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ABSTRACT

Decisions on Extending Group Membership: Evidence from a Public Good Experiment

We experimentally analyze whether the opportunity to receive a permanent contract motivates temporary group members in a public good setting and how this affects the other group members. We compare an exogenous and an endogenous decision mechanism to extend the temporary agent's group membership. The exogenous mechanism to extend the contract is modeled by a random draw. In the endogenous setting, one other group member decides about the temporary agent's future group membership. Our results reveal that both — the decision to extend a contract and the decision mechanism itself — affect not only the temporary group member's effort but also the efforts of the permanent group members and, ultimately, also cooperation within the group after the decision has been made.

JEL Classification: C9, M5

Keywords: cooperation, experiments, groups, public good games, teams, temporary employment

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Decisions on Extending Group Membership – Evidence from a Public Good Experiment

1. Introduction

Cooperation in groups has been well studied in the field of economics, as the level of cooperative behavior determines the success of work results and the whole organization. Often, group members are heterogeneous with respect to their possible inputs to the group, such as demographic characteristics (e.g. Chatman/Flynn, 2001; Kirkman et al., 2004), cultural background (e.g. Watson et al., 1993; Connaughton/Shuffler, 2007), abilities (e.g. Barrick et al., 1998; Jones 2008), or endowment distribution (e.g. Dickinson, 2001; Weng/Carlsson, 2015). Like differences in inputs, also differences in time perspectives among group members are possible, e.g., represented by the employment contract in practice. Often, employees with permanent or temporary contracts work together, which implies that certainty and duration of group membership vary among group members. In organizational reality, heterogeneous workforces with respect to contracts are prevalent in virtually every firm, even though the total share of temporary employment in the OECD countries has remained constant at a level of 11% during the last 20 years (OECD, 2018). Research extensively analyses the effects of temporary work on the economy-level, the firm-level and the individual-level (e.g. Michie/Sheehan-Quinn, 2001; Engellandt/Riphahn, 2005; Rinne/Zimmermann, 2012) but does not directly address the effect of differences in contracts on the team-level. This lack is striking, because some of the macro-level effects, such as decreases in productivity (e.g. Jahn et al., 2012; Damiani et al. 2016), are likely to be caused by group outcomes.

In this study, we investigate the role of the decision to extend a temporary worker's contract and, thus, her membership the group. If a worker's contract is not extended, she will be replaced by another worker. We focus on potential incentive effects before the decision is made and subsequent effects of the decision on further cooperation.[1]

In our setting group members repeatedly interact with each other for a given period of time in a public good game. One member in each group has a temporary group membership, i.e., she does not know whether her membership will end or continue at a pre-defined point of time in the future. We differentiate between two settings: (i) one of the group members is given the

[1] In contrast to Kopanyi-Peuker et al. 2018, who study fear of exclusion effects in a repeated weakest link experiment, there is only one candidate per group for the respective extension or replacement decision in our approach.

right to (endogenously) decide whether the group membership of the temporary member will be extended for an additional period or whether the temporary group member will be replaced by a new member, and (ii) a random mechanism decides whether to extend the temporary worker's group membership. The prospect of membership extension may influence the behavior of temporary and also permanent group members, both knowing about their different group membership horizon.

Some experimental studies use social dilemma games (e.g. Andreoni, 1988; Fehr/Gächter, 2000) to compare cooperation behavior in groups of either strangers, i.e., participants who are assigned to new groups in each round, or partners, i.e., participants who stay with the same group for a given number of rounds. They show mixed results concerning the comparison of cooperation levels between partners and strangers. However, they focus on homogeneous groups where members all have the same type of group membership duration. A few studies explore uncertainty of termination of group membership for members of homogeneous teams with ambivalent effects on cooperation behavior (Palfrey/Rosenthal, 1994; Norman/Wallace, 2012). Even though mixed teams with heterogeneity in terms of termination rules of team members are very common in practice, there is as yet no research on team cooperation, to our knowledge.

Concerning the effect of different time horizons of agents, a small branch of literature explicitly examines the effects of varying time horizons. Anderhub et al. (2003) show that short-term contracts significantly reduce the investment rates of agents. Angelova et al. (2012) analyze heterogeneous agents with economic experiments. Their experimental results indicate that principals tend to discriminate against temporary agents, which - in turn - negatively affects the efforts of both temporary and permanent agents.

We are aware of only two studies analyzing heterogeneous groups: Grund et al. (2015) conduct an experiment implementing a one-shot public good game with partners and strangers in the same group and observe lower cooperation rates in groups with a higher number of temporary group members. Furthermore, Grund et al. (2018) analyze mixed groups of strangers and partners in a repeated public good setting, and their results indicate that a specific group composition may induce spillover effects and may, thus, impact cooperation behavior in subsequent groups. Particularly, they show that past experience affects cooperation in a subsequent group setting when a group formerly consisted of three partners and only one stranger.

Partners and strangers as implemented in experiments as described above may simulate permanent and temporary workers. However, strangers in these studies typically switch groups after every period and are never able to become permanent group members. In real settings, however, starting as a temporary group member and receiving a permanent contract after an initial probation period is a very realistic prospect. Further, firms can hold out the prospect of contract extension before the temporary contract starts and can determine a decision mechanism to decide whether a temporary contract will be extended or not.

Next to the mere fact of a contract being extended or not, the decision mechanism is likely to affect cooperation behavior in groups.[2] Extension decisions can be described as endogenous (made by a group member) or exogenous (a random mechanism). Effects on both player types have been shown in the experimental literature on ostracism: There, a group member can be excluded exogenously or endogenously (e.g. Masclet, 2003; Maier-Rigaud et al., 2010; Walasek et al., 2019). Results include that either the introduction of a costless or a voluntary exclusion mechanism leads to higher cooperation levels of individuals and groups and a tendency to downsize groups (e.g. Cinyabuguma et al., 2005). In contrast to our contribution, firm size is automatically affected by decisions. In real settings, groups with temporary group members do not shrink when a temporary contract is not extended. Often, group members are replaced by new group members.

While endogenous decisions are likely to be based on preceding performance, exogenous decisions might be perceived as a case of (bad) luck by all group members. Therefore, an endogenous decision mechanism may have a positive effect on the temporary agent's motivation, while a random draw may not be able to set an incentive to perform well. In particular, temporary agents in a setting with an endogenous decision may increase cooperation to avoid contract termination. Moreover, the cooperation level of permanent group members may also be influenced by reciprocal behavior towards contributions from the temporary agent. Furthermore, the decision may affect the long-term cooperation behavior within the group. After contract extension, the temporary agents may not be incentivized to contribute more to the public good.

[2] There are interesting experimental studies analyzing the impact of different decision mechanisms on cooperation behavior, such as direct democracy (e.g. Walker et al., 2000; Kroll et al., 2007), election delegation (e.g. Hamman et al., 2011; Kocher et al., 2018), or leadership (e.g. Güth et al., 2007; van der Heijden et al., 2009). In our experiment we do not set the in-group decision maker as leader of the group. Moreover, the results by Ibanez and Schaffland (2018) reveal that leaders who are members of the group do not affect contributions in a public good game.

The aim of this study is to advance our understanding of the dynamics of mixed work groups by adding the possibility that contracts can be converted from temporary to permanent. We are going to focus on three research questions: (i) we analyze whether the chance of having one's contract (endogenously) extended by a group member may serve as an incentive to cooperate more compared to situation where the extension decision is arbitrary, (ii) we investigate what determines the decision to extend a temporary group member's contract, and (iii) our study is expected to shed some light on the effect of extending a contract or replacing a group member on subsequent cooperation rates of all group members.

The remainder of this paper is organized as follows: We describe our experimental setup in section 2 and present our results in section 3. Section 4 concludes.

2. Experimental setup

The purpose of this study is to understand cooperation behavior in groups with heterogeneous agents. Heterogeneity is modeled with regard to within-group contract diversity of subjects: We distinguish between temporary and permanent contracts. To analyze cooperation in groups, we use a version of the public good game of Fehr and Gächter (2000). In groups of four, all individuals are endowed with 20 tokens and decide how many tokens they want to contribute to a public good project or how many tokens they want to save in their private account. Investments of all four group members into the project are multiplied by 1.6 and equally reallocated to the group members, which implies a marginal per capita return of 0.4.

In total, 20 rounds of the same public good game are played with a restart after 10 rounds. The treatments are illustrated in Figure 1. Subjects are randomly assigned to three different player types before round 1: permanent (P), temporary (T), and (potential) newcomer (N). Subjects of the player type P represent group members with a permanent contract and stay in both treatments for the entire 20 rounds in the same group without uncertainty about their own group membership. Players of type T represent employees with temporary contracts who stay in the same group during the first 10 rounds (part I) and are uncertain about their group membership after the first part.

We introduce two treatments in order to analyze cooperation behavior by varying the decision mechanism on group composition in the second part. In part I, the treatments differ with respect to the decision mechanism. Either the decision about the subsequent group membership of T is exogenous (*Exo*) or endogenous (*Endo*). If decisions after part I are made exogenously, a random draw decides whether T will be replaced by N (*Exo_Rep*) or whether T's contract will be extended (*Exo_Ext*). If decisions after part I are made endogenously, one randomly chosen player of type P decides whether T will be replaced by N (*Endo_Rep*) or will remain in the group (*Endo_Ext*). The randomly chosen player of type P who decides about group composition in part II is informed about her right of decision after part I to preclude contributions adjustments in part I. Players of type N are initially not allocated to any group and may replace temporary group members (T) after the first part of the experiment.

Before the experiment starts, subjects are informed about their own player type and the group composition. Furthermore, subjects receive the information about whether a random draw or a player of type P will decide about the group composition in part II. In the first 10 rounds, a group consists of four members in both treatments: three players of type P and one player of type T. In part I, all four members – Ps and T – know that they will interact for 10 rounds. While Ps and T decide simultaneously about their contributions to the project in each round of part I, N does not join the group and has the opportunity to read comics.

Before the second part starts, in *Exo* the random draw decides about group composition in part II. In *Endo*, one randomly chosen player of type P is informed that she may decide about the group composition. In both treatments, subjects receive the information about whether T will remain in the group or will be replaced before part II starts. They again decide simultaneously about their contributions to the project in each round of part II. Replaced Ts or non-allocated Ns do not join groups and have the opportunity to read comics. They receive a lump sum of 12 tokens in each round.[3] Figure 1 illustrates our experimental setup.

[3] In most cases, the lump sum of 12 tokens is much worse for a player T or N compared to the payoff from the public good game. If only one of the four players contributes 20 tokens to the public good, that player will take a payoff of 8 tokens, whereas that player will receive a payoff of 32 tokens if all group members contribute 20 tokens each to the public good, and that player will receive a payoff of 44 tokens if she shirks.

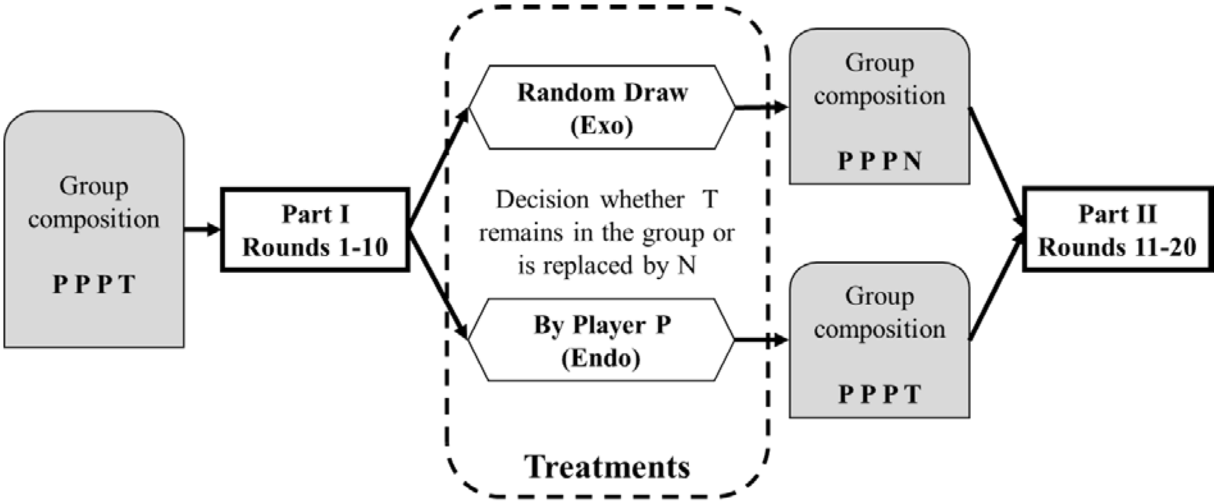


Figure 1: Experimental Design. Notation: P permanent group member, T temporary group member, N newcomer in a group

Prior to the experiment, subjects are asked to answer test-questions to ensure that they have understood the design. Moreover, subjects are asked in an incentivized one-shot public good game to decide about their own contributions conditional on the average contribution of other group members (integers from 0 to 20).[4] No information on the decision of others or payoffs derived from this pre-test are provided. We use this first decision to distinguish certain types of players with regard to their degrees of conditional cooperativeness (Fischbacher et al., 2001). Afterwards, the actual experiment starts and subjects are randomly assigned to (new) groups and player types. Before the start of each part, we elicit subjects' beliefs to verify expected contributions made by their group members in the first round of each part. After each round, subjects are informed about their individual payoff from the project and their private account.

In total, eleven sessions with a sum of 320 subjects (68 groups) were conducted and took place in July and November 2018 in the AIXperiments laboratory located at RWTH Aachen University, Germany. The subjects, mostly students (mean age: 23.97, 0.34 female[5]), were recruited with "ORSEE" (Greiner, 2004) and the experiment was programmed with "z-Tree" (Fischbacher, 2007). As shown in Table 1, 90 subjects were randomly assigned to the *Exo_Rep* variation and 80 to the *Exo_Ext* variation. In *Exo_Rep*, 72 of the 90 subjects contributed to the public good in part I and part II because in each of the 18 groups, one player of type N was

[4] Subjects were randomly assigned to groups of four and received a payoff as described above.
[5] All subsequent results are robust by including a female dummy.

assigned as a potential replacement without actually participating in the public good game. Due to the exogenously set contract extension of the temporary group members in the *Exo-Ext sessions*, no subject was assigned as a player type N and all 80 subjects contributed to the public good.

In total, 150 subjects were assigned to the *Endo* treatment from which 120 subjects contributed to the public good in each part (I and II). Almost two thirds of decisions were in favor of replacement so that 95 subjects were part of *Endo_Rep* and 55 of *Endo_Ext* in part II. The average duration of the experiment was 1.5 hours and the subjects earned on average 13.69 Euros each.

Table 1: Allocation of subjects to treatments

Treatment (variation)	**# Groups**	**# Individuals**	**# Player**		
			P	**T**	**N**
Exo All	38	170	114	38	18
Exo_Rep	18	90	54	18	18
Exo_Ext	20	80	60	20	-
Endo All	30	150	90	30	30
Endo_Rep	19	95	57	19	19
Endo_Ext	11	55	33	11	11

3. Results

The analysis of the results will be structured along our three major research questions. First, we ask whether the opportunity of a contract extension motivates temporary agents and also affects permanent group members' cooperation levels in both treatments. Secondly, we investigate why a P player decides to extend the contract. And finally, we focus on behavior in part II to gain insight into cooperation behavior after a contract has been extended or the temporary player has been replaced by a new player. To understand the effect of the endogenous decision of the internal group member, we compare behavior in the *Endo* treatments with behavior in the *Exo* settings in which the extension decision is randomly made.

3.1 Does the prospect of contract extension affect cooperation?

Exploring possible incentive effects of the extension promise, we first focus on type T players in particular, because they are directly affected by the decision. However, we then also consider possible effects for type P players, because individual contributions within groups are most likely to be related.

Total and individual mean contributions in our two treatments *Endo* and *Exo* do not significantly differ in part I. However, we do not find any differences regarding contributions of players P between the two settings in part I (Table 2, see also figures 2a and 2b). Furthermore, temporary agents cooperate significantly more than the permanent players (mean: 6.89; *p=0.064*)[6] in *Endo*. This result may indicate that T-type subjects in *Endo* choose higher contributions in order to foster an extension decision. Note that there is a considerable monetary incentive to get a contract's extension, as temporary group members have an expected income when staying in the group of 24.34 tokens compared to lump sum of 12 tokens for being unemployed. During the first part, only three Ts earn less than 12 tokens in one of the ten rounds each. Thus, Ts have an incentive to stay in the group.

Table 2: Mean contribution in part I

	Total	**Player P**	**Player T**	
Exo (n=152)	6.98	7.24	6.20	*p=0.287*
Endo (n=120)	7.14	6.89	7.88	*p=0.308*
	p=0.491	*p=0.865*	***p=0.064***	

[6] All reported non-parametric tests are conducted with the Mann Whitney-U Test.

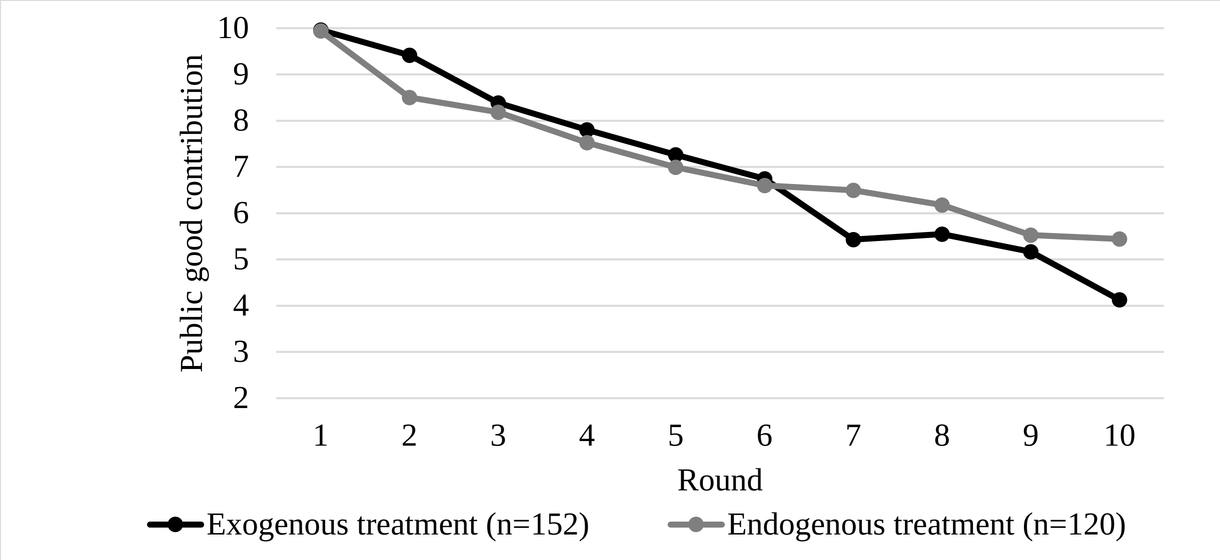


Figure 2a: Mean contribution over rounds in part I per treatment

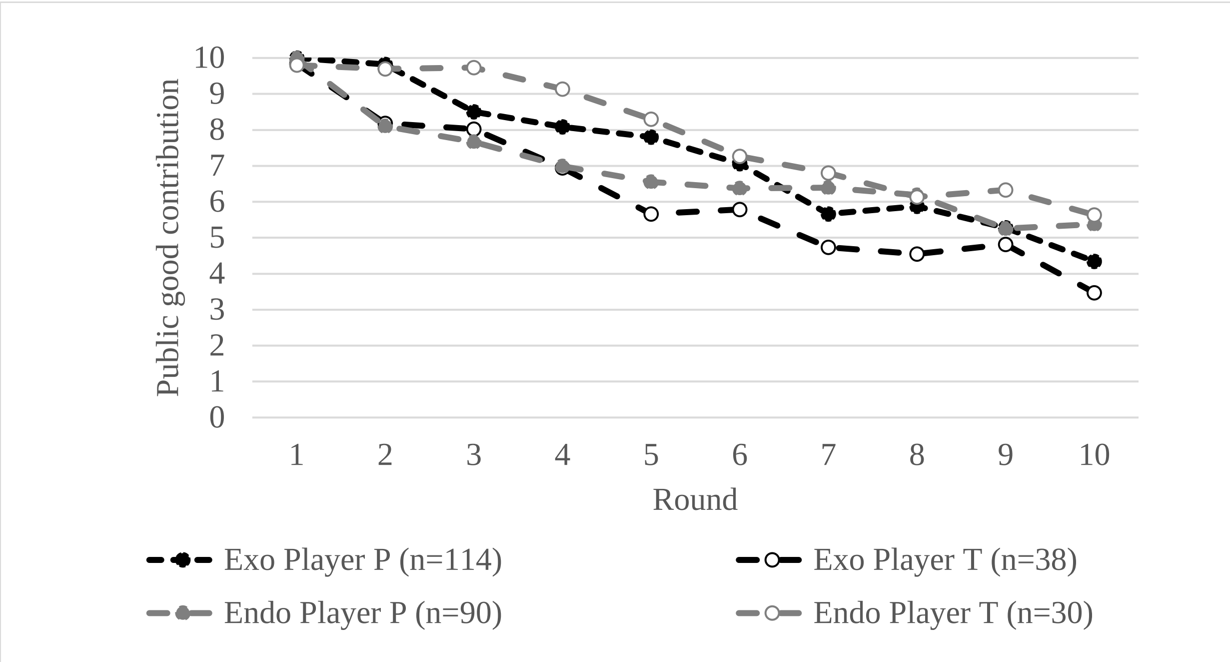


Figure 2b: Mean contribution over rounds in part I per treatment and player type

In order to get a deeper understanding of behavior in part I, we control for the conditional contributions that subjects are asked for before the experiment starts. In line with Fischbacher et al. (2001), we calculate Spearman rank correlations for each subject between the individual contribution and the mean contributions of the other group members in a one shot public good game as a measure for the *Conditional willingness to cooperate*. Insignificant correlations (*p*-

value<0.001) are recoded to zero. To capture typical diminishing contributions in public good games, we use *Round* as a control variable, too. We apply Tobit estimations and cluster at the subject level in the analysis presented in Table 3.

The results confirm our non-parametric tests: Participants contribute (weakly) significantly more in *Endo* than they do in *Exo*. There are no player type differences in *Exo* indicated by the insignificant effect of the dummy variable for player type P. However, the relation of contributions by type of player is different in the *Endo* treatment: P type players contribute relatively less than T type players. The conditional willingness to cooperate is positively related to contributions in part I of our experiment. Overall, our results indicate that the prospect of contract extension in our *Endo* treatment seems to serve as an incentive device for temporary players to contribute more to the public good.

Table 3: Tobit estimations on individual contributions in part I

	Individual contribution in part I
Endo (1=yes)	3.009*
	(1.701)
Player of type P (1=yes)	1.451
	(1.359)
Endo × Player of type P	-3.512*
	(1.982)
Conditional willingness to cooperate	5.549***
	(1.018)
Round	-0.888***
	(0.0783)
Constant	5.603***
	(1.472)
Pseudo R^2	0.023
Observations	2,720

Notes: Robust standard errors clustered at the individual level of 272 subjects (in parentheses). *** p<0.01, ** p<0.05, * p<0.1

3.2 What determines the decision to extend the contract?

In the *Endo* treatment, one of the P players is informed after part I that she is entitled to decide about extending T's contract or not. Almost two of three decisions (19 of 30) were in favor of replacing the temporary group member by a newcomer, whereas 11 contracts of temporary players were extended. To understand why a contract has been extended we examine the behavior in part I ex post for a given decision. We assume that higher levels of cooperation in part I lead to the decision to extend T's group membership.

Our results depicted by Table 4 show that the decision to extend the contract or not seems to be related to group contributions in part I. Indeed, groups in which T is replaced contribute 6.34 in part I while groups in which T's contract is extended contribute significantly more on average in *Endo* (8.52; p=0.051, one-sided Mann Whitney U- test)[7]. Thus, the contribution level of part I seems to play some role in the extension decisions.

Besides an analysis of the mean contribution, also the evolvement of group contributions over rounds may explain extension decisions. Thus, we introduce a second measure which may influence the decision in favor of or against replacement of the temporary group member: We calculate the difference between the maximal average group contribution in a round in the first part and the average group contribution in round 10 (*MaxDrop*, Table 4). This measure serves as an indicator for the experienced group-specific maximal drop in average contributions. Descriptively, there is indeed a considerable difference between the averages of *MaxDrop* regarding the extension decisions, but it is not statistically significant.

Table 4: Average mean group contribution and *MaxDrop* in part I by decision

	Replacement decision (*Endo*_Rep, n=19)	**Extension decision (*Endo*_Ext, n=11)**	*[*]*
Mean group contribution part I	6.34	8.52	*p=0.051*
MaxDrop	6.47	4.52	*p=0.160*

Note: *[*]* Since we have an explicitly directed hypothesis, we use one-sided Mann Whitney-U tests here.

[7] In the case of a directed hypothesis non-parametric tests applied are one-tailed. In all other cases, they are two-tailed.

The question is whether the reported difference in mean group contribution is equally driven by both player types. Table 5 reveals that both player types P and T play a role here. In particular, contributions of Ps are significantly higher in the *Endo_Ext* (mean contribution: 8.36) than in the *Endo_Rep* (mean contribution: 6.04, p=0.022) in part I. The T-type players also contribute somewhat more in part I of *Endo_Ext* than in *Endo_Rep* (9.02 vs. 7.23). However, mean contributions do not differ significantly at the usual level due to fewer observations (p=0.189).

Table 5: Contributions by player type in Part I by subsequent decision

	Replacement decision (*Endo*_Rep)	**Extension decision (*Endo*_Ext)**	*[*]*
Player P	6.04 (n=57)	8.36 (n=33)	*p=0.022*
Player T	7.23 (n=19)	9.02 (n=11)	*p=0.189*

Note: *[*]* Since we have an explicitly directed hypothesis, we use one-sided Mann Whitney-U tests here.

Mean contributions per group do not differ between *Endo_Ext* and *Endo_Rep* in the beginning of the experiment, but drift apart after the first rounds. From round five onwards, T in *Endo_Ext* contribute more on average than T in *Endo_Rep* (significant difference in rounds eight to ten with p<0.1). Moreover, also Ps in *Endo_Ext* cooperate more than the respective Ps in *Endo_Rep*: The mean contribution of P in *Endo_Ext* is already higher than in *Endo_Rep* from round three onwards (significant difference in rounds seven to ten with (p<0.05). This difference between Ps in *Endo_Ext* and Ps in *Endo_Rep* may be related to differing beliefs elicited before round 1: Player P's beliefs towards the contributions of type T players before round 1 differ between cases of later extensions (10.97) and replacements (8.78, p=0.044).

Further, we apply probit estimations in order to examine in more detail the decisions to extend or not to extend the contract. (Table 6). We again use the conditional willingness to cooperate of the decision maker as a control variable.

Table 6: Binary probit estimations on replacement in decisions in *Endo*

	I	II	III
Mean group contribution in part I	-0.149*		-0.121
	(0.081)		(0.078)
	[-0.050]		[0.039]
MaxDrop		0.153*	0.115
		(0.083)	(0.074)
		[0.052]	[0.037]
Conditional willingness to cooperate	-0.361	-0.279	-0.330
	(0.568)	(0.544)	(0.569)
	[-0.122]	[-0.095]	[-0.106]
Constant	1.654	-0.314	0.782
	(0.827)	(0.614)	(0.882)
Observations	30	30	30

Notes: Robust standard errors (in parentheses). Marginal effects [in brackets]. *** p<0.01, ** p<0.05, * p<0.1

In line with our non-parametric results, we test the effect of average group contributions in part I on the decision to replace the temporary group member by a newcomer (model 1). Mean group contributions in part I are negative and significant, which implies that higher average group contributions in part I decrease the probability of replacement. Further, we introduce *MaxDrop* as described above (model II). The variable is positively significantly related to the replacement decision in *Endo*. This result indicates that a higher probability of replacement is in line with a higher drop in contributions in part I. Since the mean group contributions in part I and *MaxDrop* are somewhat related, it is not surprising that significance levels decrease in a joint estimation (model III of Table 6).

To conclude, the decision of the randomly selected player P, who may decide to extend a contract, is related to the preceding cooperation rate within the group. Non-parametric and multivariate results implicate a higher probability of extending the contract with a higher cooperation rate within the group in the first part.

3.3 How do contract extensions or replacements affect subsequent cooperation behavior?

Finally, it is important to investigate whether extending the contract affects subsequent cooperation behavior. Therefore, we compare contributions in the different settings in part II of the experiment. Mean contributions by treatment variation and type in part II of our experiment are reported in Table 7. We find that within the *Exo* treatment average contributions subsequent to replacements exceed those after extensions (Mann Whitney-U Test; p=0.071). In part II, neither the previous decision mechanism (*Endo* versus *Exo*) nor the decision (replacement or extension) affects contributions for a given type of player, i.e., T or P players. The difference – reported above – within the *Exo* treatment between the replacement and the extension decision is only driven by the high contributions of the *Newcomers* (N).

Table 7: Mean contribution in part II

	Rep			***Ext***			
	Total	**Player P**	**Player N**	**Total**	**Player P**	**Player T**	Total *Rep* vs. Total *Ext*
Exo (n=152)	6.63	6.46	7.16	4.91	4.97	4.77	***p=0.071***
Endo (n=120)	5.58	5.22	6.67	6.31	6.25	6.52	*p=0.562*

In the *Exo*-Treatment, new players of type N contribute significantly more in round 11 than their group members of type P (mean contribution: 14.06 vs. 9.15, p=0.021). Their contributions are also much higher than those of type T players in *Exo_Ext* (mean contribution: 5.80, p=0.007). However, from round 12 onwards the players N reduce their contributions, and differences between T in *Exo_Ext* and N in *Exo_Rep* are not significant any more. We find similar patterns in *Endo* even though the overall difference in mean contributions is not significant: The new player of type N contributes more to the public good in the beginning. In round 11 of *Endo_Rep*, N (mean: 12.47) contributes on average more than P (mean: 8.75, p=0.066). Subsequently, Ns adjust to the mean contribution level after round 13.

Thus, we find that the new players who are added to the group in the replacement settings provide higher contributions in the beginning than all other players. Comparing the contributions of the new N players in round 11 to the contributions of other players in their first round in part I, we find that only in the *Exo* treatment are contributions of N significantly higher compared to both other player types in round 1 (N in round 11 (mean: 14.06) vs. P in round 1 (mean: 10.00): p=0.031; N in round 11 vs. T in round 1 (mean: 9.84): p=0.046).

Moreover, we also take a closer look at the evolvement of contributions over rounds to get a better understanding of behavior in settings in which the contract was extended. The average contribution per player type in each round in *Exo* and *Endo* is shown in Figure 3a and 3b. In the *Exo* treatment, contributions show the typical behavioral pattern of social dilemma games, i.e., contributions decrease over each part of the experiment. Furthermore, a restart effect can be shown for all player types (p<0.01) in *Exo* except for players of type T in *Exo_Ext*.[8] Comparing part I and part II in *Exo_Ext*, we find higher contributions in the first part for both player types compared to the second part (P-type: mean in part I: 7.05; mean in part II: 4.97; p=0.007; T-type: mean in part I: 7.73; mean in part II: 4.77; p=0.030).

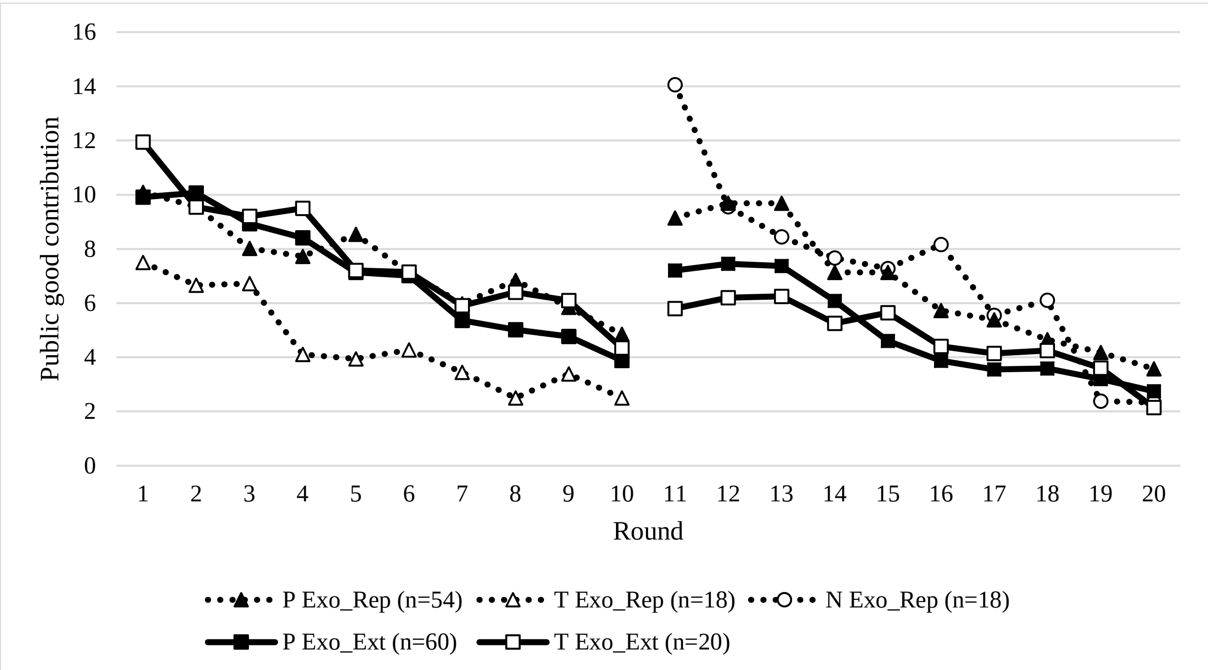


Figure 3a: Mean contribution over rounds in *Exo*

[8] We examine the restart effect by comparing the contributions of round 10 (end of part I) and round 11 (first round in the second part).

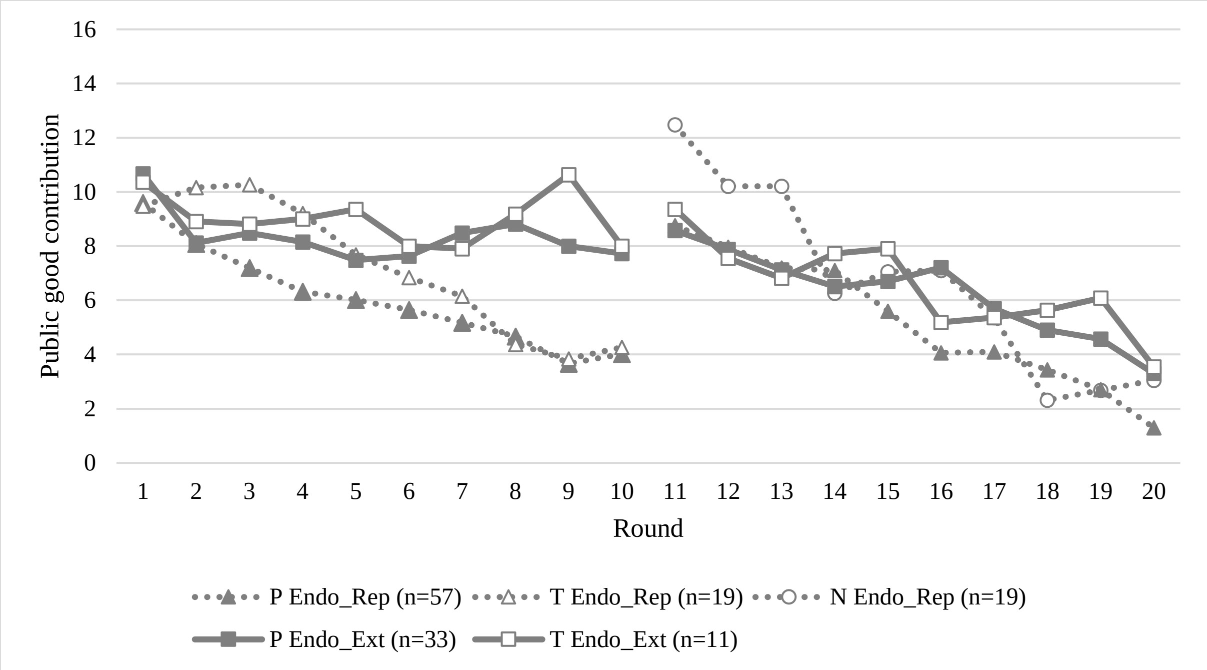


Figure 3b: Mean contribution over rounds in *Endo*

The evolvement of mean contributions over all rounds in the *Endo* treatment is illustrated in Figure 3b. A restart effect can only be shown for P, and T (compared to their successors N) in *Endo-Rep* (p<0.01).

Further, we analyze possible determinants of contributions in part II by using multivariate analysis. We separately explore the determinants of contributions for *Exo* and *Endo* (Tables 8 and 9, respectively). In detail, we apply Tobit estimations and cluster at the subject level.

First, we examine the effect of *Replacement* or *Extension* in part II for *Exo* in Table 8. Subjects in the *replacement* treatment (*Exo_Rep*) contribute (weakly) significantly more compared to the *extension* treatment. Additionally, we check for player type (P or T and N) and do not find a significant relation between the *Player type P* and individual contributions in the second part (model II). Moreover, the interaction between P and *Replacement* is not significant (model III) so that there are no hints of particular effects of temporary group members.

To investigate spillover effects in the sense that experiences from part I affect the individual contributions in part II, we use the variable *MaxDrop* as described above and add it to model IV. Indeed, *MaxDrop* is negatively significantly related to the individual contribution in the second part. Additionally, we examine the interaction between *MaxDrop* and *Replacement* in models V and VI. The role of *MaxDrop* for contributions in part II of the experiment is only relevant subsequent to extension decisions indicated by the significantly positive interaction term which abolishes the negative *MaxDrop* effect.

Table 8: Tobit estimations on individual contributions in part II (*Exo*)

	I	II	III	IV	V	VI
Replacement (1=yes)	2.558*	2.579*	3.503	2.026	-3.456	-2.570
	(1.444)	(1.433)	(3.456)	(1.439)	(3.103)	(4.323)
Player type P (1=yes)		-0.322	0.250	-0.320	-0.306	0.241
		(1.840)	(2.167)	(1.794)	(1.766)	(1.941)
Player type P × *Replacement*			-1.224			-1.159
			(3.748)			(3.592)
MaxDrop				-0.395*	-0.709**	-0.708**
				(0.210)	(0.287)	(0.287)
MaxDrop × *Replacement*					0.848*	0.847*
					(0.471)	(0.471)
Conditional willingness to		3.274*	3.318*	3.175*	2.727	2.769
Cooperate		(1.725)	(1.707)	(1.738)	(1.725)	(1.702)
Round	-1.297***	-1.299***	1.298***	-1.307***	-1.311***	-1.310***
	(0.144)	(0.145)	(0.145)	(0.145)	(0.145)	(0.145)
Constant	21.85***	19.899	19.434***	23.007***	25.687***	25.235***
	(2.160)	(3.190)	(3.248)	(3.360)	(3.618)	(3.632)
Observations	1,520	1,520	1,520	1,520	1,520	1,520

Notes: Robust standard errors clustered at the individual level of 152 subjects (in parentheses). *** p<0.01, ** p<0.05, * p<0.1

Second, we use the same multivariate analyses for the *Endo* treatment as depicted by Table 9. *Replacement* does not have a significant effect on the individual contribution in part II (model I). Further, players of type P contribute significantly less in part II than players of type T or N (model II). The interaction between player type P and *Replacement*, though, is not significant (model III). Also the variable *MaxDrop* shows no significant effect on the individual contribution in general (model IV). In model V, the interaction between *MaxDrop* and *Replacement* is included. The variables *Replacement* and *MaxDrop* are negative and significant whereas the interaction term is positive and significant. Again, experiences from part I seem to influence behavior in part II especially for *Extension* (*Endo_Ext*). These findings coincide with prior findings from *Exo*. The effects of *Replacement*, *MaxDrop,* and the interaction term of both are confirmed in model VI.

Finally, we further explore possible differences between type P players in the *Endo* treatment. We denote players as “decision makers” if they are randomly assigned the right to decide on extending the contract or not after part I; others in the group are denoted as “non-decision makers” in the following. Here, we again (see also Table 3 above) take the degree of conditional cooperativeness next to *MaxDrop* into account. The results are reported in Table 10 and reveal considerable differences between decision makers and non-decision makers. Decision makers in particular seem to react to *MaxDrop*. Also, the positive interaction effect between *MaxDrop* and *Replacement,* already known from Tables 8 and 9, traces back to decision makers in particular. In contrast, the (ex-ante reported) degree of conditional willingness of decision makers to cooperate does not matter. In contrast, the degree of conditional willingness to cooperate plays a crucial role for non-decision makers. This relevance is decreasing in *MaxDrop*, indicated by the significantly negative interaction term. However, previous experiences seem to be not as relevant for non-decision makers as for those who are assigned the role of decision maker after part I. Even the interaction term of *Replacement* and *MaxDrop* is not significant.

Table 9: Tobit estimations on individual contributions in part II (*Endo*)

	I	II	III	IV	V	VI
Replacement (1=yes)	-1.089	-0.431	0.785	0.376	-4.888*	-3.672
	(1.353)	(1.316)	(2.119)	(1.400)	(2.677)	(3.069)
Player type P (1=yes)		-2.334*	-1.335	-2.346*	-2.333*	-1.364
		(1.369)	(2.016)	(1.371)	(1.339)	(1.906)
Player type P × *Replacement*			-1.616			-1.563
			(2.710)			(2.623)
MaxDrop				-0.363*	-1.156***	-1.152***
				(0.208)	(0.417)	(0.415)
MaxDrop × *Replacement*					1.058**	1.050**
					(0.476)	(0.473)
Conditional willingness to		2.871*	2.994*	3.138**	2.844*	2.965*
Cooperate		(1.535)	(1.554)	(1.536)	(1.506)	(1.529)
Round	-1.270***	-1.269***	-1.269***	-1.270***	-1.264***	-1.264***
	(0.132)	(0.132)	(0.132)	(0.132)	(0.132)	(0.132)
Constant	24.00***	23.407***	22.572***	24.838***	28.486***	27.965***
	(2.209)	(2.764)	(2.777)	(2.745)	(3.234)	(1.529)
Observations	1,200	1,200	1,200	1,200	1,200	1,200

Notes: Robust standard errors clustered at the individual level of 120 subjects (in parentheses). *** p<0.01, ** p<0.05, * p<0.1

Table 10: Tobit estimations on individual contributions in part II (*Endo by decision of player of type P*)

	Decision maker (Player of type P)			Non-decision maker (Player of type P)		
	I	II	III	IV	V	VI
Replacement (1=yes)	3.915	-7.172	-6.597	-1.354	-3.425	-3.831
	(2.909)	(5.796)	(5.643)	(1.854)	(3.647)	(3.814)
Conditional willingness to cooperate	0.816	-0.0152	-5.147	6.019***	5.856***	13.73***
	(2.836)	(2.542)	(5.929)	(2.195)	(2.154)	(4.189)
MaxDrop	-1.554***	-3.282***	-3.966***	0.0522	-0.255	0.638
	(0.530)	(1.068)	(1.131)	(0.266)	(0.627)	(0.726)
Replacement × *MaxDrop*		2.378**	2.247*		0.407	0.575
		(1.194)	(1.168)		(0.680)	(0.716)
Conditional willingness to cooperate × *MaxDrop*			0.957			-1.344**
			(1.086)			(0.669)
Round	-1.203***	-1.168***	-1.160***	-1.321***	-1.320***	-1.323***
	(0.266)	(0.259)	(0.257)	(0.210)	(0.210)	(0.210)
Constant	27.23***	34.45***	38.20***	19.88***	21.38***	15.86***
	(4.280)	(6.350)	(6.531)	(3.747)	(4.387)	(4.978)
Observations	300	300	300	600	600	600

Notes: Robust standard errors clustered at the individual level of subjects (in parentheses). *** p<0.01, ** p<0.05, * p<0.1

Overall, although there are no treatment effects in part II subsequent to the extension or replacement decision at first sight, when digging a little deeper our detailed analysis reveals a number of interesting findings. First, newcomers start with considerably high contributions after replacement decisions. However, they adapt to contributions of other group members rather fast. Second, the maximal drop of cooperation rates over part I (measured by *MaxDrop*) is positively related to the replacement decisions. Third, the fact that some participants are given the authority to make an extension decision (or not) considerably affects how their subsequent cooperation rates are determined. The decision makers are obviously rather influenced by experiences in the past, and reduced their cooperation rates in particular, while those who are not given the right to decide tended to act in accordance with their original preferences for cooperation.

4. Discussion & conclusion

Our contribution adds to prior work on the determinants of cooperation in heterogeneous work groups with heterogeneity being modeled by different time limits of employment contracts. In our setting, three permanent workers (players of type P) and one temporary worker (player of type T) repeatedly contribute to a public good. Temporary workers know that their group membership will either be extended after the first part of the experiment or that they will be replaced by a new player. We vary the decision mechanism after the first part by comparing an endogenous decision where one of the permanent players is entitled to decide about the temporary worker's membership extension with an exogenous decision which is randomly made.

First, we investigate whether the prospect of being allowed to stay in the group serves as an incentive mechanism to provide higher contributions. In line with research on the literature of endogenous group formation (e.g. Page et al., 2005; Croson et al., 2015), our results show that endogenous decision mechanisms can serve as an incentive for temporary group members also in heterogeneous groups. Thus, having a temporary contract leads to higher contributions when agents know that the decision about contract extension will be endogenously made by one of the group members.

Second, we analyze why a contract is extended or not. We conjecture that higher contributions may rather induce a decision maker to extend the contract. Our results show that there is a tendency to replace temporary workers by new players. When comparing groups ex post in which the contract of temporary members has been extended by one permanent member to groups in which they were replaced, we find that in the former groups not only the temporary group member contributed more in the first part, but also the permanent group members. Interestingly, permanent group members start to contribute more than temporary group members earlier, implying that the former even initiate higher levels of contributions. One possible explanation is revealed by the analysis of beliefs measured before the experiment starts. We find that in groups in which Ts' contracts are extended, Ps expect temporary workers to contribute more than in groups in which a T's contract is not extended. This expectation may result in a self-fulfilling prophecy. Although this attribution is not justified by actual contribution patterns from the start, it does become true after round three or five. Additionally, our variable *MaxDrop* reflects the difference between the maximal contribution per group over rounds and the low contribution in the last round. One may cautiously interpret this variable as a proxy for the degree of disappointment, as it captures the maximal perceived decrease of cooperation per group. Our results indicate that temporary workers are more often replaced when the disappointment measured by *MaxDrop* is higher. Taken together, an ex post analysis for a given decision shows that groups in which the temporary group member is extended reveal different contribution patterns early on compared to groups in which the temporary group member is replaced. When the contract is extended, the contribution level is higher early on, and we do not observe the characteristic decrease in contributions over rounds.

Finally, we investigate whether subsequent cooperation behavior is affected by the decision to extend the contract or not. Interestingly, we find that cooperation is higher if a temporary worker is replaced by an exogenous random mechanism compared to the case of being extended by a group member. This effect is driven by the new player who is added to the group and replaces the temporary worker and who contributes more in the beginning of part II than other players. His contribution is even higher than contributions of others at the very beginning of the experiment. Also when the decision is made endogenously, new players provide higher contributions in the first rounds of part II but the effect is not similarly pronounced. How can we explain the extraordinarily high contributions of new players when they are "invited" by a random device?

The decision of a group member to replace a temporary team member could be interpreted as a sanction for preceding behavior. The decision maker may use the chance to signal her dissatisfaction to the group by deciding to replace the worker. Apparently, the new incumbent might try not to fall into disfavor with the permanent group members in contrast to the former temporary group members. This may explain why the new players' contributions are somewhat higher if the decision is made endogenously. In the case of an exogenous random mechanism, participants know that they are not entering the group to replace a temporary worker who might not have provided the contribution as expected. Thus, there is a chance to enter a group that may not have experienced a low cooperation rate and newly entering participants might be willing to match potential contributions of others.

However, new group members integrate well into the group in both settings with endogenous and exogenous replacement decisions. The new incumbent influences the whole group contribution positively, albeit she promptly adapts her contribution behavior to the contribution behavior of the other, experienced group members. This result is in line with the finding of Gunnthorsdottir el al. (2007), who show that individuals adjust their contributions to a public good depending on the former group mates' contributions.

Moreover, results from the multivariate analysis reveal that a higher experienced disappointment approximated by *MaxDrop* in part I implies lower contributions in the second part. However, in case a temporary worker has been replaced, the new incumbent can neutralize this effect on average through high contributions in the second part.

Also within the group of permanent members, we observe differences in contribution behavior according to the different roles of permanent group members. Some of the permanent members are randomly assigned the right to decide on extending the contract or not. Our results show that contributions of decision makers seem to be rather influenced by past experiences, while the behavior of those who are not allowed to decide seems to be related to their original conditional willingness to cooperate. As history does not seem to be strongly related to the behavior of the non-decision makers, we conjecture that they perceive this second part of the experiment as a completely new game. In contrast, the mindset of subjects is completely different if they are assigned the role of the decision maker after part I. These decision makers focus more on experiences in this specific context so that their original conditional willingness to cooperate takes a back seat.

Our results indicate that allowing one of the team members to extend the contract of the temporary group member (or not) may actually serve as a motivating incentive within the group. This increased cooperation rate pays off, as temporary workers in groups with higher contributions are more likely to receive an extension. Albeit, groups in which the temporary workers have been replaced do not perform worse subsequently. We observe that newcomers replacing the temporary workers show a high level of contribution only at the very beginning, particularly if the replacement was randomly made. However, they quickly adapt to the rest of the group. Thus, our results imply that the prospect of having a contract extended may be used as a motivating incentive in heterogeneous work groups. Subsequent to the contract decision, however, extending a contract seems to be similar to settings where temporary workers have been replaced.

References

Anderhub, V., Königstein, M., Kübler, D., (2003). Long-term work contracts versus sequential spot markets: experimental evidence on firm-specific investment. Labour Economics, 10(4), 407-425.

Andreoni, J., 1988. Why free ride?: Strategies and learning in public goods experiments. Journal of Public Economics .37(3), 291–304.

Angelova, V., Güth, W., Kocher, M., (2012). Co-employment of permanently and temporarily employed agents. Labour Economics, 19(1), 48-58.

Barrick, M., Stewart, G., Neubert, M., Mount, M., 1998. Relating member ability and personality to work-team processes and team effectiveness. Journal of Applied Psychology, 83(3), 377-391.

Chatman, J., Flynn F., 2001. The influence of demographic heterogeneity on the emergence and consequences of cooperative norms in work teams. Academy of Management Journal, 44(5), 956-974.

Cinyabuguma, M., Page, T., Putterman, L., 2005. Cooperation under the threat of expulsion in a public good experiment. Journal of Public Economics, 89, 1421-1435.

Connaughton, S., Shuffler, M., 2007. Multinational and multicultural distributed teams; A review and future agenda. Small Group Research, 38(2), 387-412.

Croson, R., Fatas, E., Neugebauer, T., & Morales, A. J. (2015). Excludability: A laboratory study on forced ranking in team production. *Journal of Economic Behavior & Organization, 114*, 13-26.

Damiani, M., Pompei, F., Ricci, A., 2016. Temporary employment protection and productivity growth in EU economies. International Labour Review, 155(4), 587-622.

Dickinson, D., 2001. The carrot vs. the stick in work team motivation. Experimental Economics, 4, 107-124.

Engellandt, A., Riphahn, R., 2005. Temporary contracts and employee effort. Labour Economics, 12(3), 281-299.

Fehr, E., Gächter, S., 2000. Cooperation and punishment in public goods experiments. American Economic Review. 90(4), 980–994.

Fischbacher, U., Gächter, S., Fehr, E., 2001. Are people conditionally cooperative? Evidence from a public good experiment. Economic Letters, 71, 397-404.

Fischbacher, U., 2007. z-Tree: Zurich toolbox for ready-made economic experiments. Experimental Economics. 10(2), 171–178.

Greiner, B., 2004. The online recruitment system ORSEE — a guide for the organization of experiments in economics. Papers on Strategic Interaction 2003-10, Max Planck Institute of Economics, Strategic Interaction Group.

Grund, C., Harbring, C., Thommes, K., 2015. Public good provision in blended groups of partners and strangers. Economic Letters, 134, 41-44.

Grund, C., Harbring, C., Thommes, K., 2018. Group (Re-)formation in public good games: The tale of bad apple?. Journal of Economic Behavior & Organization, 145, 306-319.

Gunnthorsdottir, A., Houser, D., McCabe, K., 2007. Disposition, history and contributions in public goods experiments. Journal of Economic Behavior & Organization, 62, 304–315.

Güth, W., Levati, M., Sutter, M., van der Heijden, E., 2007. Leading by example with and without exclusion power in voluntary contribution experiments. Journal of Public Economics, 91(5-6), 1023-1042.

Hamman, J., Weber, R., Woon, J., 2011. An experimental investigation of electoral delegation and the provision of public goods. American Journal of Political Scienc, 55(4), 738-752.

Ibanez, M., Schaffland, E., 2018. Organizational performance with in-group and out-group leaders: An experiment. Journal of Behavioral and Experimental Economics, 73, 1-10.

Jahn, E., Riphahn, R., Schnabel, C., 2012. Feature: Flexible forms of employment: Boon and Bane. The Economic Journal, 122(562), F115-F124.

Jones, G., 2008. Are smarter groups more cooperative? Evidence from prisoner's dilemma experiments, 1959–2003. Journal of Economic Behavior & Organization, 68(3-4), 489-497.

Kirkman, B., Tesluk, P., Rosen, B., 2004. The impact of demographic heterogeneity and team leader-team member demographic fit on team empowerment and effectiveness. Group & Organization Management, 29 (3), 334-368.

Kocher, M., Fangfang, T., Yu, J., 2017. Providing global public goods: electoral delegation and cooperation. Economic Inquiry, 56(1), 381-397.

Kopányi-Peuker, A., Offerman, T., Sloof, R., 2018. Team production benefits from a permanent fear of exclusion. European Economic Review, 103, 125-149.

Kroll, S., Cherry, T., Shogren, J., 2007. Voting, punishment, and public goods. Economic Inquiry, 45(3), 557-570.

Maier-Rigaud, F., Martinsson, P., Staffiero, G., 2010. Ostracism and the provision of a public good: Experimental evidence, 73, 387-395.

Masclet, D., 2003. Ostracism in work teams: A public good experiment. International Journal of Manpower, 24, 867-887.

Michie, J., Sheehan-Quinn, M., 2001. Labour market flexibility, human resource management and corporate performance. British Journal of Management, 12, 287-306.

Norman, H., Wallace, B., 2012. The impact of the termination rule on cooperation in a prisoner's dilemma experiment. International Journal of Game Theory, 41, 707-718.

OECD (2018), Temporary employment (indicator). doi: 10.1787/75589b8a-en, accessed on 21 September 2018.

Page, T., Putterman, L., & Unel, B. (2005). Voluntary association in public goods experiments: Reciprocity, mimicry and efficiency. *The Economic Journal*, *115*(506), 1032-1053.

Palfrey, T., Rosenthal, H., 1994. Repeated play, cooperation and coordination: an experimental study. Review of Economic Studies, 61, 545-565.

Rinne, U., Zimmermann, K., 2012. Another economic miracle? The German labour market and the Great Recession. IZA Journal of Labour Policy 1:3.

Walasek, L., Juanchich, M., Sirota, M., 2019. Adaptive cooperation in the face of social exclusion. Journal of Experimental Social Psychology, 82, 35-46.

Walker, J., Gardner, R., Herr, A., Ostrom, E., 2000. Collective choice in the economics: experimental results on proposed allocation rules and votes. The Economic Journal, 110, 212-234.

Watson, W., Kumar, K, Michaelsen, L., 1993. Cultural Diversity's impact on interaction process and performance: comparing homogeneous and diverse task group. Academy of Management Journal, 36(3), 590-602.

Weng, Q., Carlsson, F., 2015. Cooperation in teams: The role of identity, punishment, and endowment distribution. Journal of Public Economics, 126, 25-38.

van der Heijden, E., Potters, J., Selfton, M., 2009. Hierarchy and opportunism in teams. Journal of Economic Behavior & Organization, 66(1), 39-50.

Appendix

Experimental Instruction (originally in German)

Welcome to the experiment! In this experiment you are able to earn money. How much money you earn depends on your decisions and the decisions of the other participants.

Please turn off your phone and as of now do not communicate with other participants.

During the experiment we will not speak of "Euros" but rather of "tokens". During the experiment your entire earnings will be calculated in tokens. At the end of the experiments the total amount of tokens you have earned will be **converted to Euros at the following rate**:

1 token = 0.18 €

All decisions in this experiment as well as the final earnings are anonymous.

The displayed results are rounded to the first decimal place.

The decision situation

One group has four members. You are playing with three randomly selected participants in a group. Each member has to decide on how to divide up 20 tokens. You can put these 20 tokens into a **private account** or you can invest them fully or partially into a **shared project**. You can only invest integral tokens between 0 and 20.

Your income from your private account

Each token that you do not invest into the project will automatically be transferred to your private account. **Nobody but yourself** can receive tokens from your **private** account.

Income from the private account = 20 – contribution to the shared project

Your income from the shared project

Each token that is being invested in the shared project will be multiplied by 1.6 and **equally distributed among all four members of the group**.

Income from the shared project = 0.4 x sum of all contributions to the project

Your total income

Your **total income** is the sum of your **income from the private account** and your **income from the shared project**. It holds that:

Income from the private account
(= 20 - contribution to the shared project)

\+

Income from the shared project
(=0.4 x *sum of all contributions to the project)*

=

Total income

If you have a question about the experiment, please raise your hand. We will then come to you and answer your question.

Please answer the control questions now.

The experiment – Part 1

In this experiment each participant has to make two types of decisions. In the following these decisions will be called **"Unconditional contribution"** and **"Contribution table"**.

"Unconditional contribution"

With the unconditional contributions to the project you have to decide how many of the 20 tokens you want to invest into the project.

"Contribution table"

Your second task is to fill out a "contribution table". In the contribution table you have to indicate for each possible average contribution of the other group members (rounded to the next integer) how many tokens you want to contribute to the project.

For example, you have to indicate how much you want to invest in the project if your group members invest on average 0 token, 1 token, 2 tokens, and so forth.

Payoff

For the payoff from this part you will be randomly assigned to a group with three other participants. In each group one member will be chosen **randomly**. For this member his decision in the **contribution table** will be relevant for the payoff. For the other three members their decision on the **unconditional contribution** will be relevant for the payoff.

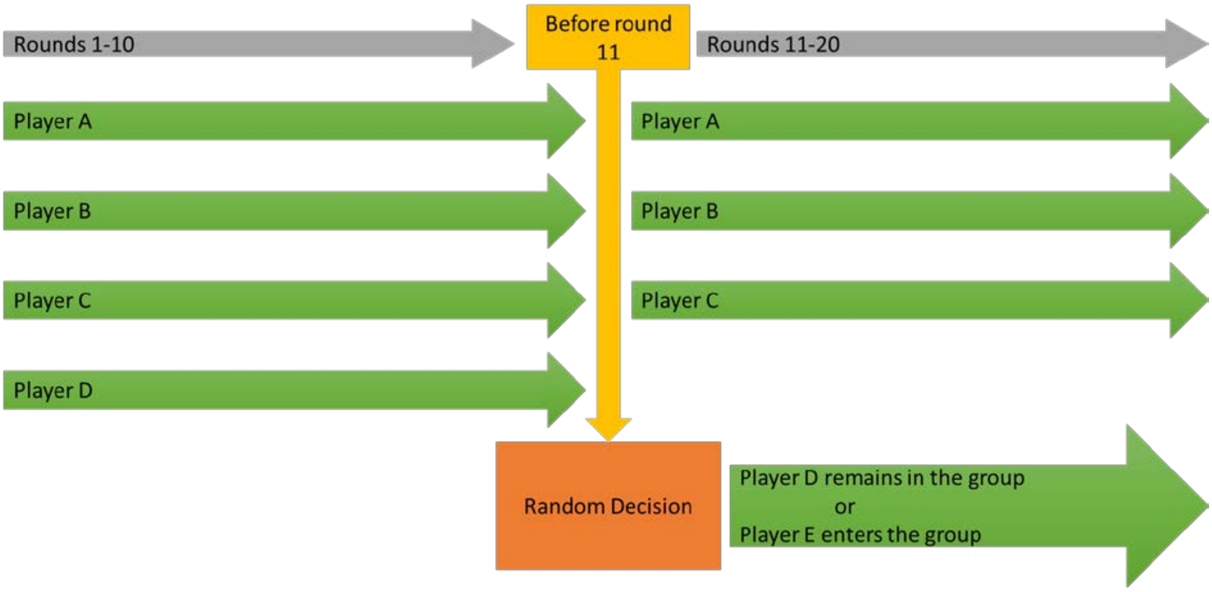
The experiment – Part 2 (Exogenous decision)

In the following experiment you will be asked again to make a decision as described above. You again have 20 tokens at your disposal in each round and have to decide how much you want to contribute to the shared project. The tokens that you do not invest will be transferred to your private account.

The following experiment will be played in groups of four members for **20 rounds**. You will be assigned a player type. These are player A, player B, player C, player D, and player E. You will be informed of your randomly assigned **player type** before the first round.

Player A, player B, and player C will be playing 20 rounds in the same group. In the first 10 rounds player A, player B, player C and player D are a group of four players. Before the 11th round a random draw will decide whether player D will remain in the group or whether she will be replaced by player E. All players will be informed about whether player D will remain in the group or whether she will be replaced by player E. After that the next 10 rounds will be played.

In each round **player A, player B, and player C** decide how many tokens they want to invest in the project. After each round they receive information about their contribution, all contributions to the project, the amount of income from the private account and from the project as well as their total income in each round.
Player D decides in the first 10 rounds how many tokens she wants to invest in the project and receives the same information after each round as player A, player B, and player C. If player D remains in the group, she will make the same decisions and will receive the same information as in the first 10 rounds. If player D is randomly replaced before round 11 she will not make any decisions about the dividing up of 20 tokens and will not be able to observe the decisions of the other players. This player will not be part of the decision-making and can read comics.
Player E will not make any decision about dividing up of 20 tokens in the first 10 rounds and cannot observe the decisions of the other players. The player will not be part of the decisions and can read comics. If player E is brought into the group to substitute player D, she will decide how many tokens she wants to invest in the project in rounds 11 to 20. After reach round she will receive information about her own contribution, all contributions to the project, the amount of income from the private account and from the project as well as her total income in each round. If player E is not brought in as a substitute, she will not make any decisions and will receive no information, as in the first 10 rounds.



Estimation

Before the players are told the results of the 1st and the 11th rounds the players A, B, C, and D (or player E if player D is replaced before the 11th round) will be asked to estimate the average contribution of the players in the group in the previous round.
If the estimation of the players is close, they will receive an individual payoff. The payoff will be calculated as followed:

Payoff from the estimation = 10 tokens - |deviation|.

If the players are out by 10 tokens or more, they will not receive a payoff but no amount will be subtracted. Thus, losses are not possible.

Payoff

After the 10th round one of the rounds 1 to 10 will be randomly selected to be relevant for the payoff of player A, player B, player C, and player D. Player E will receive a fixed compensation of 12 tokens.
Again after the 20th round one of the rounds 11 to 20 will be randomly selected to be relevant for the payoff of player A, player B, player C, and D (or player E if player D is replaced before the 11th round). Player E (or player D if she is before the 11th round) receives a fixed compensation of 12 tokens.

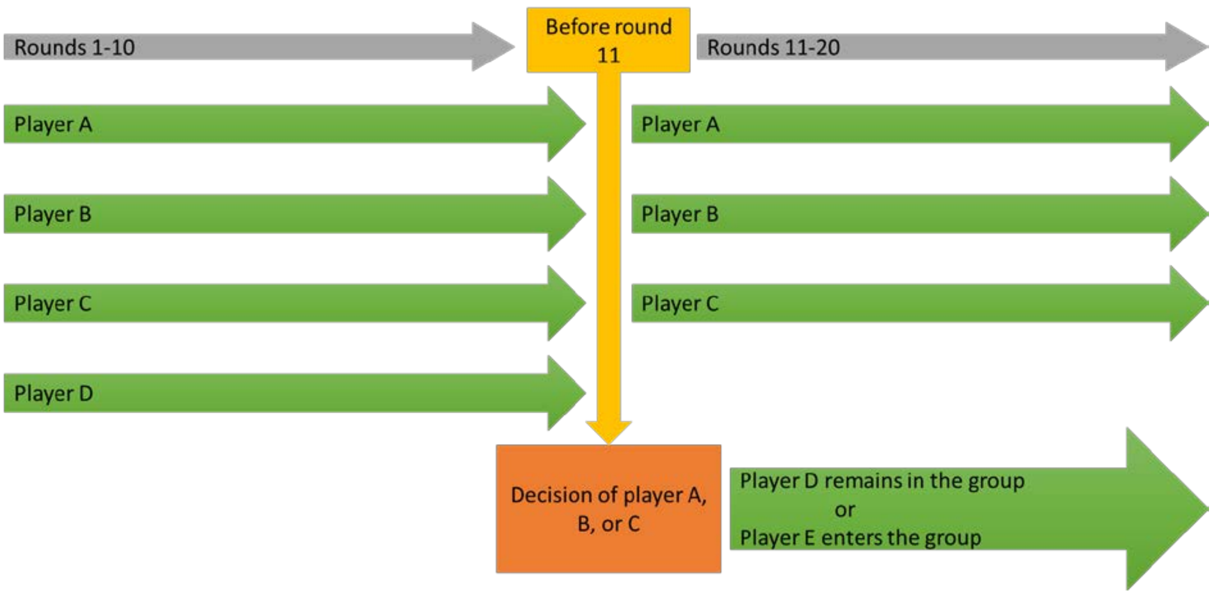
The experiment – Part 2 (Endogenous decision)

In the following experiment you will be asked again to make a decision as described above. You again have 20 tokens at your disposal in each round and have to decide how much you want to contribute to the shared project. The tokens that you do not invest will be transferred to your private account.

The following experiment will be played in groups of four members for **20 rounds**. You will be assigned a player type. These are player A, player B, player C, player D, and player E. You will be informed of your randomly assigned **player type** before the first round.

Player A, player B, and player C will be playing 20 rounds in the same group. In the first 10 rounds player A, player B, player C, and player D are a group of four players. Before the 11th round one randomly assigned player A, player B, or player C will decide whether player D remains in the group or if she will be replaced by player E. All players will be informed about whether player D will remain in the group or whether she will be replaced by player E. After that the next 10 rounds will be played.

In each round **player A, player B, and player C** decide how many tokens they want to invest in the project. After the 10th round one randomly assigned player A, player B, or player C decides about the extension or replacement of player D within the group. After each round they receive information about their contribution, all contributions to the project, the amount of income from the private account and from the project as well as their total income in each round. **Player D** decides in the first 10 rounds how many tokens she wants to invest in the project and receives the same information after each round as player A, player B, and player C. If player D remains in the group, she will make the same decisions and will receive the same information as in the first 10 rounds. If player D is randomly replaced before round 11, she will not make any decisions about the dividing up of 20 tokens and will not be able to observe the decisions of the other players. This player will not be part of the decisions and can read comics.
Player E will not make any decision about the dividing up of 20 tokens in the first 10 rounds and cannot observe the decisions of the other players. The player will not be part of the decisions and can read comics. If player E is brought into the game to substitute player D, she will decide how many tokens she wants to invest in the project in rounds 11 to 20. After each round she will receive information about her own contribution, all contributions to the project, the amount of income from the private account and from the project as well as her total income in each round. If player E is not brought in as a substitute, she will not make any decisions and will receive no information, as in the first 10 rounds.



Estimation

Before the players are told the results of the 1st and the 11th Rounds, the players A, B, C, and D (or player E if player D is replaced before the 11th round) will be asked to estimate the average contribution of the players in the group in the previous round.
If the estimation of the players is close, they will receive an individual payoff. The payoff will be calculated as followed:

Payoff from the estimation = 10 tokens - |deviation|.

If the players are out by 10 tokens or more, they will not receive a payoff but no amount will be subtracted. Thus, losses are not possible.

Payoff

After the 10th Round, one of the rounds 1 to 10 will be randomly selected to be relevant for the payoff of player A, player B, player C, and player D. Player E will receive a fixed compensation of 12 tokens.
Again after the 20th round one of the rounds 11 to 20 will be randomly selected to be relevant for the payoff of player A, player B, player C, and player D (or player E if player D is replaced before the 11th round). Player E (or player D if she is replaced before the 11th round) receives a fixed compensation of 12 tokens.