial punishment as there is a huge variability at individual and group level which remains unexplained. However, we complement our study with ethnographic material to show the relation between ASP and local level norms of civic cooperation and the rule of law.

Herrmann et al. put forward several explanations taken from the broader socio-psychological literature to explain antisocial punishment at the individual level. Following them, it might be, that people act with a motive of conformity, that they want to treat people alike and punish free-riders and co-operators alike. Furthermore, they argue that when punishment is cheaper for the punisher than the punished it may be, that people with high demand for dominance, a competitive personality or a desire to maximize relative payoff are more likely to punish. Nikiforakis (2008) finds counter-punishments to be driven partly by a desire to retaliate punishments and partly by strategic considerations. For example we do not know whether antisocial punishment happens as a reaction on received punishment or whether it is proactive to keep the relative distance to the other players as high as possible.

³ From a methodological point of view there remains a doubt besides the unclear causality. The regression (Table 2 in Herrmann et al.) has been carried out with 20,000 observations (although the study covers 15 countries where 7 have literally no ASP and data for Oman was not available) instead with country averages. Thus, the result may be driven by some few observations or outliers and when using the large sample, the significance level should be inversely adjusted with the sample size to the 1% level (Leamer 1983).

So far the occurrence of antisocial punishment has not been investigated ‘in the field’ testing for socio-demographic determinants of ASP as well as personal attitudes towards norms of cooperation. For example it might be that the strength of an individual’s perceived adherence of norms of civic cooperation in the village might similarly predict antisocial punishment at individual or group level. Grounding on a trust game that has been carried out in the same area before we hypothesise that younger male roadside dwellers with a higher education level should act more selfish (Pröpper 2008). Thus, inland villagers who are also older and have lower education levels are more likely to have internalized traditional norms of reciprocating, while younger, mobile roadside villagers have more contact with the goods of modern consumerism and thus a stronger incentive to acquire cash. Additionally we exploit the cultural background and the socio-demographic variability of our participant pool.

The paper has the following structure: Next we describe the setting of the experiment and give ethnographic background on norms of cooperation and adherence to rule of law for the study area. In the result section we report the negative impact of ASP on cooperation and analyze the determinants of anti-social punishment. We test the proposed hypotheses on civic cooperation, revenge, strategic considerations, conformity, and dominance as well as the influence of socio-demographic variables. As it turns out, revenge seems to be the leading motive behind ASP which is most likely to be influenced by a stronger adherence to the rule of law. However, neither ethnographic, group-level nor individual level measures of civic norms of cooperation relate to ASP in our experiment. We then discuss our results in the light of the local context with envy, spite respectively witchcraft.

The Experiment: Setting, design and sample

Data collection on ASP has been part of a public goods experiment that was executed to assess the impact of different enforcement regimes and mechanisms (e.g. external vs. internal punishment) under different real life institutions (existence of a community forest) on the behaviour of timber users in the Kavango region of Namibia (Pröpper & Vollan in prep.). Namibia is an arid country of sub-Saharan Africa that faces considerable political, economic and ecological challenges (RoN 2007). The dry-

forest savannah of the Kavango Region is threatened by deforestation. Increasing anthropogenic impact on local forests includes next to agriculture the unsustainable harvesting of broad-leaf timber species through the local population for commercial purposes. Timber resources are of considerable value with long regeneration cycles which need to be protected from short term exploitation. Thus, the game was framed as a task to extract resources from a common forest for private use or together with the community, while the latter increases group payoff. Thus, our game and real world setting resembles a public good experiment where group benefits are larger if individual harvest is restrained.⁴ We use this context as it is directly related to the participants' real life and thus reduces confusion among the participants that might have been the case with a context free instruction.

Namibia: Properties of the setting

In a first step we will locate Namibia in a broader context of the comparative experiment that Herrmann et al. (2008) have executed, then in following steps we will characterize properties of the experiments setting within the Kavango region. Figure 1 and 2 put Namibia into the context of the Herrmann et al. (2008) study. The graphs show that Namibia is not an outlier when comparing to the other countries. Namibia ranges higher in rule of law than the eastern European countries (Russia, Ukraine, Belarus and China) but lower than those countries with the highest occurrence of antisocial punishment (Greece, Saudi Arabia and Oman). Thus, the rule of law indicator does itself not consistently rank the 15 countries in Herrmann et al. 2008 according to ASP since those countries with *highest* ASP (Greece, Oman, Saudi Arabia) have also *higher* rules of law than e.g. the transition countries (Russia, Ukraine, Belarus) and China who had all less ASP.

Comparative country data on cooperative norms were not possible to obtain for Namibia. The only available measure is the general trust measure (which is also not available for Oman) taken from 'Afrobarometer'. However, general trust corresponds to norms of civic cooperation as it is a

⁴ Although we are aware that the forest resembles a common-pool resource with rivalry in use and non-excludability our design resembles a public good game since we only model the rivalry with a threshold value.

prerequisite for an individual to cooperate with unrelated strangers.⁵ The level of generalized trust is as high as in Greece or Russia where a lot of ASP occurred – but much lower than Saudi Arabia (where also a lot of ASP occurred). Thus, based on the two available indicators we would expect at least some ASP but not necessarily more than in any of the other countries.

Resource management and sociality in Kavango

In Kavango an estimated 80% of the 210.000 inhabitants of different ethnic backgrounds still depend on subsistence farming, livestock keeping and the use of natural resources. People live in villages of traditional homesteads built from natural resource and depend largely on staple products like millet and maize. Rural households mainly consist of kinship networks and have to rely on their ability to produce major shares of their budget from the local resource base as a basis for subsistence. Kinship ties and family networks play a crucial role for widely impoverished landusers survival in an area characterized by sandy soils of low fertility and unstable rains. This has been a central aspect of domestic economies for decades. Additionally self-reliance has been the central mechanism to hedge the risks of migration into the waterless hinterland in the first place. Within this setting that the individual is strongly involved in networks and norms of social cooperation.

The household usually composed of family members is a private sphere where strong *norms of cooperation* involve individuals of all ages in a *culture of collectivity*.⁶ Daily duties are divided by gender. Men and boys clear fields, herd the cattle and build the houses, women prepare food, take care of children fulfil domestic duties and work on fields which are private or household property.

⁵ G-trust is less specific than the index used by Herrmann et al. (2008). In our rural Namibian context not paying for a bus fee (they are collected by the driver immediately) is not possible and subsistence farmers as in our study do not pay taxes.

⁶ Within households and urban-rural kinship networks special norms of inner family reciprocity are applied. Sharing of goods within these groups has a long tradition and cooperation is accompanied by a strong cooperation-norm. This cooperation-norm does not only involve productive labour but also putting up with each other's company and nursing each other in times of disease. Family networks sometimes reminded me of a sports team commanded by the elders. In cases of hospitalization of one player, another available player was commanded to accompany the sick one and care for his/her food, washing, communicating with the 'team leaders' about decisions etc. - services that the hospital does not automatically provide. In one case this duty lasted several months and the nursing player was required stay with the sick one at the hospital for the entire period.

The sphere between households is a public space where all sorts of social encounters in the form of chats, jokes, common walks to the fields, and short term visits take place. Here different norms of civic interaction take place. People know each other well as community members, neighbours, friends, or relatives, and address each other with strongly enforced politeness – *nkareso* –, respect and elaborate forms of greeting, nicknames and teknonyms.⁷ This is especially apparent in the principle of seniority directed towards the elders – *vakondi* – a term which is regularly translated with ‘the grown-ups’ and does roughly account for people of about 60 years of age or older. These people are respectfully addressed as *musamane* or *mukurukadi* – the old man/old woman. A social history about neighbours, as well as certain norms of interaction, exists. Reciprocal interaction between different household-networks happens mainly in the *public* and the *economic* sphere and involves the exchange of labour and goods. Intra community exchange of goods and resources happens on a *very informal* basis with little institutional involvement. Another sphere of civic cooperation is the religious. Christianity is widespread in the region and people are members of different and often interethnic church networks. Membership and collaboration in such networks requires altruism based cooperation.

The villages are usually ruled by elected traditional headmen who are part of a three level traditional authority. Traditional authorities apply a traditional *rule of law* on the grounds of coexistence of two bodies of law in Namibia – the statutory and the traditional. As we have outlined elsewhere in respect to the protection of public goods the rule of different layers of legislative and executive organs (statutory and traditional) can be described as *weak* (Pröpper 2009). The few existing institutional bodies, such as headmen/women, local councils and committees, involve mostly the same senior community members and follow the immediate need to collectively manage public goods, e.g. the common water-point, school infrastructure, prevention of fire or the resolution of resulting conflicts but enforcement of compliance is weak and thus leaves a lot of space for individuals to actually succeed with free-riding as well as ASP.

⁷ Rule of addressing others with the name of their first-born child plus a gender specific pre-syllable.

In the public sphere some forms of pro-social *punishment* exist to penalize observable *unkind* behaviour. Actions such as quarrelling drunkenly, fighting or committing adultery, will most likely be observed by others. Besides the fact that several strong norms of interaction exist the rural society is economically rather stratified (Pröpper 2009), hence envy is frequently mentioned as a prevalent model to explain antisocial behaviour.⁸

In the long run such incidents rarely remain unnoticed and ‘un-gossiped about’. In such repeated interactions actors acquire a reputation, and thus social history is influential for other people’s willingness to trust and reciprocate. People who, for instance, are known to be lazy and neglecting their field will not be given additional land to farm. Dominant traditional mechanisms of sanctioning and coercion rely strongly on *verbal articulation* and the application of *public shame*. They take the form of public discussions about behaviour that range from joking-demand to serious extended palaver in traditional courts and usually attempt to reach a consensus.

Hence in formal public interaction antisocial punishment in the form of ‘revenge’ as a means of dispute resolution is rarely observable. Nevertheless, the membership in a network of loyalties, power relations, dependencies, and kinship ties and the desire to maintain good neighbourly relations can as well lead people to avert one’s eyes from the free-riding behaviour of others. In such cases threats and fears of antisocial punishment may as well play a role. In Kavango traditional law the false or insubstantial accusation of others, e.g. in cases of suspected witchcraft attacks, can lead to costly or ruinous counterattacks. Hence the decision to openly accuse will be very well pondered since it might require to mobilize the financial and moral support of a wider network. In cases of accusation (e.g. PSP) the accused will almost certainly defend himself with counter-accuses. But in a majority of cases accuses and counter accuses on the subject of witchcraft – a subject that is never directly observable – will remain in the domain of clandestine non-public communication, taking the form of gossip and rumour. Anonymous attacks on peoples reputation are a well known phenomenon that might as well influence people decisions to retaliate PSP.

⁸ The worst kind of antisocial behaviour is believed to be the use several practices of witchcraft to attack other for personal motives, mainly envy and greed.

Experimental design

The villages in the central Kavango region are all situated in the same ecosystem – a dry-forest and woodland savannah. They were chosen because they are all situated within a vicinity of 30 km. In each village six sessions were played and in total 120 people participated. Subjects were aware of the identity of the other group members but game decisions were made anonymous and were kept confidential even after the game ended. All experiment instructions were presented orally and visually in Rukwangali accordingly (protocol available upon request). The instructions included a set of examples of possible actions and outcomes. The facilitator and experimenter were the same for all sessions. A post-game questionnaire on basic demographic information, attitudinal questions and the understanding of the experimental design and decision tasks was conducted with interviewers after the session.

Our public goods experiment is played with $n=5$ players and 20 rounds. The game was framed as a task to extract timber and other non-timber forest resources (FR) from a commonly owned forest or to leave them for the group account.⁹ The *sustainable* yearly harvestable amount of forest resources was announced to be 50 units for each round. Players had a decision range of 1 to 20 FR to extract from. They were informed that they could extract for their private account or leave FR to the public account. FR extracted into the private account were immediately private gains¹⁰, whereby FR units left in the common forest also yielded a return to each group member. Regardless of extraction levels of individual players each forest unit left was rewarded by doubling it and sharing it among the five players. If the group total extracted was more than 50 units of forest resources, private returns for all forest resources were halved.¹¹ Accordingly, the individual payoff function in the Extraction Game is:

⁹ Examples were given: Fresh wood, dry wood, grass, medicine, fruits, wild animals. Limiting the extraction to timber resources alone would have left all the players that do extract from a forest but do not extract timber with no incentive.

¹⁰ Ten forest resources are equal to 1 Namibian Dollar / 1 Unit = 10 cents.

¹¹ The reason that, a group harvest higher than 50 units leads to half the price of the forest resource is that the yearly regeneration is exceeded and too many young trees were harvested with lower quality and thus lower market price in Rundu, Windhoek or South Africa. Thus, if all players harvest the maximum amount of 20 unit the total private harvest is 100. As 100 is more than 50 there is no communal harvest and the price per all units will be halved. Thus, each player only earns 10 points instead of 20 points for his/her harvest.

$$\pi_i(x_i) = \frac{2(50 - \sum_{i=1}^n x_i)}{n} + x_i, \text{ if } \sum_{i=1}^n x_i < 50$$

$$\pi_i(x_i) = \frac{1}{2} x_i, \text{ if } \sum_{i=1}^n x_i \geq 50$$

In this experimental setting as well, free-riding is the dominant strategy. Because the private rewards of extracting from the public good is higher than the private rewards from the public good, individual (Nash) incentives to extract dominate. However, at the social optimum, all players would be better off if none of the players extracts any unit.

After round 10 we introduced the punishment treatment where group members could punish each other at own costs. While most field laboratory studies used a treatment with imperfect external punishment the internal punishment which dominates the laboratory experiments has to our knowledge not been applied in field settings before. Bernhard et al. (2006) and Vollan (2008) are recent examples of one shot third party punishment experiments in the field in dyadic games.

In our punishment treatment players were told that the new rule enables them to punish each other. After each round players' extraction decisions were announced publicly by naming the player numbers. Since each player only knew his own number sanctioning happened anonymously. Real life punishment is not without social costs of conflict. Hence punishment in our experiment cost the punisher 1 FR and reduced the punished players amount of allocated FR by 3 FR. After 10 rounds, the end of the game was announced and players received money for each FR they gained during the game, whereby 1 FR was equal to 10 Namibian cents. Earnings averaged 22N\$ and each experiment lasted one and a half to two hours.

The game was extensively pre-tested with a separate sample from Rundu. The real sessions were played in separate school or community forestry office rooms of the different villages. Instructions for the game had been translated into the local vernacular with a double crosscheck translation.¹² Instructions were read aloud by a local game administrator. After reading the instructions several sample rounds were played to safeguard all participants understanding of the procedure and proper

¹² One translator translated all game related material into Rukwangali. A separate translator translated the material back to English to crosscheck and eliminate potential mistakes.

handling of the material. All decisions by and transactions with participants were done anonymously assigning player numbers randomly and using game cards to be put into envelopes. On these decision cards people could circle the amount of trees they wanted to harvest. Punishment results were as well transferred in envelopes.

Sample recruitment and composition

The whole sample consisted of 120 people from four villages of the central Kavango region. Three villages are situated along the road that connects the regional capital Rundu with the south of the country. One village is situated in the hinterland few kilometres away from that road.¹³ In each village 30 adult people participated in 6 sessions à 5 players.¹⁴ The part of the whole sample under consideration for internal punishment consisted of 60 players (12 groups à five players) and comprised 28 women and 32 men, resulting in a sex ratio of 1.14. Players were informed on a short notice beforehand that the experiment would take place and all eligible households from the village were invited to send players who would be able to understand the rules and participate in the game. On the day of the game before recruiting actual players it was made sure that all sending households would be represented. Players then were recruited randomly and were assigned to groups randomly as well.

The majority of participants stated that they were occupied in rural subsistence farming and 48% of participants stated to have a regular income (Std. Dev. 0.5). Households are comprised of a mean of 8.8 people (Std. Dev. 5.2). While the largest rural household has to support 30 members a major fraction lies below the average value. On average people had lived in the villages for a mean of 12.18 years (Std. Dev. 8.1). The average age in the whole sample was 31 years (Std. Dev. 11.7) with the youngest players being 19 years old and the oldest players being 71 years of age. Low average age data mirror the pyramidal age distribution of the very young Kavango society. The ethnic affiliation in the sample differed as well, mirroring the mixed ethnic composition of the villages. The largest fraction in the sample were people who consider themselves a Kwangali with 38% (Std. Dev. 0.5),

¹³ The choice of the villages was done according to the criteria of the broader experiment on internal vs. external punishment which are being published elsewhere.

¹⁴ Village sizes in the area differ between 100-300 persons.

followed by two groups whose members migrated to the region during recent decades as a consequence of the war in neighbouring Angola, namely Nyemba 23% (Std. Dev. 0.4), and Tjokwe 13.3 % (Std. Dev. 0.3). People within the sample had an average school education of 7.1 years (Std. Dev. 4.2). Those below the mean age of 31 had on average 8.8 years of schooling while those above only 4.6 years. Separate calculation for women and men showed that women had on average 6.8 years of school education.

Results

During the first 10 game sessions people earned on average 137.03 points (Std. Dev. 41.5) with a maximum earning of 265 and a minimum of 63. Buying punishment points and getting punished significantly ($t=5.8$, $df=118$, $p=.000$) reduced earnings in the second rounds (11-20) to an average of 73.35 points (Std. Dev. 78.6, Min -197, Max 186) while the standard deviation in earnings rose from 5.4 in round 1-10 to 10.2 in round 11 to 20. Overall points earned were 210.38 (Std. Dev. 92.6), with one player reaching a minimum outcome of -63 and the most successful player earning 423 points. Converted into Namibian Dollars, players earned an average of 21 N\$ (Std. Dev. 9.3) with a maximum of 42 and a minimum of 10.¹⁵ Our results suggest internal punishment (as well as external punishment) were ineffective in increasing group earnings. With regard to harvest decision we find that only in the internal punishment treatment individual harvest could be significantly *reduced* ($t=1.9$, $df=118$, $p=.05$). The discrepancy with lower earning and lower individual harvest decision is due to the high use of the punishment possibility. In total 600 punishment decisions could be taken (60 players, ten rounds) and 267 were taken of which 67 (one fourth) were antisocial punishment – meaning that players were punishing someone who extracted less forest resources than himself. We also find a high heterogeneity between the sessions with some sessions having practically no ASP. At a stage we even had to limit the amount of punishment points people could impose on each other since punishment escalated drastically (as can already be seen by the negative points of some individuals and even

¹⁵ In case of negative earning we gave participants 10N\$ for participating since we did not administer a show-up fee.

groups). Before testing in a multivariate setting we rule out some of the hypotheses stated in the beginning:

Descriptive Results

Cooperative norms: On cross country basis Herrmann et al. (2008) find that country norms of civic cooperation explain antisocial punishment. We have started with trust and trustworthiness as being taken from the World Value Survey. Additionally we have analyzed different questionnaire items on cooperativeness, as well as reported days worked in voluntary collective action. However, we find that all these measures do not correlate (negatively) with aggregated antisocial punishment. Given the strengths of social norms of cooperation in the Kavango setting it needs to be discussed if the anonymity of the experiment and the incentive to achieve a personal gain partly function as a possibility to free the individual player from the constraints of functioning as a member of a wider cooperative network.

Rule of law: Results indicate that ambivalent perceptions of the responsibility and effectivity of the various levels of legislative and executive offer incentives to disobey. Though direct correlations could not be found as our proposed measure of the perception of the rule of law did not vary between individuals (basically all people stated it is bad to harvest forest resources without a permit etc.). From assessing the ethnographic context we can affirm the hypothesis that a weak local rule of law supports free-riding behaviour. Acts of illegal exploitation of public timber resources by free-riders rarely happen completely unobserved and will be gossiped about. Crucial is the status and perception of ownership of such public resources. People who perceive the trees to be owned by the state expressed the conviction that stealing from the state is a misdemeanour. Someone who tries to enforce rules in such a case will probably suffer anti-social punishment, in the case of discovery on the spot people who want to complain to free-riders and exercise control have to fear strong anti-social *violence*. In Epingiro the headwoman and other villagers complained that when they discovered illegal harvesters in the forest northwest of the village they were threatened to be beaten up.

Revenge: Indeed we do find a correlation of 0.2 between last round received PSP and next round ASP which is significant at the 1% level (while the correlation between last round penalty and prosocial punishment is insignificant with -0.017). Thus, we include lag of penalty (both ASP and PSP) in our regression analysis. Considering the conspicuous norms of politeness and conformity this result is rather striking. Obviously the game exposes an inclination to retaliate prosocial punishment. This aspect will be discussed further below.

Conformity: The correlation between number of times a person punished prosocially and antisocially is 0.05 suggesting that there is no positive relation between the two and thus no reason to believe that people simply punish both free-riders and co-operators alike in a certain round.¹⁶

Dominance: To test the hypothesis that people with high demand for dominance, a competitive personality or a desire to maximize relative payoff are more likely to punish we have mainly two variables. One way to have a look at this relation is to see whether higher relative harvest corresponds to higher antisocial punishment. The correlation between relative harvest (deviation from the group mean) and having used antisocial punishment is 0.15 and significant at the 1% level, too.¹⁷ However, by definition, those who earn more must be those who use ASP, thus we need to control for the relative level of harvest in order to reject the dominance hypotheses. Also, the post game question “I compare my gains to the gains of the others” or “my decisions were influenced by the behaviour of the others” do not correlate with the cumulated sum of ASP of an individual.

Socio-demographic determinants: From a trust game carried out in the Kavango we hypothesized that younger males should be more selfish. However, none of these variables do significantly correlate with antisocial punishment neither does education. The only socio-demographic variable that significantly correlates with antisocial punishment is having a permanent income. This backs up our

¹⁶ Also, cumulated over the total ten period there is a no significant positive correlation between ASP and PSP (0.17; $p=0.18$).

¹⁷ We use relative harvest as measure of cooperation instead of relative earnings since earnings also capture received and given punishment points which would confound our results.

finding that dominant people tend to use ASP more often since regular income is our best available real world equivalent to relative earning in the experiment.

Another interesting finding is that those who answered with yes on the item “Were your decisions influenced by behaviour of others?” were more likely to use antisocial punishment. We explain this by the fact that people were well aware of their actions and need some kind of justification for their behaviour. Thus it might be that those becoming antisocial punishers were cooperating in the beginning and got upset by the behaviour of others and started a combination of free-riding and punishing. Those who harvested relatively more in the first ten rounds (or earned more) are not positive correlated with the number of antisocial punishments in the following ten rounds and neither are initial penalties until round 12, 13 respectively 15 is significantly correlated with high ASP.

Overall Results

To explore these issues further we use a random effects panel analysis of the rounds 11-20 conditional on a variety of covariates. When explaining individual's harvesting decision respective the antisocial punishment decision in round 11-20 we include several game related variables that can be classified into three different “blocks” of variables: last round, to capture immediate effects, cumulated until last round to test for long term influences during the game and cumulated at round 10 to see whether prior game history affected individual choices. The last round and last round cumulated variables help to explain the within and between individual variance while the cumulated earnings in round 10 controlling for the different starting points after introduction of the rules. These “blocks” contain individual profit (earning), relative profit (difference earning), group standard deviation (Stddev earning), points deducted through antisocial or prosocial penalty (asp_received, psp_received) and the costs that a player had to pay for punishing (cost of punishing). We also include socio-demographic variables and attitudinal questions that might be important to explain harvest or punishment decisions. We further control for the round number, since co-operation might increase or decrease over time and we control for the last round where we expect higher harvesting due to the endgame effect.

Figure 3 shows the average earning, harvest and penalty of all players over the 20 rounds. During the first stage (round 1-10) earnings are high and equally distributed within the group there is a sharp decrease in earnings immediately in round 11. Although harvest is steadily decreasing from round 1 to 20 earnings drop significantly due to the high amount of penalty that players have to subtract. However, it is not clear whether this drop in earning (or better increase in harvest if applicable) is due to ASP as was found in Herrmann et al. (2008). In the panel regression of table 1 we show that last round antisocial punishment *reduces* group harvest significantly as does prosocial punishment. Thus when purely interested at safeguarding as many forest resources as possible antisocial punishment is as effective as prosocial punishment (Model 4). When only comparing the group means the effect of cumulated prosocial punishment becomes large and significant and is the only reducing influence on group harvest (table 2, model 2). Our analysis further reveals that antisocial punishment is as detrimental as prosocial punishment to overall group earnings (specification of table 1) but not significantly detrimental to earnings using the same specification as in table 2 (both results not reported). However, there is one difference between these two since earnings and harvest levels are influenced mainly by the last round while the effect of prosocial punishment is picked up by the cumulated variable. This might indicate that ASP in period t-1 leads to revenge and thus costs (and lower earnings) for punishment in period t while PSP is effective when it happened more often. In a next step we thus further analyse the decision to use antisocial punishment.

Figure 4 and 5 show how antisocial punishment and earning evolves over time. Figure 4 shows the number of times ASP and PSP occurred which seems to have parallel trends and Figure 5 shows the costs for the buyer of punishment points over the ten rounds (this amount tripled would be the amount of penalty). Here, however there is a strong increase in PSP from round 11 to 13 while at the same time ASP is decreasing. This high initial punishment which should curb other's harvest (and it does in most laboratory settings) leads to an increase in ASP until in round 15 where players buy as much punishment points for ASP as for PSP. After the peak in round 15 ASP drops sharply and then increases again steadily until the end of the game. Thus, although ASP is prevalent from the beginning

it is a reaction on either high received punishment or due to unsuccessful attempts to punish others, or both.

Figure 6, 7 and 8 show ASP and PSP and earnings per session. There were two sessions where group earnings were negative from round 11-20 (session 15 and 23) and one where group earnings were slightly above 0 (session 5). In all these sessions occurrence of penalty was high but only in session 15 (see figure 7 and 8) was also ASP higher than normal. Session 5 and 23 had its low outcomes due to high prosocial punishment. To capture these effects we use a panel model trying to explain the decision of players buying punishment points and use them for antisocial punishment. In table 3 we find that received PSP prior to the current round significantly *increases* (negative values are received penalties) the use of ASP in the next round. The result holds when controlling for relative difference of harvest which is by definition correlated with ASP. Thus, PSP and thus revenge seems indeed to lead to ASP. Table 4 presents an OLS of the total amount of punishment points used for ASP and confirms this view that the amount of received PSP positively influences the use of ASP. We include specification with alternative hypotheses in table 4 but neither dominance, nor trust or co-operation seems to explain ASP. Only larger households seem to be more prone to use ASP however this is due to an outlier from session 15 who indicated to have a household size of 30 people. When omitting household size we find that being able to speak English has a positive significant impact on the use of ASP.

In internal punishment the reason for giving high anti-social punishment (number of punishment points assigned) depends on the obtained cumulated amount of prosocial penalties by the other players assigned in the last round (revenge). Having a higher relative earning in the period prior to the punishment, thus dominance, does not explain the use of ASP.

Discussion

We have presented attempts to test various hypotheses on the occurrence of ASP in Kavango. Concerning the hypothesis that norms of civic cooperation increase ASP we found no significant

correlations though ethnographic research on the social context confirms that relatively strong norms of interaction exist. The experiment offers the individual player the possibility to 1.) decide anonymously and without having to communicate while normally within the fabric of cultural and social rules and duties behaviour rarely remains unobserved and uncommented, 2.) the incentive to play for personal cash income that can be kept. Both effects seem to leverage existing norms of civic interaction (e.g. based on kinship or religion) that strongly depend on communication and observation as much as norms of contributing to a collective economic goal without personal cash gains. Their influence could be interpreted as the ‘struggling free’ of individuals from social constraints in a situation of increasing attainability and visibility of new consumer markets whose access is limited by lack of cash and a very limited upward mobility. Such a situation would favour dominant personalities with a higher income, a better education, a better market integration who still profit but as well suffer from the constraining social norms of reciprocating with the ‘have less’.

The absence of a functioning structure of enforcing existing legislation concerning natural resource behaviour seems to leave a void that is used by people with an inclination to free-ride. One might hypothesize that this absence might motivate players to enforce rules by applying PSP. But it is apparent that this rule of law is equally missing with regard to the occurrence of antisocial punishment, meaning that antisocial pressure on fellow villagers especially by dominant players will most probably remain unsanctioned due to the weakness of enforcement agencies. Results from the external monitoring treatment confirm that people are in general willing to take the chances of being caught and seem to perceive natural resources not as being their common possession but owned by the state (Pröpper & Vollan in prep.). In summary we conclude on the two variables that have been suggested by Herrmann et al (2008) that it cannot be confirmed that they substitute or support each other since local level reality is far more complex and involves other decision guiding factors.

Our preliminary findings suggest that we have to turn the view to the occurrence of revenge and also dominance. We found very revengeful behaviour in the field. Obviously in the anonymous interaction in the game people tend not to accept prosocial punishment as a substitute for lacking official rule

enforcement but rather perceive it as a constraint to personal freedom which they retaliate. Such results correspond to the ethnographic findings which describe that apart from the conspicuous politeness competition and envy play an equally important role in Kavango culture. Envy arises from the stratified performance of actors and households but as well from their different integration into an evolving cash and labour economy. Envy finds an active expression in the use of gossip and rumour that targets peoples reputation and causes retaliation and subliminal climate of distrust.¹⁸ Such examples of anti-social behaviour (expressed in the widespread occurrence of witchcraft-beliefs) perceived as a phenomenon that 1.) can destroy trust and therefore social capital 2.) is a means of social control and levelling of social stratification that causes dominant and self-oriented individuals to 'struggle free' from by applying ASP in our experimental setting.

¹⁸ Economic success in such cases is explained with a model of witchcraft. The whole complex of envy based witchcraft remains unobservable and hence rarely breaks out into open conflict. Many cases have been documented though where people who have an extraordinary economic performance are secretly being accused of using supernatural forces e.g. the help of a ghost worker in the form of a snake that consumes human souls but provides for wealth and prosperity. Equally any kind of unexplainable misfortune that happens to actors can be explained with the attack of an envious witch instrumentalising supernatural forces to level social stratification.

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APPENDIX – Figures & Tables

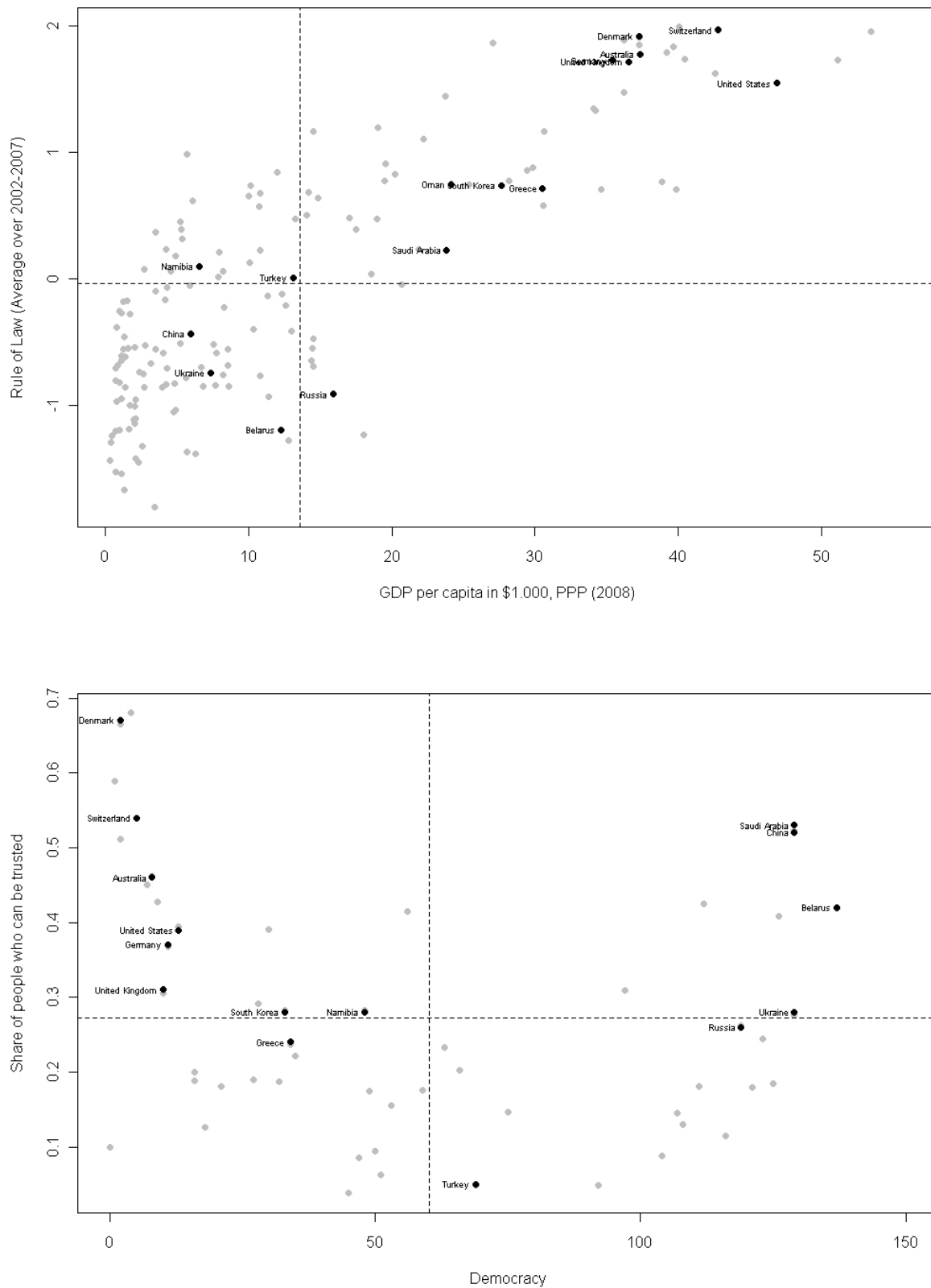


Figure 1 and 2: Distribution of rule of law, GDP, norms in the countries where Herrmann et al. (2008) conducted their experiments as well as Namibia and all other countries for which data are available in the respective data set (grey dots without labels). Lines indicate world averages of the respective variable.

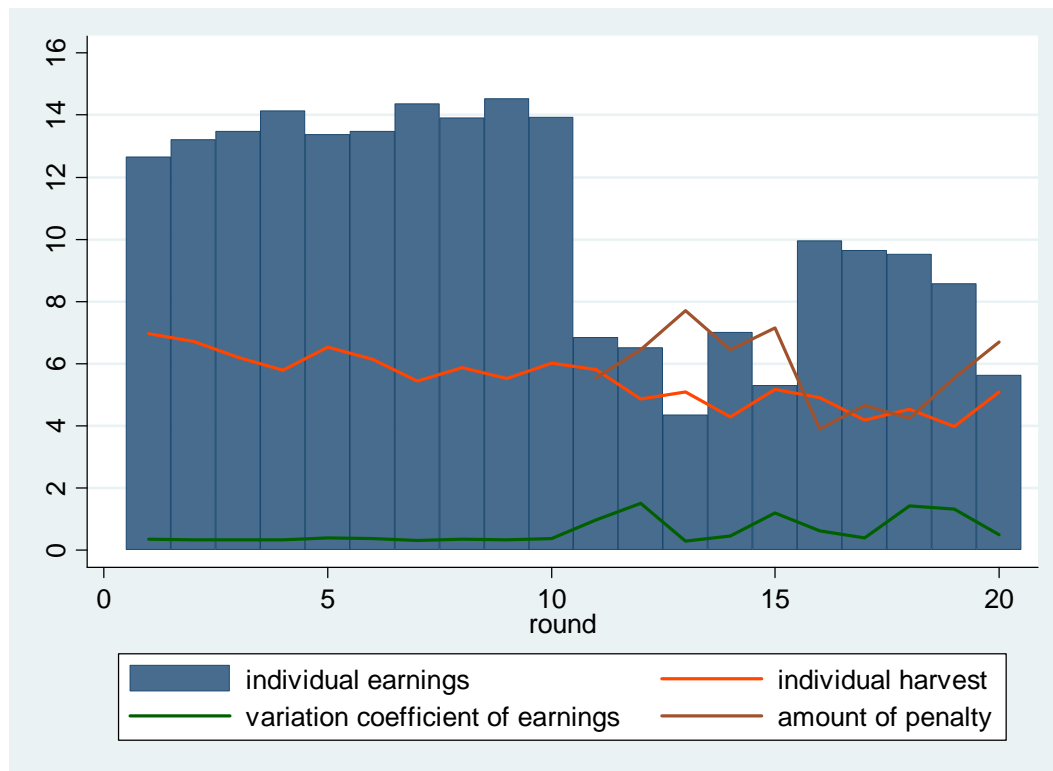


Figure 3 Earnings, harvest, penalty during the game.

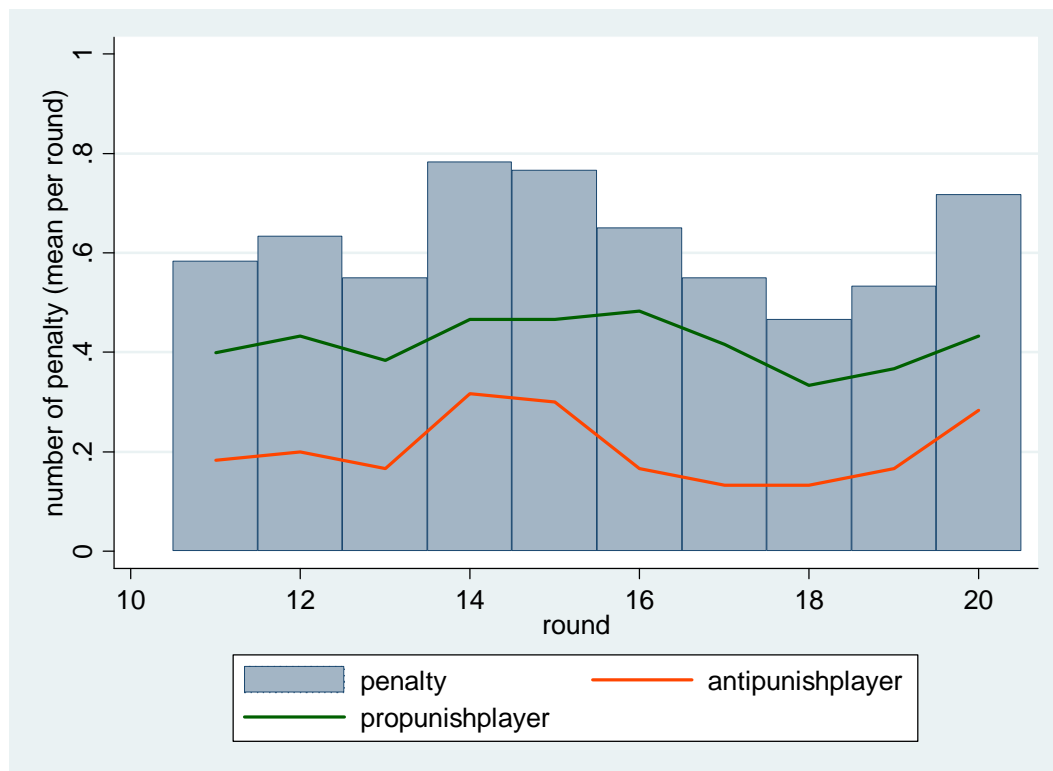


Figure 4 Distribution of ASP and PSP over time (number of times a player did either use ASP or PSP; min=0 max=4)

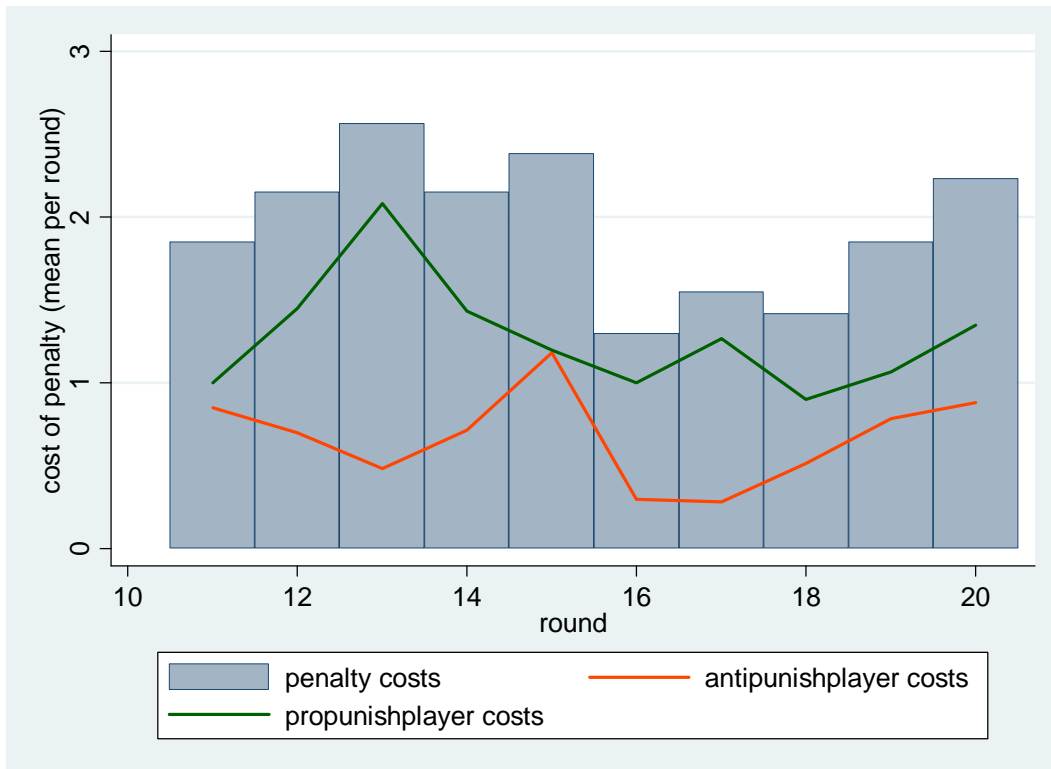


Figure 5 Distribution of ASP and PSP over time (costs to the punisher)

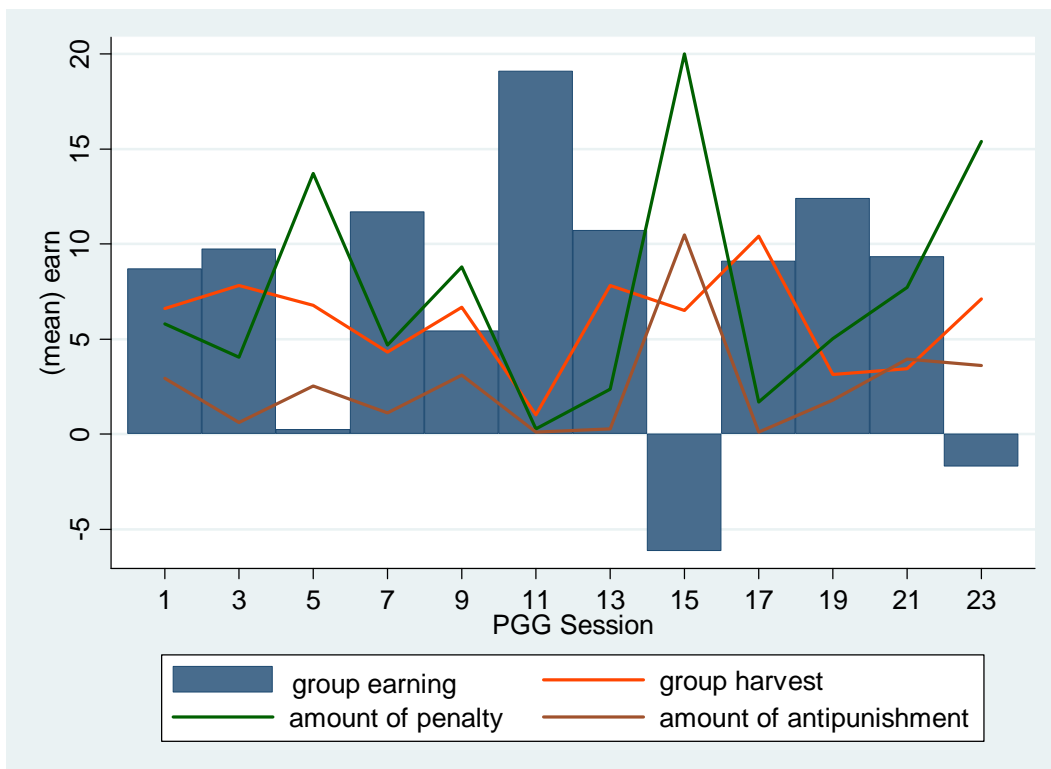


Figure 6 Distribution of earning, harvest, penalty and ASP by session (only round 11-20).

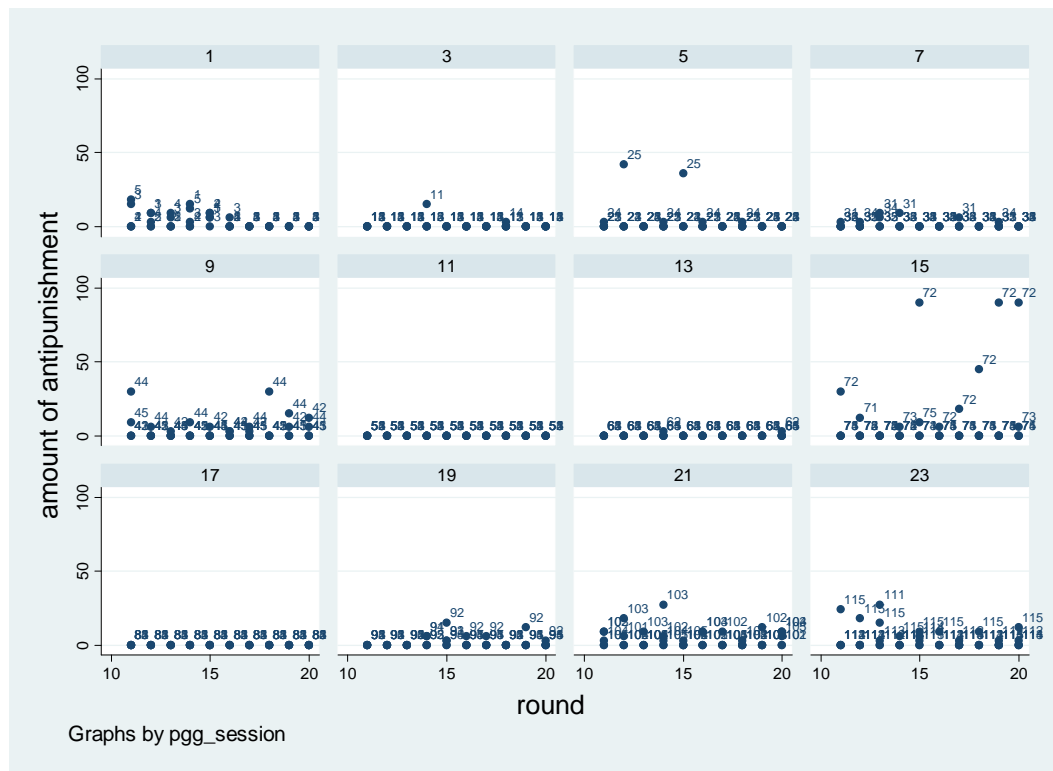


Figure 7 Distribution of ASP (points deducted from other player) by session and over time.

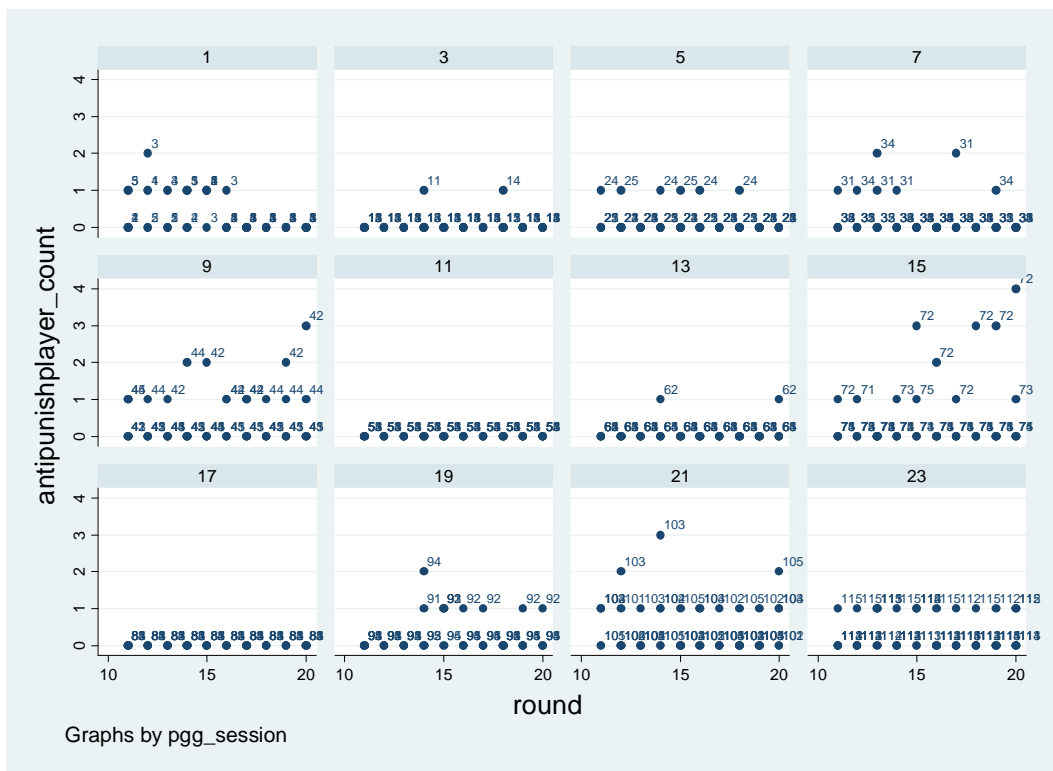


Figure 8 Distribution of ASP (number of times player punished per round) by session and over time.

Table 1: Panel estimate of group harvest dependent on ASP and PSP

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model
group_harvest				
lag_group_antisocial_total	-0.142** (0.059)	-0.092** (0.042)	-0.091** (0.040)	-1.844*** (0.668)
lag_group_antisocial_total_cum	0.553 (0.460)	0.413 (0.447)	0.433 (0.439)	0.310 (0.271)
lag_group_prosocial_total		-0.019 (0.041)	-0.017 (0.043)	-1.846** (0.793)
lag_group_prosocial_total_cum		-0.631** (0.314)	-0.621* (0.344)	-0.255 (0.400)
round	-1.076*** (0.384)	-0.574 (0.386)	-0.591 (0.385)	0.033 (0.498)
round_20	6.423*** (2.042)	5.563*** (1.981)	5.600*** (2.007)	6.250*** (2.327)
vill_1			-18.392*** (4.028)	-8.308* (4.473)
vill_2			-5.816 (3.590)	-2.173 (2.660)
vill_3			-16.993** (7.933)	-6.478* (3.815)
lag_group_mean_earn				-1.991** (0.843)
lag_stddev_earn				0.231 (0.214)
lag_earn_group_cum				-0.054 (0.035)
lag_stddev_earn_cum				0.039 (0.051)
Constant	39.138*** (5.627)	33.918*** (5.144)	44.387*** (6.144)	65.252*** (9.989)
Observations	120	120	120	120
r2_b	0.000992	0.0219	0.470	0.907
r2_o	0.0283	0.00779	0.396	0.634
r2_w	0.142	0.230	0.230	0.115

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 2 OLS regression of group mean harvest in second stage on ASP and PSP

VARIABLES	(1) Model	(2) Model	(3) Model
group_harvest_cum_10_20			
group_harvest_cum_10	1.374*** (0.437)	2.666*** (0.651)	0.953* (0.477)
var_coeff_earn_cum_10	-10.776 (18.477)	-13.989 (18.940)	5.961 (37.171)
group_antisocial_total_cum	-1.013 (3.351)	-7.865 (5.745)	-5.825 (7.175)
group_prosocial_total_cum	-3.660 (3.365)	-13.346** (4.505)	-5.136 (5.270)
vill_1		70.375 (93.738)	
vill_2		181.693* (89.433)	
vill_3		243.417* (126.195)	
group_trust_village			0.548 (0.616)
group_income			-0.478 (2.239)
group_religion			-0.881 (1.232)
Constant	-118.353 (102.395)	-546.885** (216.823)	-29.538 (161.331)
Observations	12	12	12
R-squared	0.670	0.899	0.780

*** p<0.01, ** p<0.05, * p<0.1; Robust standard errors in parentheses

Table 3 Panel regression of buying punishment points for ASP

VARIABLES	(1) Model	(2) Model	(3) Model
antipunishplayer_total			
lag_receive_asp	-0.018 (0.013)	-0.020 (0.014)	-0.022 (0.014)
lag_receive_psp	-0.027*** (0.005)	-0.025*** (0.006)	-0.024*** (0.006)
lag_receive_asp_cum		0.004 (0.006)	0.005 (0.006)
lag_receive_psp_cum		-0.003 (0.002)	-0.004* (0.002)
harvest_cum			0.002 (0.005)
diff_harvest_cum			-0.007* (0.004)
var_coeff_earn_cum			0.003 (0.008)
individual_harvest			-0.043 (0.036)
diff_harvest			0.127*** (0.032)
var_coeff_earn			0.010 (0.013)
round	-0.017 (0.018)	-0.019 (0.020)	-0.035 (0.032)
round_20	0.197 (0.170)	0.197 (0.171)	0.220 (0.170)
vill_1	-0.059 (0.312)	-0.051 (0.299)	-0.057 (0.295)
vill_2	-0.191 (0.312)	-0.205 (0.299)	-0.243 (0.303)
vill_3	-0.235 (0.312)	-0.224 (0.299)	-0.227 (0.300)
Constant	0.615* (0.346)	0.639* (0.358)	0.916** (0.407)
Observations	1200	1200	1200
r2_w	0.019	0.019	0.049
r2_b	0.0917	0.0940	0.148
r2_o	0.0409	0.0467	0.0868

*** p<0.01, ** p<0.05, * p<0.1; Standard errors in parentheses

Table 4 OLS regression of buying punishment points for ASP (total points from round 11-20)

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model
antipunishplayer_total_cum				
receive_asp_cum	0.040 (0.051)	0.026 (0.052)	-0.002 (0.058)	0.001 (0.059)
receive_psp_cum	-0.082*** (0.021)	-0.073*** (0.023)	-0.072*** (0.025)	-0.086*** (0.025)
diff_earn_cum	-0.018 (0.015)	-0.018 (0.015)	-0.017 (0.016)	-0.014 (0.017)
var_coef_earn		-0.800 (0.932)	-1.051 (1.039)	-1.725* (1.028)
age		-0.051 (0.159)	-0.083 (0.172)	-0.129 (0.175)
sex		-0.022 (2.480)	-0.122 (2.575)	-0.076 (2.643)
head		-0.038 (3.463)	2.421 (3.833)	3.610 (3.903)
hh_size		0.728*** (0.235)	0.626** (0.259)	
married		-0.304 (2.643)	-0.122 (2.986)	0.490 (3.054)
formal_rel		-4.009 (2.901)	-3.730 (2.992)	-4.198 (3.065)
att_services		0.130 (0.810)	0.177 (0.837)	0.166 (0.860)
english		0.880 (2.061)	2.681 (2.307)	4.067* (2.295)
years_village		-0.314* (0.171)	-0.180 (0.184)	-0.116 (0.187)
schooling		-0.178 (0.416)	-0.330 (0.469)	-0.350 (0.482)
regular_income		0.534 (2.374)	0.419 (2.578)	0.100 (2.643)
alert			1.578 (2.950)	0.754 (3.008)
trust_villagers			0.318 (1.110)	0.201 (1.138)
others_harvest			1.736 (1.684)	2.497 (1.698)
other_behaviour			-1.336 (3.119)	-2.045 (3.188)
influenced_others			0.052 (3.521)	-1.529 (3.552)
cooperation			1.319 (1.232)	1.373 (1.264)
collective_action			0.117 (3.956)	-0.889 (4.039)
membership			-3.251 (2.699)	-3.074 (2.770)
willingnes_pay			-1.988 (2.605)	-2.141 (2.673)
decision_influence_other			-2.174 (2.493)	-1.858 (2.555)

compare_gain_others			-1.302 (2.903)	-2.403 (2.943)
problem_nrm			-3.405 (2.620)	-3.842 (2.684)
vill_1	-0.526 (3.101)	-0.738 (3.494)	-1.038 (3.782)	-1.776 (3.870)
vill_2	-2.576 (3.122)	-2.007 (3.497)	-1.200 (4.362)	1.004 (4.379)
vill_3	-2.311 (3.108)	-3.825 (3.369)	-1.976 (3.925)	-0.811 (3.999)
Constant	3.161 (2.374)	5.733 (7.685)	3.910 (8.993)	8.556 (9.019)
Observations	120	120	120	120
R-squared	0.139	0.283	0.353	0.310

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1