Pre-analysis plan

Consequences of cooperation: Linking cooperative behavior and outcomes in a large-scale experiment

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Abstract

This project provides evidence on how cooperative inclination is related to professional behavior and success in a large multinational software corporation. The pre-analysis plan at hand anticipates respective analyses of the data to be elicited through artefactual field experiments and company data to be linked on the individual and group level. Also, potential sources of naturally occurring experiments as well as potential field interventions are described. The three main hypotheses we are going to address in this pre-analysis plan are the effect of cooperative inclination measured via variants of the public goods game on main outcome variables of professional behavior within a company (1), the predictive power of cooperative norms elicited through coordination mechanisms (2), and the external validity of these experimental measures of cooperation (3). Adjustments to the first version of this pre-analysis plan are written in green.

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1 Introduction

The importance of the concept of cooperation in social dilemmas in economics, and the social sciences in general, is unquestioned. The vast majority of our empirical knowledge on cooperation relies on laboratory experiments in parsimonious setups. However, how cooperation in an experiment translates to real-life cooperation decisions within an organization and how real-life cooperation interacts with given institutions and contexts are under-researched topics. Building on this observation, the twofold purpose of this project can be described as follows:

First, we plan to study cooperation and cooperative norms within an organization (a large company) and relate it to relevant outcomes in the professional context at hand. More specifically, we will analyze the extent to which cooperation makes individuals and teams in a competitive environment more or less successful with respect to their individual or team/organizational goals. In this context, we will analyze how cooperative inclination of individuals and teams or perceptions of cooperative norms interact with given incentive schemes, different complementarities of cooperative and selfish effort in the production function, and team compositions.

Second, as experimental measures on behavioral types with respect to cooperation so far have mostly been used in the laboratory, our study also fulfills a methodological purpose by assessing the external validity of laboratory measures of cooperation in an artefactual field experiment setting. We plan to use the elicited levels of individual and team-level cooperation as correlates and predictors of real-world cooperative behavior within the company.

Our project will address these research objectives in a unique setting. In collaboration with a large software corporation in Germany, we are able to run fully incentivized online experiments with up to 1,000 employees (approximately 100 teams) of the company. We link the data from the experiments that measure cooperative behavior in variants of the public goods game and individual norm perception using coordination mechanisms (including a large set of controls) with objective outcome variables from the company. We

herewith systematically address the context and consequences of cooperative behavior in a professional environment controlling for contextual factors of cooperation.

This pre-analysis plan also serves as an instrument to anticipate the exploitation of potentially naturally occurring experimental variations or the planning of field experimental interventions that rely on analyses of the artefactual field experiment and company record data.

The reminder of this pre-analysis plan is structured as follows: First we specify our research strategy by describing the sampling, the data to be used, and the data collection procedures. Then, we sketch our planned empirical analyses. Here, among other aspects, we define our primary and secondary outcome variables, state our hypotheses, and specify how we are going to test these hypotheses. We conclude with a brief description of how we proceed from here.

2 Research strategy

2.1 Sampling

Our sample will consist of teams within the company that have at least 8 members of which more than 70% are based in Germany. For a first two-weeks long roll-out phase, starting in November 2017, a total of around 1,300 potential respondents (i.e., about 100 teams) will be randomly chosen (given the stratification criteria mentioned above), and we aim for a participation rate of about 50%. Another 1,000 potential respondents will be randomly chosen for the second two-weeks long roll-out phase taking place in 2018.[1] Our objective is to reach a final sample size of 1,000 participants. After a team has been randomly selected, the potential individual team members will be send an e-mail with an official invitation for which both the HR Department and the Works Council have agreed to accompany a strong support statement.[2] Then, a few days later, potential participants

[1] Here, we only describe the analyses for the first wave's data.
[2] All material including invitation and reminder e-mails can be found in the appendix.

receive a personalized participation link and have two weeks time to take part in the experiment. We also plan to send one reminder after the first week of the respective roll-out phase and a second reminder two days before the experiment ends to make sure that attrition is as small as possible. Having all company information about non-respondents that we have for respondents will allow us to control for potential sample selection effects.

2.2 Data to be collected

Our analyses is based on data from four different sources. We collect data on cooperative behavior and respective norms from a fully incentivized online experiment (an artefactual field experiment in the terminology of Harrison and List (2004)) taking place with 1,000 employees of the company (2.1.1). In a subsequent survey module, we elicit a variety of control variables like socio-economic characteristics or measures for team coherence and identification (2.1.2). The gathered data is then merged with objective outcome variables (and other context variables) from the company (2.1.3). We aim at exploiting potential natural experiments within the company's incentive structure, team production functions, team compositions or performance communications (2.1.4).[3]

An overview of all elicited variables and the full online experiment/survey can be found in the appendix.

2.2.1 Artefactual field experiments

The first part is an experiment according to the abc-framework of cooperation. It uses the design of Fischbacher et al. (2001), including the elicitation of beliefs. This is a standard experimental design that has been used extensively in experiments with different subject pools. It elicits an unconditional contribution, a full contribution schedule, and subjects' beliefs about others' average unconditional contributions in a voluntary contribution mechanism (VCM) setting.

[3] 2.1.4. requires further discussions with the company that rely on the outcomes of the analyses of the first two modules.

Participants are randomly grouped in groups of three. Every participant is aware of the fact that all other participants are randomly selected employees of the company. Each group member receives an initial endowment of 10 Tokens (which equals 10 Euro) to be allocated to a private account or to be contributed to a public account. The invested amount, an integer that satisfies $0 \leq c_i \leq 10$, is referred to as the unconditional contribution. The sum of all contributions to the public good is multiplied by $n\gamma$, which is 1.5 in our case, and divided equally among all n group members. This leads to the following payoff function for subject i

$$\pi_i = 10 - c_i + \gamma \sum_{j=1}^{n} c_j$$

which is linear in the public good contribution and where c_i denotes the contribution of group member i. The marginal per capita return (MPCR) from investing in the public good is $\frac{1}{n} < \gamma < 1$. From an individual perspective, free-riding (i.e., $c_i = 0$) is a dominant strategy. Since the sum of marginal returns is larger than 1, however, contributing the entire endowment is the optimal choice from a collective perspective (i.e., maximizing efficiency). The decision is made only once and anonymously; thus there are no incentives to build a reputation.

After indicating an unconditional contribution and without any feedback, participants are asked to fill in a contribution table, indicating their contribution for each possible average contribution of the other group members, rounded up to integers. The conditional contributions from the contribution table ("the contribution vector") allow us to classify types: *free riders*, *conditional contributors*, *hump-shaped* or *triangle contributors*, and *others* (Fischbacher et al., 2001; Kocher et al., 2008, 2015). To make both sets of decisions, the unconditional and the conditional contribution, incentive-compatible we use the mechanisms described in Fischbacher et al. (2001). That is, for one randomly slected subject the conditional contributions are payoff-relevant, whereas for the two remaining subjects the unconditional contribution is. We also elicit expected contributions of others in an

incentivized way. Following Gächter and Renner (2010), participants are asked to guess the average unconditional contribution of the other group members and receive 5 Euro if they hit the correct average, and 0 Euro otherwise.

After the public goods game has ended, we will elicit norms and norm perception with regard to helping, information sharing and teamwork. This provides us with a better understanding of the "cooperative culture" in the company. Each participant will receive five vignettes with each of the vignettes describing a specific social dilemma. A social dilemma consists of a cooperation subject (a person that decides to cooperate or not) and a cooperation object (a person to cooperate with). Subsequently an action statement is made that expresses whether the cooperation subject decided to cooperate or not.

For 50% of the participants the question is whether the respective action statement is deemed "very appropriate", "rather appropriate", "rather inappropriate", or "very inappropriate". For the other 50% of the participants the question is whether the behavior is observed "very frequently", "rather frequently", "rather rarely", or "very rarely". It is important that we are not interested in the answers per se, but in the perception of the social norm. A social norm is a shared perception (for an overview, see Bicchieri and Muldoon (2011). When asking how socially appropriate the described behavior is, we elicit the injunctive norm. In contrast, how frequently a specific behavior is observable gives rise to the descriptive norm (for a discussion on differences between injunctive and descriptive norms see Burks and Krupka (2012)). To elicit the norm, we pay 3 Euro per vignette to those participants that select the answer category that has been chosen by the relative majority of the respondents. Hence, a profit-maximizing decision maker should choose the answer category that he or she deems the modal answer category. Krupka and Weber (2013) have shown that the procedure is indeed suitable to elicit social norms.

In a very similar vein to the coordination mechanism above, we elicit the shared perception of team success, the shared assessment of the team's impact on the company's value, and the perceptions about the necessity of cooperative efforts. The first aspect is addressed by asking how successful the team is on a scale from "not successful", "rather

successful", "rather unsuccessful", to "very unsuccessful". The impact question is addressed by asking whether the team's contribution to the company's value is "very high", "rather high", "rather low", or "very low". The necessity of cooperation is measured on a scale from "very unimportant", "rather unimportant", "rather important", to "very important". Again, we incentivize participants by paying 3 Euro for each question for which they hit the modal answer category.

Finally, we also elicit time preferences in an incentivized fashion as described by Falk et al. (2016).

2.2.2 Survey

After the incentivized parts, we elicit additional variables that are relevant for the analysis of the determinants of cooperation in an unincentivized way. We capture personality traits (a short form of the Big Five; see Gosling et al., 2003), and information about individual cooperative behavior in spare time using items from the self-reported altruism questionnaire (Rushton et al., 1981). Furthermore, we elicit basic socio-economic variables (like nationality, education, and martial status). Finally, variables with respect to perceived team cohesion, team coherence, team and company identification (Mael and Ashforth, 1992), and team stability will be elicited as well as variables regarding the cooperative attitude within the team, competitive attitude (e.g., the competitiveness index; see Smither and Houston (1992); Newby and Klein (2014)) and an indicator of self-evaluated performance/cooperation.

2.2.3 Company information

In addition to the data we collect from the experimental and survey modules, we obtain information about team structures (e.g. gender composition), hierarchy levels, personal responsibilities, incentive schemes, bonuses and awards received, performance and potential ratings, and other aspects from the company.

2.2.4 Potential sources of natural variations or field experimental interventions

In the progress of our projects and conditional on the first wave's findings we will make use of data from "natural experiments" within the firm, i.e., currently planned changes in incentive schemes and promotion rules or discuss and plan experimental interventions within the company.

There are several developments at the company over the coming two years that will allow us to take them into account in our final study design. First, the company is starting to implement new incentive models that are rolled out in waves. Second, there is a gradual change in the business model - the traditional model uses servers that are on the premise of the client and that are serviced by company employees, whereas the new model uses internet cloud solutions that concurrently apply to many clients. According to our discussions with managers of the company, the latter model requires more cooperation among employees than the former; in other words, it entails a production function with much more pronounced complementarities (for instance, between software development and service). We want to exploit these natural experiments. We will use data collected in the other other parts of the study and compare the response of individual team members before the change (or re-organizations in combination with the change) and comparable individuals in teams after the change (making sure that the assignment to the before-after conditions is as close as possible to random). It is important to add that the implementation of these analysis and its details depend on on-going developments at the company for which an exact time line does not exist, but we have the agreement with managers of the company to be able to fine- tune the roll-out of our online experiment along a time line that allows taking these natural experiments into account. For instance, a change in the compensation scheme (from competitive to more cooperative) would probably not affect cooperation levels in the experiment (assuming them to be quite stable), but it could affect cooperation in the company and, thus, the predictive power of experimental cooperation for real-world

cooperation.

We are also currently discussing field interventions that rely on the findings from our artefactual field experiment and company record data. For example, this includes the by our data informed reorganization of teams.

2.3 Data collection procedures

We are conducting the described experimental and survey modules online. Potential participants receive a personalized participation link. Every respondent knows that he/she must complete the experiment within the two-weeks long roll-out. The online experiment does not require participants to simultaneously take decisions. Groups will be assembled randomly ex post, and participants will know that. Since nobody receives feedback during the experiment, such a procedure is game theoretically equivalent to actually simultaneously entered decisions. Participants can use their personal ID code to login after the roll-out phase has ended to get feedback on the results. We will ask participants to perform the online experiment individually. The random allocation to groups makes sure that coalition formation among group members when filling in the online experiment will be impossible.

We will also take upmost care to ensure data protection. Individual data from the company to be linked to our elicited data will be de-identified. The data collection and storage is facilitated through Qualtrics. There exists a data protection agreement between the company and Qualtrics; and a research agreement (including data protection) between the company and the research team. Data protection units at the company, at LMU and University of Heidelberg supervise the study. The company will not receive individual-level data, and all participants will be informed about the full pseudonymization of their responses. Data protection procedures will also be monitored by the responsible unit for data protection at the company. However, the latter will only be involved in determining the exact procedures, not in handling the linked data. We make sure that the

pseudonymized final data set will only be stored on the computers of the researchers involved in this project within university fire walls. An application for ethics approval of the Universities of Munich has been filed in September 2017. We are currently awaiting the response.

3 Empirical analysis

We analyze two main guiding hypotheses, but our data allows us to assess many other hypotheses (for the statistical analysis we will make sure to control for multiple hypothesis testing; see List et al. (2016)). In the following, we formulate the null hypotheses. Obviously, one can write down economic models that support both the null hypotheses and the alternative hypotheses, depending on assumptions regarding the complementary of efforts within a team or the specific formulation of social preferences in team members.

The conceptual framework that best describes the underlying tradeoffs and the context of cooperative behavior in a company setting is a multitasking model in the fashion of Holmstrom and Milgrom (1991). The contextual factors and the respective sensitivity of cooperative effort are, for example, described by Holmstrom and Milgrom (1991) (complementarity of efforts), Rob and Zemsky (2002)(development of cooperative cultures within companies), or Dur and Sol (2010) (assumption on form of social preferences).

We see our project as, on the one hand, providing exploratory evidence, but more importantly, on the other hand, (i) providing evidence on the alleged but not substantiated association between cooperative inclination, cooperation culture and individual as well as team success within a company and (ii) providing rigorous evidence for the external validity for a business context of two of the most frequently applied laboratory measures of cooperative behavior and norms.

All data descriptions and the anticipation of the analyses rely on the exact format and company record data availability. While the most variables in our list have approached at the end of December after running the experiments but before looking into the experimental

data, some additional variables are still going to be delivered by the company.

3.1 Primary outcome variables

For our first purpose of understanding the relationship between cooperative inclination and success/performance, the main variable of interest is *performance* that is a manager appraisal on the performance of each employee on a scale from 1 (very good) to 6 (insufficient).[4] We use the average performance evaluation of all members of the same real-life team in our sample as an indicator for team performance.[5] As described by the managers we talked with in our steering committee, the most direct mapping of performance differences can be expected to be individual and average team wage (variable *wage*), as well as given potential ratings for the years 2016 and 2017 (variable *potential*).

To analyze the external validity of the public goods game and the cooperation games, we employ measures of within-company cooperation which is most likely to be the variable *reward* that is 1 if an employee received a recognition award for being very cooperative at the workplace, and 0 otherwise.[6] The receipt of such an reward can be proposed by other employees in the company (peer-level reward) and it measures whether employees behaved like they are ought to do. On the team level we consider a measure of team cohesion (Mal and Ashford, 1994) as main indicator for a cooperative team.

3.2 Secondary outcome variables

As an alternative measure of performance especially for younger employees (that are also likely to be on lower hierarchy levels because of their seniority) we use a potential rating (variable *potential*) that is a committee appraisal whether a employee is a "growth", "accelerated" or "fast"-track candidate. To have a less subjective evaluation of a single

[4] The variable *performance* is not available yet.

[5] For some of the employees there is a new performance rating from 2016 on in which not marks but verbal evaluations are reported. In the first step of the analysis we will exclude this subjects but will later on try to generate a variable that brings the qualitative data on a scaleable measure.

[6] The variable *reward* is not available yet.

or a smaller group of managers we also cross-check our findings with the dependent variable *leader*, *talent*, and *career* that indicates the level of an employees HR responsibilities, whether an employee participates in a talent program, and the career level of the employee, respectively.[7] A success measure that is more broadly relevant for teams across different incentive schemes is the shared perception about team success elicited via our earlier described coordination mechanism.

Finally, outcome variables of secondary importance will be the self-evaluation of employees' performance that are being measured on the same scale as *performance* and the self-report about individual satisfaction (and an average measure for teams).[8]

To check the external validity of our experimental measures we use a team stability index (see variable *team-stability*) as a secondary measure for cooperation and norms on the team level. On the individual level, we use the difference of the self-evaluation and the manager appraisal to describe the difference between norm and real behavior. We cross-check the predictive power of our public good measure using standard instruments that we elicited in our survey module. In particular, these are the variables *trust*, *pos-reciprocity*, *donation*, and *friends*. We use the public good game contributions (both conditional and unconditional) for the external validity check of the norm elicitation. On the team level we use the average contribution for each real-life company team that is represented with more than one team member in our sample or a variable that describes the team compositions with respect to the cooperative types in our sample.

3.3 Hypotheses

Hypothesis 1:

Cooperative attitude has no relationship to individual success/performance within the company.

[7] Again, a speciality could lie in the seniority of the employees. We might also consider the variable *successor* that indicates whether a especially younger employee is designated to be a future leader of a team.

[8] The variable *self-performance* is not available yet.

Being cooperative can be beneficial if others are also cooperative, but it can be a disadvantage if others are not cooperative. In the latter case, cooperative players are exploited. In an extreme case, in which outcomes depend on individual and on group effort, in which group effort levels are neither substitutes nor complements and in which there is a contest among group members for promotion, the free riding equilibrium in a social dilemma is sustained (and it will be even reinforced from a behavioral perspective, i.e., group members that would have cooperated in the absence of the contest, will not cooperate anymore). Naturally, this result could change if the contest takes place between two groups (one member of each group is promoted) or if there are complementarities in efforts. We formulate Hypothesis 1 cautiously, but one can conceive a relationship that probably has different signs on different hierarchy levels or in different departments of the company, following different production functions (remember that we can assess the actual levels of complementarities in different participating departments and teams).

Hypothesis 1-a:

Cooperative attitude has a positive relationship to team success/performance within the company. The relationship becomes more strongly positive with more complementarities being present.

Most tasks within a team require cooperation and coordination. It is natural to expect to see teams function better if their members are cooperative. However, we can also look at the specific influence of the distribution of types within a team (we will select comparatively small teams for our experiment from the teams at the company). Is one strong free-rider enough to spoil the performance of a small team or can a team handle a certain number of free riders and still sustain cooperation?

Hypothesis 1-b:

The incentive mechanism has no impact on the relationship between cooperative attitude and individual success/performance.

Hypothesis 1-b is formulated cautiously. One can imagine that strong individual performance incentives are related to less cooperative behavior in many environments, whereas fixed wages (with weak promotion incentives) are associated with more cooperative behavior. The variation in actual tenure of employees in specific incentive mechanisms can give us some guidance on the extent of self-selection and the extent of the direct effects of the incentives.

Hypothesis 1-c:

A higher average cooperative attitude has a positive impact on individual and team satisfaction.

If cooperation is perceived as the social norm and if we assume that humans have a preference for following the norm or for sustaining a positive image, higher average levels of cooperation, controlling for everything else, should lead to more satisfaction on the individual level and on the team level. However, the level of satisfaction might interact with individual attitudes toward cooperation or with personality traits.

In environments with strong complementarities promotion incentives may foster cooperation, whereas if complementarities are weak, they should not be very important for the observed level of cooperation. Importantly, the nature of the promotion will matter a lot - if the promotion is most likely outside the team (into another team or department), cooperation incentives are reinforced, whereas if team members compete directly for promotion, cooperation will likely break down.

Hypothesis 2:

Measures of cooperative attitudes and cooperative behavior have no predictive power for real-world cooperation within the company.

Hypothesis 2 addresses the issue of external validity of measures from the online experiment. Real-world cooperation will be proxied by the assessment of one's cooperative behavior by one's team members and by one's self-assessment. This is an assessment that

can be performed on the individual level, when one uses employee evaluations of superiors and subordinates by the respective other group. However, we can also exploit the variation across teams. Teams that perceive themselves as more cooperative (by evaluations) should have members that, on average, tend to be more cooperative in the online experiment. Whenever possible, we will try to control for the level of competition across teams. Competition across teams might foster cooperation within teams. Remember that our online experiment elicits cooperation in an anonymized fashion, without sanctioning mechanisms being available. In day-to-day team business within the company, teams interact repeatedly and informal peer sanctioning is possible. Hence, there is no one-to-one relationship between the "online laboratory" and the "wild". However, even in repeated interaction with sanctioning, cooperative individuals are required to sustain cooperation. As a consequence, the direction of any effect against the null hypothesis formulated above should still be relevant. Notice that we assume cooperative attitude as measured by our public goods experiment to be a relatively stable individual trait; thus, we formulate a causal statement. However, a word of caution is necessary: without this assumption, we can establish only a potential correlation.

Hypothesis 2-a:

A higher average cooperative attitude is positively related to team cohesion and team stability.

It is rather obvious that more cooperative teams should be more stable and more cohesive. However, again, rigorous empirical evidence from the workplace is scarce. Furthermore, team cohesion has been shown to have ambiguous effects on performance. More cohesive teams are more likely to fall prey to "groupthink" in decision making (Janis, 1972), which might lead to inferior results.

Hypothesis 2-b:

The perception of social (cooperative) norms influences cooperative behavior in the experiment and outside the laboratory.

We observe the perception of cooperative norms by employees at the company, and we also observe actual cooperation in the online experiment and outside the laboratory. It is straightforward to assume that these measures are correlated. We also expect that injunctive and descriptive norms will be correlated and that injunctive norms will be more extreme than descriptive norms. Both perceptions of the social (cooperation) norms should have predictive power for cooperative behavior in the experiment and outside the laboratory. Injunctive norms should be a better predictor for conditional cooperation in the VCM and descriptive norms should be a better predictor for unconditional cooperation. Depending on the team, units with more complementarities, less individual incentives, and more team incentives will report higher social standards, both injunctively and descriptively.

Hypothesis 2-c:

Differences in the perception of social (cooperative) norms within a team help explain team success/performance.

Team success should depend on the level of cooperation (cooperative attitude) within the team (see Hypothesis 1-a), but cooperative attitude might be influenced by the perception of the social norm. It could be that, even though all team members are in principle conditionally cooperative, they perceive the norm differently and, thus, the team is less successful. We can control the type of decision makers and assess the effect of perception on behavior. Perception of social norms may also be related to structural variables, to one's position in the company, to one's immediate environment (such as variables capturing team cohesion and team stability), and to one's cooperative behavior.

3.4 Construction of main regressors

Our main regressors are public good game contributions (unconditional and conditional) and the respective classification of types that also rely on the beliefs about other group members contribution. We use the typology as described in Kocher et al. (2015). Also, the cooperative norms (injunctive/descriptive norms, differences between norms, average of

the five) will be very relevant contextual factors. We will specify our variables as described in Krupka and Weber (2013) or Burks and Krupka (2012). Due to the between-subject elicitation of injunctive and descriptive using one of these norms will lower our sample size. Shared perception about impact, success and complementarity will also be used. The variable *team-stability* will be an average index from three questions on team stability in the survey module. All other control variables are described in more detail in the variable list attached to this pre-analysis plan.

3.5 Econometric models

While our hypotheses document our theoretical predictions and relevant contextual factors (that give rise to control or interaction variables), we also anticipate our econometric model specifications. Instead of writing the exact model down, however, we specify classes of dependent and independent variables that will later be proxied by the variables mentioned and defined in 3.1., 3.2., and 3.4., respectively. We also want to mention that some of the relations we anticipate might differ for different areas or hierarchies in the company. We will encounter these structural differences more exploratively as these are most likely company-specific and we also clearly remind the reader of the potentially limited scaleability of our results.

The attached table "Econometric models" summarizes our regression specifications. We will make sure to account for the panel structure of the data by using random effects specification and will also cluster on the team-level if necessary. We will also address potential censoring or truncation of the data when necessary.

4 What's next?

We are still awaiting some of our key variable measures to arrive. We analyze the first wave of the data and will discuss the results with the company. Resulting field interventions or the exploitation of natural experiments or the start of the second wave of the experiments

will then also be pre-registered.

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Consequences of cooperation: Data

Variables collected from the experiments

Category	Variable	Scale	Description	Details
Public goods game	*contribute*	ratio	Unconditional contribution	
	x_contribute	ratio	Contribution conditional on *x* contributed by other team members	
	belief_contribute	ratio	Belief about average contribution of the other team members	$x \in \{1,2,\dots,10\}$
Coordination games	*y_inorm*	ordinal	Guessed modal answer category for question on social appropriateness of behavior in the vignettes	50% der TeilnehmerInnen: $x \in \{1,2,\dots,5\}$
	y_dnorm	ordinal	Guessed modal answer category for question on frequency of observability of behavior in the five vignettes	50% der TeilnehmerInnen: $x \in \{1,2,\dots,5\}$
	team_success	ordinal	Guessed modal answer category for question on perceived team success	
	team_impact	ordinal	Guessed modal answer category for question on perceived impact of team on company value	
Time preferences	*time*	binary	Switching point in Falk et al. (2016) incentivized elicitation procedure	

Variables collected from online survey

Category	Variable	Scale	Description	Details
	team_cooperation	ordinal	Need for cooperation among team members	
	team_cohesion	cardinal	Perception of team cohesion (Mal and Ashford)	
	team_stability	cardinal	Perception of staff stability within the team	Individual average score
	n_competiveness	ordinal	Perception of negative competitive pressure among team members	
	p_competiveness	ordinal	Perception of positive competitive pressure among team members	
	stress	cardinal	Perceived chronic stress	Individual average score
	big_five	cardinal	big five personality measure (Rammstedt et al 2012; Gosling et al 2003)	Individual average score (for each personality trait)
	neg_reciprocity	ordinal	Social preference measure indicating the participants tendency for negative reciprocity (Falk et al 2016)	
	pos_reciprocity	ordinal	Social preference measure indicating the participants tendency for positive reciprocity (Falk et al 2016)	
	trust	ordinal	Social preference measure indicating the participants trust (Anderson et al 2004)	
	competitive_attitude	cardinal	The participants individual competitive attitude (Newby and Klein 2014)	Individual average score
	donation	binary	Participants donation of his/her earned money from the study	
	children	binary	Indicating whether the participant has children or not	
	friends	cardinal	The participants amount of friends (Anderson et al 2004)	
	complement	binary	In which business model is the employee working? Model A requires much more cooperation than model B.	Model A Model B

Variables collected from the company

Individual-level data on a yearly basis for 2017

Category	Variable	Scale	Description	Details
Structural aspects	*team_membership*	nominal	Unique team identifier (from ORG structure)	
	team_size	ratio	Number of team members	Head count
Socio-economics	*age*	ratio	Age of employee	
	gender	nominal	Gender of employee	
Work-related characteristics	*seniority*	ratio	Seniority of employee (in years)	Tenure
	board	nominal	Board area	Cloud Business Group Digital Business Services Finance & Administration Global Customer Operations Human Resources Office of CEO Products & Innovation
	function	nominal	Functional area which consists of clusters of several job families based on generic job content	Development Education and Knowledge Services Finance General Management and Admin Information Technology Marketing Sales and Presales Services Non Headcount relevant
	career	ordinal	Career level of employee (describes contribution based upon business results, accountability, complexity, experience and communication)	T1 (Associate) T2 (Specialist) T3 (Senior) T4PF (Expert) T4PM (Manager) T5PF (Chief Expert) T5PM (Senior Management) ET SET

	job	nominal	Job families, i.e., groups of jobs in a more specific occupational area within a functional area	More than 104
Personnel responsibility	*leader*	ordinal	Within company hierarchy	First Level Leaders Mid Level Leaders Executive Senior Executive
HR development	*potential*	ordinal	Potential rating by manager appraisal	If *2016*: accelerated fast track if *2017*: key contributor
HR development Incentives	*successor*	binary	Indicator for employee is designated successor of a position on the next hierarchy level	
	talent	binary	Indicator for employee participating in a talent program	Selected Selected but not applied
Incentives	*wage*	ratio	Yearly wage before taxes	Mean of wage category
	bonus	nominal	Bonus scheme the subject is incentivized with; variable wage component (additional specification within board areas)	Not eligible Revenue Enabling Bonus Plan Revenue Generating Plan: Callidus Revenue Generating Plan: Quota Carriers Sales Revenue Generating Plan: Services

To be discussed or not received data yet:

performance	ordinal	Performance rating by manager appraisal	If *talk*= 0: insufficient progressing successful outstanding extraordinary if *talk*= 1: none
self_performance	ordinal	Self-assessment of performance rating to be appraised by the manager	If *talk*= 0: insufficient progressing successful outstanding extraordinary if *talk*= 1: none
cooperate	ratio	Number of peer-to-peer awards received for being cooperative	Social recognition awarded by another employee
complement		Complementarities of cooperation in the production function (expert interview)	Not conducted yet
satisfaction		Average satisfaction in team (People survey)	no information yet

Econometric models

Hypothesis	Unit	Dependent variable class[1]	Main independent variable	Further controls	Models	(Potential) Interactions with main independent variable
1/1-a (primary)	individual	Success/performance - *[performance]* - *potential* - *wage*	*contribute/type*	*norms* *board area* *seniority* *[avg contribute_others]* *bonus* *team_cooperation* *[hierarchy]*	OLS as baseline Mixed, ordered and multinomial logit	*[hierarchy]* *board areas* *seniority* *team_cooperation*
1/1-a (primary, additional regressors)	individual	Success/performance - *[performance]* - *potential* - *wage*	*contribute/type*	*…* - *gender* - *education* - *age*	OLS as baseline Mixed, ordered and multinomial logit	*[hierarchy]* *board areas* *seniority* *team_cooperation* *age* *gender*
1/1-a (secondary)	individual	Success/performance - *leader* - *talent* - *career* - *successor*	*contribute/type*	*norms* *board area* *seniority* *[avg contribute_others]* *bonus*	OLS as baseline Mixed, ordered and multinomial logit	*board areas* *seniority* *team_cooperation*

[1] Variables in parentheses "[ ]" are not available yet.

				team_cooperation		
1/1-a (secondary, additional regressors)	individual	Success/performance - *leader* - *talent* - *career* - *successor*	*contribute/type*	*…* - *gender* - *education* - *age*	OLS as baseline Mixed, ordered and multinomial logit	*board areas* *seniority* *team_cooperation* *age gender*
1-a	team	Success/performance - *[avg. performance]* - *team_success* - *avg. wage*	*avg. contribute/ type_composition*	*norms* *board area* *seniority* *bonus* *team_cooperation* *[hierarchy]*	OLS as baseline Probit and mixed logit	Esp. *team_cooperaton*
1-b	individual	Success/performance - *[performance]* - *wage* - *potential* - *leader* - *talent* - *career* - *successor*	*contribute/type*	*norms* *board area* *seniority* *contribute_others* *bonus* *team_cooperation*	OLS as baseline Mixed, ordered and multinomial logit	Esp. *bonus*
1-c	individual	*[satisfaction]*	*contribute/type*	*norms* *big_five* *board area* *seniority* *contribute_others* *bonus* *team_cooperation*	OLS as baseline Mixed logit	*norms*

1-c	team	*[satisfaction]*	*avg. contribute/ type_composition*	*norms* *board area* *seniority* *bonus* *team_cooperation*	OLS as baseline Mixed logit	*norms*
2	individual	Real-life cooperation within company *[cooperate]*	*contribute/type*	*norms* *board area* *seniority* *bonus* *team_cooperation* *[hierarchy]*	OLS as baseline Probit	*bonus* *[hierarchy]* *board areas* *seniority* *team_cooperation*
2 (check)	individual	*contribute/type*	*pos_reciprocity* *trust* *donation* *friends*	*big_five* *competitive_attitude* *gender*	OLS	*gender*
2 (check)	team	*Avg contribute /type_composition*	*pos_reciprocity* *trust* *donation* *friends*	*big_five* *competitive_attitude* *gender*	OLS	*gender*
2	team	Real-life cooperation within company *[cooperation_assessment]*	*avg. contribute/ type_composition*	*norms* *board area* *seniority* *bonus* *team_cooperation* *[hierarchy]*	OLS as baseline	*bonus* *[hierarchy]board areas* *seniority* *team_cooperation*
2-a	team	Real-life cooperation within company - *team_cohesion* - *team_stability*	*avg. contribute/ type_composition*	*norms* *board area* *seniority* *bonus* *team_cooperation*	OLS	*bonus* *[hierarchy]* *board areas* *seniority* *team_cooperation*

				[hierarchy]		
2-b	individual	Cooperative behavior - contribute/type - *[cooperate]*	*Norms (injunctive and descriptive separately)*	*board area* *seniority* *incentives* *team_cooperation*	OLS Multinomial logit	*incentives* *team_cooperation*
2-b	team	Cooperative behavior - *avg. contribute/* - *type_composition*	*Norms (injunctive and descriptive separately)*	*board area* *seniority* *incentives* *team_cooperation*	OLS Multinomial logit	*incentives* *team_cooperation*
2-c	team	Success/performance - *[avg. performance]* - *[team_bonus]* - *team_success*	*norms_differences*	*avg. contribute/* *type_composition* *team_cohesion* *team_stability* *board area* *seniority* *bonus* *team_cooperation*	OLS as baseline Probit and mixed logit	