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Leaders as role models and ‘belief managers’ in social dilemmas

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ABSTRACT

We investigate the link between leadership, beliefs and pro-social behavior in social dilemmas. This link is interesting because field evidence suggests that people's behavior in domains like charitable giving, tax evasion, corporate culture and corruption is influenced by leaders (CEOs, politicians) and beliefs about others' behavior. Our framework is a repeated experimental public goods game with and without a leader who makes a contribution to the public good before others (the followers). We find that leaders strongly shape their followers' initial beliefs and contributions. In later rounds, followers put more weight on other followers' past behavior than on the leader's current action. This creates a path dependency the leader can hardly correct. We discuss the implications for understanding belief effects in naturally occurring situations.

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1. Introduction

“Once you as a CEO go over the line, then people think it's okay to go over the line themselves.”

Lawrence Weinbach, Head of Unisys. (quoted after The Economist, July 27, 2002, p.58)

“... the most common argument legitimizing tax evasion among Swedes is that those in leading positions in society violate the social norms.”

Hammar et al. (2009, p. 239)

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Field evidence on charitable giving, tax evasion, the abuse of the welfare state, criminal behavior, corruption, and corporate culture, suggests that people's own behavior in these domains depends strongly on their beliefs about how others will behave.¹ Leaders – politicians, government officials, and managers – may serve as role models for what is considered appropriate and may thus shape their followers' beliefs about the behavior of others. For instance, leaders who behave too selfishly, evade taxes, consume unwarranted privileges, accept bribes, etc. may induce people to do the same (as suggested by our opening quotes) and may nurture people's beliefs that other people will do the same. This may exacerbate the problem to the extent that people's behavior is not only shaped by the leader's example but also by their beliefs about other people's actions. Of course, if the leader behaves as a positive role model, the opposite conclusions may hold.

Our main contribution is testing this intuition. More generally, we aim to contribute to a better understanding how leaders shape the beliefs of a group of people and their actual pro-social behavior. The framework for our analysis is the public goods game, which is a well-known social dilemma that pits collective welfare against self-interest. We chose a public goods context because the real-life problems that have inspired our research – tax morale, no corruption, high corporate culture etc. – have features of a public good, which is undermined by selfish acts of evading taxes, paying and accepting bribes, and egotistic behavior at the workplace.

Our specific setup is as follows. Four players, who form a stable group for ten rounds, make contributions to a linear public good. Since we are interested in the link between beliefs and behavior we elicit beliefs of all players about how much others will contribute. We will look at belief effects in two basic variations of the public goods game. In one version (the 'leader treatment'), one randomly chosen player is assigned to be the 'leader' who decides first how much to contribute to the public good.^{2,3} The other players are 'followers' who decide simultaneously how much to contribute after they observe the leader's contribution. A leader-follower framework has the advantage that we can observe how the leader's action influences followers' beliefs. We contrast the leader treatment with a "no-leader treatment" in which all group members decide simultaneously.⁴

How can leaders influence followers? There are two possible channels, which both rest on many people being conditional cooperators who cooperate if others do so too (for evidence see the next section). The first channel is a direct channel according to which conditionally cooperative followers will match the leader's contribution, at least to some degree. The second channel opened up by conditional cooperation is via followers matching the beliefs about other follower's contributions, and these beliefs are likely influenced by the leader's contribution and the followers' previous contributions. To investigate these channels, we estimate a belief-formation process that is inspired by Fischbacher and Gächter (2010) and then we explain follower contributions as a function of follower beliefs and leader contributions. Our approach in the no-leader treatment is analogous.

Our main results are as follows. Leaders strongly shape their followers' beliefs. In this sense, leaders are 'role models' and 'belief managers'. While this holds in all periods, it is particularly important in early periods. In later periods, we find that the followers' beliefs in a given period are not only determined by what the leader did in the present period but also by what other followers did in the past. Moreover, when forming beliefs for the current period, followers put more weight on average on the other followers' past behavior than on the leader's current behavior. This leads to a strong path dependency: the leader's initial behavior shapes the followers' initial behavior and in later periods the followers' behavior is not only determined by the leader's current contribution but also – and even more strongly – it is shaped by the other followers' past behavior. Thus, if a leader initially contributed little, then this will have a long-lasting effect on the beliefs of followers that is not easily corrected later on.

Path dependency effects also exist in the no-leader treatment. Groups that start at high contribution levels have on average higher overall contribution levels than groups that start out low. An explanation for this observation is that in teams with no leader beliefs are shaped initially by the group members' intuitive ('homegrown') beliefs and later on by the followers' past behavior. More importantly, contributions, for a given belief, are the same in both treatments: the same belief triggers the same behavior. Yet, in the leader treatment it is in the hand of the leader to shape beliefs.

We make three contributions to the literature. First, our two treatments provide simple frameworks for understanding belief effects in reality: In some situations, beliefs are shaped by role models such as politicians, top officials, managers, or even celebrities, whereas in the absence of leaders the behavior of the relevant group members influences beliefs. As we will show in the next section, there is plenty of field evidence that is consistent with belief effects. Yet, causal inferences of beliefs on behavior are hardly feasible in the field. Our experimental approach allows the observation of beliefs and how leaders influence them. Thus, our experimental data provide a behavioral micro-foundation for field observations that

¹ We will discuss the relevant evidence in the next section.

² We deliberately selected the leader randomly and anonymously, because we did not want to confound leader-induced belief effects with leader attributes, like status, persuasion, charisma, ability, superior information, power etc. These leader attributes certainly can matter strongly in reality. Our stripped-down leader-follower game measures only one aspect of leadership – leading by example. An investigation of other aspects of leadership or the impact of leader attributes requires different designs. For examples see Güth et al. (2007), Van Vugt and Ahuja (2010), Arbak and Villeval (2013) and Bruttel and Fischbacher (2013).

³ We focus on the role of leaders for cooperation. Of course, leaders are also important for coordinating behavior (e.g., Foss, 2001; Van Vugt and De Cremer, 2002 and Weber et al., 2001). Leaders are also often in a position to shape incentives in teamwork (e.g., Drouvelis et al., 2017).

⁴ As we will see below, we are in particular interested in how leaders shape beliefs and action at the beginning of the leader-follower relationship. In a standard public goods game, players decide simultaneously about how much to contribute initially and they can thereby only rely on their homegrown beliefs.

are consistent with presumed belief effects. Our main insight is that there is strong path dependency in behavior in both treatments. In our view, the observation of path dependency contributes to an explanation of why it is so difficult to fight corruption, tax evasion, and welfare fraud and why corporate cultures are hard to change. Once a norm of cooperation is destroyed, leaders have a hard time re-establishing it because followers are more strongly impressed by their beliefs about other followers than about the leader's behavior.

Second, by comparing belief effects in games with and without a leader we contribute to a better understanding of determinants of voluntary cooperation. Existing experimental evidence (see next section) suggests that people contribute on average more the more they believe others contribute. This observation implies that any factor that shifts beliefs will shift behavior. Our leader-follower framework is suitable to test this implication because leaders are in a position to shift follower's beliefs.

While our paper is not the first in a 'leading-by-example' framework (see next paragraph), it is the first to elicit leaders' and followers' beliefs about others' contributions in a group context. The exception is Gächter et al. (2012), who, however, study pairs and elicit only leader beliefs. Eliciting both beliefs of leaders and followers allows us to understand better how leading by example actually works and may thus contribute to further theory development.⁵

Finally, we place our paper in the broader literature that shares the characteristic of a leading-by-example framework in social dilemma games. Some early papers comprise Moxnes and van der Heijden (2003) and Gächter and Renner (2003). Moxnes and van der Heijden are motivated by environmental problems and study a public bad with and without a leader. Gächter and Renner investigate a public goods game with and without a leader, similar to the one we study here, but without belief elicitation. Subsequent research investigated consequences of leader selection and motives of leaders. For instance, Güth et al. (2007) are interested in the effects of fixed vs. rotating leaders, with and without the power to exclude followers. Haigner and Wakolbinger (2010), Rivas and Sutter (2011) and Arbak and Villeval (2013) compare voluntary and randomly-chosen leaders. Préget et al. (2016) study the link between preferences for conditional cooperation and voluntary leadership. Further research questions also concerned the role of information asymmetries, communication, and transparency. For example, Potters et al. (2007) study leading by example when returns from cooperation are privately or publicly known. Houser et al. (2014) explore the consequences of how transparent the leader's decisions are for followers' cooperation. Levy et al. (2011) study how contributions suggested by human and computerized leaders influence followers' contributions. The leading-by-example framework has also proved useful for a variety of other economically interesting research questions.⁶ None of these studies elicited beliefs.

2. The importance of beliefs for pro-social behavior – evidence from the lab and the field

Here we discuss evidence from the field and the lab that has inspired our research. Our focus is on evidence that beliefs about others' behavior matter for pro-social behavior. Economically important areas where belief effects might be relevant are donations to charities, tax morale and abuse of the welfare state, corruption, criminal behavior, and corporate culture. All examples have aspects of social dilemmas, which is why we model belief effects in a public goods game. We hasten to add that for all field examples discussed below belief effects are not the only factor at play; standard economic explanations like correlated and contextual effects (Manski, 2000) are certainly important as well.

With this caveat in mind, we start with *charitable donations*. In some fund-raising campaigns, it is common practice to list the names and donated amount on fund raising websites.⁷ Donations by well-known politicians and celebrities often feature prominently (Kumru and Vesterlund, 2010). This observation suggests that fund raising organizers not only rely on people's feelings of altruism and compassion but also on belief effects: the organizers apparently think that more people will donate if many others (and in particular prominent people) do so as well. Seed money effects (List and Lucking-Reiley, 2002) are a related phenomenon that at least in part exploits belief effects.⁸ Consistent with belief effects, Andreoni and Scholz (1998) report econometric evidence that charitable donations depend to some degree on other people's donations.

Tax morale is another interesting case because taxes are typically used to finance public goods from which one benefits even if one has not paid taxes. Existing evidence suggests that, controlling for detection probabilities, people are less likely to cheat on their taxes or to commit benefit fraud if others behave honestly (e.g., Slemrod, 1992; Andreoni et al., 1998; Scholz and Lubell, 1998). See Luttmer and Singhal (2014) for a more recent survey of relevant literature. In line with this evidence Cowell (1990) argues: "a person's propensity to dodge taxes seems to be strongly affected by the number of other people who are already doing the same" (p. 108).

⁵ Previous theoretical papers on leadership and leading by example include, e.g., Bianco and Bates (1990), Rotemberg and Saloner (1993), Hermalin (1998), Arce (2001), and Komai et al. (2007). However, while the above-cited experimental papers explain leading by example at least in part by non-selfish reciprocal motivations, these theoretical studies all give (different) rational (or evolutionary) accounts of leadership under the selfishness assumption. For an explanation of leading by example in terms of inequality aversion see Huck and Rey-Biel (2006).

⁶ For example, Drouvelis and Nosenzo (2013) explore the interaction of leading by example and group identity. d'Adda et al. (2017) investigate how the ethical conduct of a leader impacts on the ethical conduct of a group of followers. Loerakker and van Winden (2017) study leading by example in a contest game.

⁷ See, for example, <http://www.justgiving.com>.

⁸ Many theoretical and experimental studies that investigate leadership effects in charitable donations use public goods games as we do in this paper. See, e.g., Vesterlund (2003), Andreoni and Petrie (2004), Potters et al. (2005) and Kumru and Vesterlund (2010).

Frey and Torgler (2007) provide empirical evidence for the relevance of belief effects for tax morale. They use data from the European Values Survey and conduct a multivariate analysis across 30 countries. Controlling for a host of variables Frey and Torgler find a positive correlation between people's tax morale (measured by a question whether cheating on taxes is justified if you have the chance) and people's perception how many others cheat on taxes.⁹

While attitudinal data provide some insights, more recent research focuses on actual compliance behavior. A prominent example is Fellner et al. (2013) who study compliance with paying TV license fees. In a natural field experiment in Austria, the enforcement authority sent letters to inform people believed to be evaders of their need to pay TV license fees. Some letters manipulated social information about the number of compliant people. Their result is that compliance after receiving the letter is higher when people believe evasion is common than when they believe it is rare. If people have heterogeneous priors, a piece of information such as how many people are compliant, can have a positive effect on those who are positively surprised (that is, whose prior beliefs about other peoples' compliance was too pessimistic) compared to those who are negatively surprised (that is, people who held an optimistic prior belief compared to actual compliance). Such reactions are consistent with the idea that beliefs about others' compliance matter for own compliance.

Hallsworth et al. (2017) present a natural field experiment in the UK, sending letters to people who are late with their tax payments. Letters that contain messages about the addressee being in a minority of late payers compared to a high number of on-time fellow citizens are particularly effective in speeding up payments of tax liabilities (compared to other interventions not specifying minority status or a high number of compliant fellow citizens). This finding suggests that peer effects matter for tax morale (see also Luttmer and Singhal (2014) who discuss peer effects as one channel of tax morale). As Hallsworth et al. (2017) also point out, details of wording seem to matter strongly. This observation is consistent with Fellner et al. (2013) who find limited evidence on the effectiveness of simply referring to a high number of compliant people.

An interesting further observation is that tax morale in various countries is also affected significantly by the behavior of 'leaders' – recall the opening quotes. In their discussion of the literature on tax morale, Luttmer and Singhal (2014) also describe reciprocity as one possible channel of tax morale. For example, tax morale is positively correlated with trust into the government (e.g., Scholz and Lubell, 1998).

The cited studies look at tax morale measured by variables such as how justified it is to cheat on taxes. These studies do not investigate determinants of *perceptions* regarding how many *other* people cheat on taxes. The study by Hammar et al. (2009) is a notable exception. Their main finding is that distrust in politicians increases perceived tax evasion.

Belief effects may also matter for *corruption*, *criminal behavior* and *public disorder*. Corruption may be more prevalent the more people think other people are corrupt (Klitgaard, 1988; Huang and Wu, 1994; Fisman and Golden, 2017). Similarly, people are more likely to commit crimes if they think criminal behavior is widespread (Kahan, 1997). For instance, on the basis of data from forty US-American cities, Skogan (1990) shows a positive relationship between public disorder and criminal behavior. At a less dramatic scale, in an ingenious experiment conducted on a parking lot, psychologists Cialdini et al. (1990) demonstrate that people are much more likely to throw away a flyer (attached to their cars by the experimenters) if the parking lot appears littered; if it is clean, people litter significantly less (see also Keizer et al. (2008)). In a cross-societal experiment involving 23 countries, Gächter and Schulz (2016) find that dishonesty (measured in an anonymous die-rolling task) is strongly correlated with the prevalence of rule violations (corruption, tax evasion, political fraud) in the respective society. The explanation for these phenomena is that people react sensitively to signals about what they believe is considered 'normal behavior' in a specific social setting.

Psychologists have long argued that people's cooperation behavior depends on what others do (e.g., Kelley and Stahelski, 1970). Many people are 'conditional cooperators' who cooperate if others cooperate and free ride if others free ride. Using the methodology of experimental economics, Keser and van Winden (2000) were among the first economists to argue for the prevalence of conditional cooperation. Croson (2007) went one decisive step further by eliciting beliefs about other group members' contributions. She finds a very high and statistically significant correlation of beliefs and contributions: Subjects who expect others to contribute a lot are more likely to contribute high amounts than subjects who expect others to free ride. Neugebauer et al. (2009), Fischbacher and Gächter (2010), Gächter and Renner (2010) and Dufwenberg et al. (2011) also find a highly significantly positive relationship between beliefs and contributions. Finally, experiments with the 'strategy method', where people make contribution decisions for all possible average contribution level of other group members, find strong evidence for conditional cooperation.¹⁰

The behavioral relevance of conditional cooperation has also been shown in field experiments. For instance, in a field study on voluntary donations to social funds at the University of Zurich, Frey and Meier (2004) show that students who are informed that 64 percent of the other students contributed to the social funds are more likely to contribute than students who are told that only 46 percent donated to the social funds. Meier (2006) replicates this finding in a follow-up study. Rustagi et al. (2010) study forest management groups in Ethiopia and find that groups comprising more conditional cooper-

⁹ This sort of evidence has also influenced theory development. Traxler (2010) provides a theoretical analysis of the implications of conditional cooperation for tax evasion. For an early theoretical treatment on the importance of perceived tax evasion see Bordignon (1993).

¹⁰ See e.g., Ockenfels (1999), Fischbacher et al. (2001), Falk and Fischbacher (2002), Kurzban and Houser (2005), Muller et al. (2008), Kocher et al. (2008), Herrmann and Thöni (2009), Fischbacher and Gächter (2010), Fischbacher et al. (2012), Thöni et al. (2012), Volk et al. (2012), Martinsson et al. (2013), Kocher et al. (2015), Cubitt et al. (2017), Gächter et al. (2017), Weber et al. (2018) and Albrecht et al. (2018). Chaudhuri (2011) provides a survey of this literature and Thöni and Volk (2018) a synthesis of the distribution of types across many studies.

ators are also more successful in managing their forest commons. For further examples, see e.g., Croson and Shang (2008), Martin and Randal (2008), Alpizar et al. (2008), Chen et al. (2010), Jack and Recalde (2015) and Dur and Vollaard (2015).

In summary, naturally occurring field evidence as well as lab and field experiments in environments that have features of social dilemmas suggest that people behave more pro-socially the more they believe others do so too. It follows from this observation that any factor that shifts beliefs will shift behavior. Leaders, whose behavior is visible to followers, are in a particularly powerful position to influence their followers' beliefs. Our main contribution in this paper is to investigate the belief-shifting effect of leaders, which previous literature has not investigated. Therefore, we chose a leader-follower public goods game, which we detail in the next section, as one framework for our analysis. Since belief effects also matter in the absence of leaders, which characterizes many of the situations discussed above, we also look at belief effects in a public goods game without a leader.

3. Design and procedures

Our basic design involves a linear public goods game. Each of the four team members has to decide on how many of 20 tokens to keep and how many tokens to contribute to a team project. For simplicity, the size of the team project is just the sum of all contributions to it. The payoff for each subject is given by:

$$\pi_i = 20 - g_i + 0.4 \sum_{j=1}^4 g_j. \quad (1)$$

From (1) it is obvious that a rational and selfish individual has an incentive to free ride on the other group member's contributions (i.e., to choose $g_i = 0$). A social dilemma arises, since it is in the joint interest of the group to contribute the whole amount to the team project but individual incentives are to contribute nothing.

The leader game is a simple variation of this standard public goods game. One randomly selected group member – who we will henceforth call the 'leader' – decides first in his or her team. We selected the leader randomly, to avoid a confound with leader attributes (see footnote 2). The other three group members (called the 'followers') learn about the leader's contribution to the team project and then decide simultaneously about their contributions to the team project.¹¹ The payoff functions of all team members, including the leader's, are identical and equal to (1). The presence of a leader does not change incentives to free ride.

We have two treatments – a treatment with a leader (the 'leader treatment') and a control treatment with no leader in which group members decided simultaneously ('no-leader treatment'). The purpose of the leader treatment is to see to what extent a leader shapes both followers' beliefs about how others play and their actual contributions. In both treatments, the relevant game was repeated ten times. Teams remained the same throughout the experiment ('partners' design). Length and team composition were commonly known. A participant took part in one treatment only.

We follow Gächter and Renner (2010) in how we elicited and incentivized beliefs. We elicited beliefs in each round of the game, on the same screen where subjects also made their contribution decisions.¹² Specifically, in the no-leader treatment we asked participants to estimate the average of the other players' contributions. In the leader treatment, we asked the leader about his or her estimate of how many tokens the three followers would contribute on average; each follower had to submit his or her estimate of the average contribution of the two other followers after having seen the leader's contribution. We paid subjects 20 money units in every case where a participant estimated the actual contribution of others exactly right (± 0.5 tokens); and 10 money units/(absolute) estimation error if their estimate deviated by more than ± 0.5 tokens from the actual contribution.

We conducted all experiments with z-Tree (Fischbacher, 2007) in the laboratory at the University of Erfurt (eLab). Our participants were 96 undergraduates from various disciplines; 48 participated in the leader treatment and 48 in the no-leader treatment. In total, we have thus observations from 24 independent groups of four subjects.

The participants were randomly assigned to the booths in the laboratory at the beginning of each session. The booths separated the participants visually and ensured that every individual made his or her decision anonymously and independently. The written instructions (see online supplementary materials) explained the above social dilemma situation and the experimental procedures. We assigned the groups randomly and anonymously, such that participants did not know which of the other participants were in their group. Participants had to answer a set of control questions to ensure that every participant understood the decision problem. We did not start the experiment before all participants had answered all control questions correctly. Subjects were paid anonymously in cash immediately after each session. Our experiments lasted 30 min on average, and participants earned €6.00.

¹¹ In the experiment, we never talked of leaders and followers, but instead of the participant that decides first in his or her group. See the instructions in the online supplementary materials for further details.

¹² Another possibility would have been to ask for beliefs on a separate screen. We decided against this. Subjects were told about beliefs in the instructions and they also knew that the game with belief elicitation was repeated ten times. Hence, subjects knew that their beliefs would be elicited and therefore it was easier (and faster) to do it on the same screen. Also, because beliefs are of central importance for our research question, we decided to incentivize beliefs despite the possibility of some hedging with contributions (Blanco et al., 2010). Although eliciting incentivized beliefs might affect cooperation levels (Croson, 2000; Gächter and Renner, 2010), we believe, however, that it is a minor issue here because we elicited incentivized beliefs in both treatments.

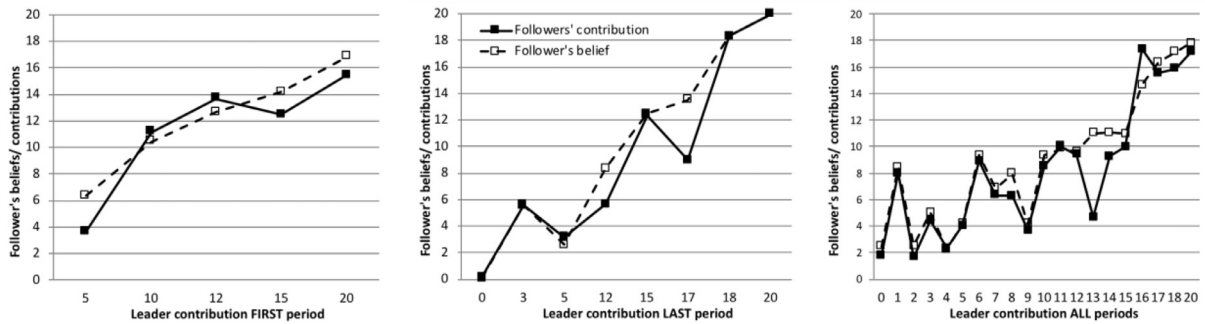


Fig. 1. Leaders as role models: Followers' beliefs and contributions as a function of the leader's contribution in the first period (left), last period (middle) and over all periods (right).

4. Results

We proceed in three steps. We first investigate how leaders shape followers' beliefs and contrast belief formation with a leader with belief formation without a leader. In the second step, we compare the link between beliefs and contributions in the leader and the no-leader treatment. In the third step, we investigate the extent to which leaders do prevent the decline of cooperation expected in the no-leader treatment.

4.1. Determinants of beliefs

We start with the impact of the leaders' decision on followers' beliefs. Fig. 1 records our main finding. The x-axis depicts the leaders' contribution and the y-axis records the followers' average belief or contribution, respectively. We distinguish between periods. The left panel shows the first period in which the followers have not yet observed any follower decisions. Leaders in the first period contributed 5, 10, 12, 15 or 20 tokens. Higher leader contributions trigger higher beliefs of followers about the other follower's contributions. Moreover, on average followers very closely match their beliefs with their actual contributions. Thus, leaders shape the belief of followers and appear to be role models for them.

The middle panel looks at the tenth period. This period is interesting, because it is the last one and hence there is no strategic reason to match the leader's contribution. Yet, we observe that the followers' beliefs about other followers' contributions increase highly significantly in the leaders' contributions. The followers also match their beliefs; that is, followers are conditional cooperators on average. This result is consistent with previous findings on conditional cooperation (see footnote 10 for references). The final panel records the evidence over all periods. We find that both the followers' beliefs and contributions are positively correlated with the leader's contributions. All correlations also hold at the group level (Spearman rank order correlations, $n = 12$, all $p < 0.017$ with group averages as independent observations).

While the main insights are conveyed in Fig. 1 and the above-mentioned non-parametric correlations, some additional insights might be gained from an econometric analysis. Table 1 investigates the determinants of beliefs econometrically. We use OLS and calculate robust standard errors using the group as the independent clustering unit (this assumes that decisions are correlated within a group but independent across groups). Specifically, we estimate a belief formation model as developed by Fischbacher and Gächter (2010) in the context of a ten times repeated public good experiment with random matching.¹³ Fischbacher and Gächter show that a subject's belief in period t about the other group members' average contribution in period t can be described as a weighted average of the belief a subject held in period $t - 1$ and what the other group members actually contributed on average in period $t - 1$.

Table 1 documents the results of Fischbacher and Gächter's belief formation model in our data set.¹⁴ Panel A presents the *no-leader treatment*. Looking at the data from all periods, we find, like Fischbacher and Gächter (2010), that beliefs in period t are a weighted average of own beliefs in period $t - 1$ and average actual contributions of others in period $t - 1$.¹⁵ When forming their estimates about the likely contributions of others, subjects put a weight of one third on their own previous belief and about a weight of two thirds on the observed average contribution of others in the previous period. The

¹³ Fischbacher and Gächter (2010) also had groups of four subjects (but randomly re-matched them in each period) and the same payoff function (1) as the present experiment. See their paper for further details on the belief formation model and Smith (2013) for a general analysis of belief effects in public goods.

¹⁴ As mentioned, we clustered at the group level, which leaves us with 12 independent clusters in each regression. This might be considered low by some (e.g., Cameron and Miller, 2015), with the concern that estimated standard errors are biased downwards; non-clustered (heteroscedasticity robust) standard errors might be more conservative. Random effects regressions with robust standard errors find that this is not the case: estimated robust standard errors are mostly lower than with the group-clustered standard errors we report in Table 1. All statistically significant results reported in Table 1 are robust to the calculation of standard errors.

¹⁵ An F-test does not allow rejecting the null hypotheses that the sum of coefficients "Own beliefs in $t - 1$ " and "Others' average contributions in $t - 1$ " is one ($p = 0.136$).

Table 1

Determinants of beliefs in the absence (Panel A) and presence of a leader (Panel B).

	A. No-leader treatment		
	Beliefs about other group members' contribution in t		
	ALL periods	Periods 2–5	Periods 6–10
Own belief in $t - 1$	0.329*** (0.067)	0.310*** (0.097)	0.338*** (0.042)
Average contribution of other group members in $t - 1$	0.629*** (0.058)	0.619*** (0.076)	0.624*** (0.045)
Constant	0.461 (0.325)	0.972 (0.542)	0.305 (0.247)
Observations	432	192	240
R-squared	0.82	0.73	0.85
	B. Leader treatment		
	Beliefs of followers about other follower's contribution in t		
	ALL periods	Periods 2–5	Periods 6–10
Leader contribution in t	0.373*** (0.090)	0.477*** (0.121)	0.290*** (0.070)
Own belief in $t - 1$	0.087*** (0.028)	0.005 (0.050)	0.138** (0.059)
Average contribution of other followers in $t - 1$	0.519*** (0.074)	0.437*** (0.095)	0.566*** (0.060)
Constant	0.010 (0.604)	0.828 (1.033)	−0.111 (0.407)
Observations	432	192	240
R-squared	0.86	0.80	0.90

OLS; robust standard errors clustered on groups in parentheses; *** significant at 1%. The estimation of the No-leader treatment follows Fischbacher and Gächter (2010).

estimation results are robust to including period as an explanatory variable, which is only weakly significantly negative (coefficient = -0.065 ; $p = 0.057$). Splitting up the data in first half (periods 2–5) and second half (periods 6–10) shows no systematic change in the belief formation process.

In the *leader treatment* (Panel B) beliefs can be shaped by the leader's current contribution, the followers' previous contributions, and the follower's beliefs in $t - 1$ about others' contributions. Starting with the results from all periods, we find again that beliefs are a weighted average of all three variables, which are all highly significant.¹⁶ In the presence of a leader the importance of own beliefs in $t - 1$ is largely diminished (although still highly significant). The important variables are the leader's contribution and the other followers' past contributions. An increase of a leader's contribution by one token increases the followers' average belief by 0.373 tokens. The impact of others' average contribution on follower beliefs is substantially higher: a one token increase in others' average contribution in $t - 1$ increases the followers' average belief by 0.519 tokens. In this sense, the followers' past contributions are more important for the beliefs about contributions of other followers in the current period than the leader's contribution in the current period. Again, results are robust to controlling for period (coefficient = -0.063 , $p = 0.109$).

Splitting the data in the first and second half (periods 2–5 and 6–10, respectively) reveals an interesting change in the weight the leader's contribution receives for forming beliefs about the other followers' contribution. Initially, followers' beliefs are a weighted average of the leader's contribution and the other followers' contribution in the previous period, with weights being very similar (0.477 and 0.437, respectively) and own beliefs in the previous period being unimportant. This picture changes in the second half, where the weight of the leader's contribution is diminished (to 0.290) and own past belief (0.138) and others' past contribution (0.566) becoming more important.

The observation that the other followers' past behavior is more important for beliefs than the leader's current behavior leads to a 'path dependency effect'. From Fig. 1 and Table 1B we know that the leader's contribution shapes the followers' initial beliefs and actual contributions very strongly. Yet, in subsequent periods the followers' belief of what happens in the current period depends more strongly on what the other followers have done in the past than what the leader just did in the present period. Thus, the direct contemporaneous impact of the leader is diminished relative to the weight that followers attach to the other followers' past behavior when forming their beliefs about the likely behavior of other followers in the present period. In other words, the impact of a leader's contribution is strongest in the first periods and, while playing a role in subsequent periods, it is not strong enough to correct the beliefs of followers once they can observe the actual contributions of followers in the later periods.

¹⁶ An F-test confirms that the sum of coefficients is insignificantly different from unity ($p = 0.510$).

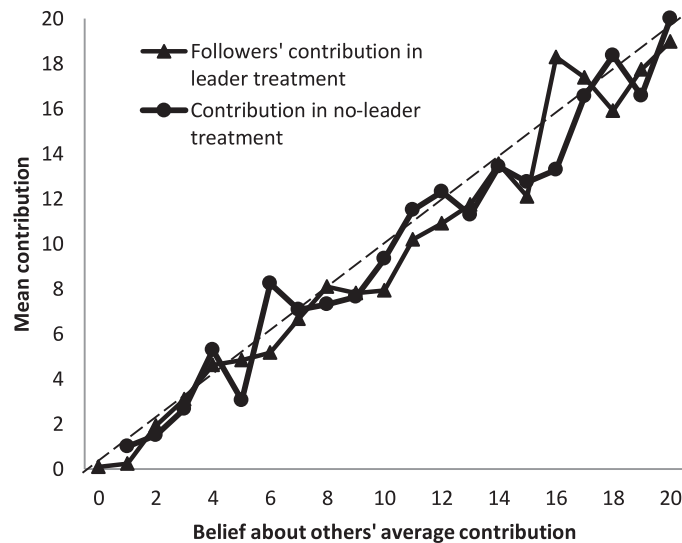


Fig. 2. Contributions as a function of the beliefs about other group members' contribution in games with and without a leader.

Table 2

Cooperation in the presence and absence of a leader.

Dependent variable:	No-leader treatment		Leader treatment			
	Contribution		Follower contribution			
	(1)	(2)	(3)	(4)	(5)	(6)
Leader contribution in t					0.115 (0.085)	0.081 (0.048)
Belief about others' average contribution in t	0.887*** (0.068)	0.494*** (0.087)	0.918*** (0.072)	0.641*** (0.085)	0.820*** (0.124)	0.577*** (0.110)
Own contribution in $t - 1$		0.523*** (0.080)		0.361*** (0.091)		0.356*** (0.087)
Constant	0.738 (0.787)	−0.571 (0.327)	0.054 (0.574)	−0.707 (0.231)	−0.215 (0.509)	−0.889 (0.245)
Observations	480	432	360	324	360	324
R-squared	0.40	0.57	0.59	0.67	0.59	0.67

OLS; robust standard errors clustered on groups in parentheses. *** significant at 1%.

4.2. The link between beliefs and contributions

Our next step is to understand how beliefs in period t and contributions in period t are linked. Fig. 2 documents the results. On the x-axis we depict the belief about others' contributions and on the y-axis we show the average actual contribution. We distinguish between the two treatments. We find strong evidence for conditional cooperation in both treatments. Moreover, average contribution behavior conditional on given beliefs is virtually identical between treatments.¹⁷ Thus, the presence of a leader has not altered conditionally cooperative behavior in any substantial sense. A further interesting observation is that in both treatments players match their beliefs almost perfectly with their contributions. Moreover, beliefs and contributions follow the diagonal very closely.

Again, an econometric analysis of the link between contributions and beliefs might provide some additional insights beyond these main observations.¹⁸ In Table 2 we distinguish between the no-leader treatment and the leader treatment. For both treatments, we run two OLS regression models with robust standard errors clustered on independent groups.

In the first model (columns (1) and (3)) we only include the belief about others' average contribution in period t as a regressor. We find that in both treatments the estimated coefficients are around 0.9 and are highly significant.

In our second set of models (columns (2) and (4)) we include the own contribution in $t - 1$ as an explanatory variable. The reason is that people might follow an idiosyncratic contribution pattern, which we capture by this variable. We find in

¹⁷ These results also hold at group level. Group-level pairs of belief-contribution observations (averaged over all periods) are distributed very closely around the diagonal. Spearman rank correlations are 0.99 ($p < 0.001$) both for the no-leader and the leader treatment.

¹⁸ The caveat about the number of clusters mentioned in footnote 14 also holds here. However, like with the re-estimated results of Table 1, we also find for Table 2 that in random effects regressions with robust standard errors estimated standard errors are mostly lower than with the group-clustered standard errors. Like in Table 1, none of the statistically significant results reported in Table 2 change upon re-estimation.

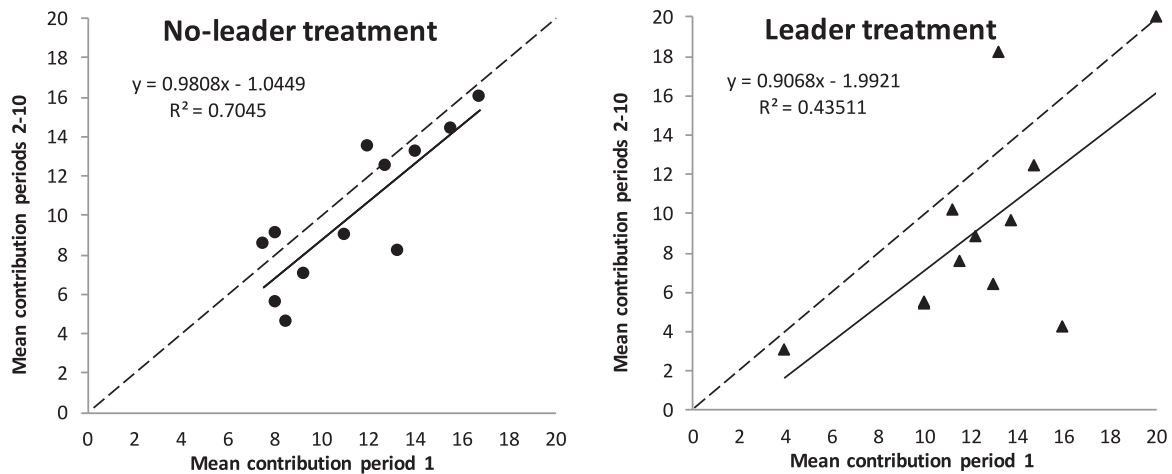


Fig. 3. The impact of a group's first-period contribution on the group cooperation level in the remaining periods in the absence (left) and presence of a leader (right).

both models that own lagged contributions matter strongly both in terms of size and significance. An interesting observation is that the belief about others' average contribution matters somewhat more in the leader treatment than in the no-leader treatment; for the variable 'own contribution in $t - 1$ ' the opposite conclusion holds.

Finally, in our third set of models (columns (5) and (6)), we also include the leader's contribution to test for direct reciprocation of the leader's contribution on top of beliefs about other followers' contributions (which are also influenced by leader contributions). Interestingly, in both models the leader's contribution only insignificantly positively related to the followers' contributions. Followers only match what they believe other followers are going to contribute. This means that, although the leader strongly shapes their followers' beliefs about other followers' contributions, the leader's contribution does not matter *on top of* follower's beliefs.¹⁹ This result also holds if we only look at the first and second half of periods, respectively.

In Section 4.1 we established a path dependency for beliefs. The strong relationship between beliefs and contributions implies a strong path dependency not only for contributions in the leader treatment but also in the no-leader treatment because beliefs on others' average contribution matter strongly in this treatment as well. Fig. 3 illustrates this path dependency at the group level. Each data point in Fig. 3 is an independent group of four members. We depict on the x-axis the mean contribution in period 1. On the y-axis we show the mean contribution of an independent group for the rest of the periods.

We see that in both the no-leader and the leader treatment period 1 group average contributions are significantly positively correlated with group average contributions for periods 2 to 10. The slope of the trend line is almost unity in both treatments. The between-group variance is higher in the leader treatment than in the no-leader treatment (compare the R^2 's).

In period 1 of the no-leader treatment contributions were determined by group members' beliefs about others' average contributions, without any information how other group members decided. In the leader treatment, the leader's contribution shaped the mean contribution in period 1 (see Fig. 1). Thus, the main difference between treatments is that it is on average largely in the hand of the leader to determine the fate of his or her group in the leader treatment.

4.3. Can leaders increase contribution levels?

Given our results so far, a natural question to ask is whether leaders are able to lead their groups to high cooperation and hence high profit levels. Figs. 1 and 2 and their supporting analysis suggest yes, and Spearman rank correlations between group average leader contributions and group average follower contributions (averaged over all ten rounds) support this conclusion ($n = 12$; $\rho = 0.697$; $p = 0.012$); the same holds for the correlation between group average leader contribution and group average earnings ($n = 12$; $\rho = 0.792$; $p = 0.002$). However, these results do not answer the question whether leaders are able to prevent the *decline* of cooperation that typically afflicts groups when contributions to the public good are determined simultaneously (e.g., Keser and van Winden, 2000; Herrmann et al., 2008; Fischbacher and Gächter, 2010; Gächter et al.,

¹⁹ We also estimated SUR regressions that simultaneously estimate follower's contributions as a function of follower's beliefs about other followers' contribution as well as followers' beliefs as a function of the Leader's contribution. We ran these regressions for period 1, period 10, and over all periods. In all regressions, the leader's contribution is highly significantly positively related with followers' beliefs, and followers' beliefs are highly significant for followers' contribution. This explains why the leader's contribution does not matter on top of beliefs.

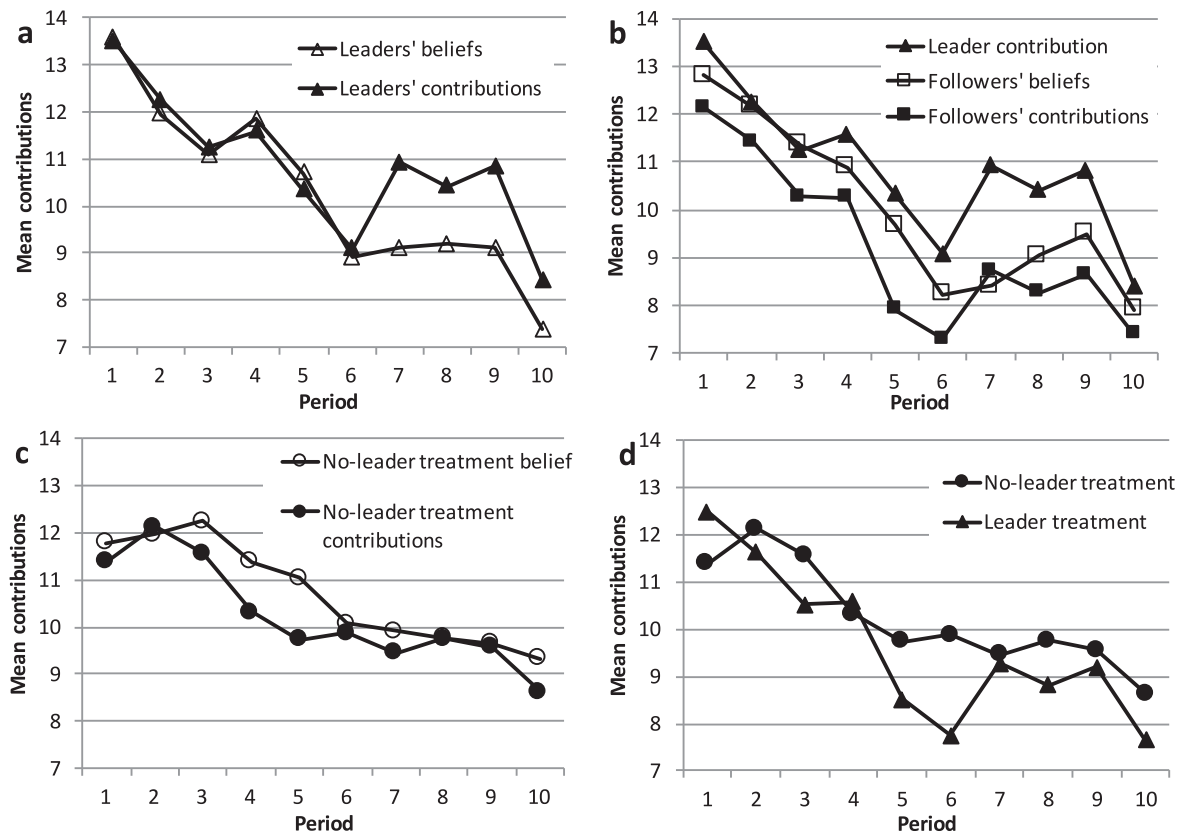


Fig. 4. The leader's curse and its consequences for beliefs and contributions.

2017). Our results so far suggest that leaders should be able to lead their groups to higher contribution levels than those achieved by groups without a leader. Yet, our experiments suggest that the presence of a leader is of no avail.

Fig. 4a–c illustrate this sobering result. Fig. 4a and b show the results in the leader treatment. We distinguish between beliefs and actual contributions and depict these variables for both leaders (Fig. 4a) and followers (Fig. 4b, which also includes the leader contributions for ease of comparison). There is an interesting, though small, difference between leaders and followers: leaders behave as almost perfect conditional cooperators who contribute the amount they believe the followers will contribute, or even more (in particular towards the end).²⁰ Followers' contributions fall short of their beliefs in almost all periods (the difference is 0.72 tokens on average). Followers free ride even more on the leader's contribution by contributing on average 1.63 tokens less than the leader.²¹ This constitutes the 'leader's curse': leaders are 'suckers'. Apparently, leaders alleviate the adverse feeling of being suckered by withdrawing their contributions over time; although, in periods 7 to 10 their contributions exceed their beliefs, which suggests that they make the conscious choice to contribute more despite expecting followers to free ride.

Fig. 4c shows the mean beliefs about others' average contributions and the average actual contributions in the no-leader treatment. Beliefs follow contributions closely, although actual contributions fall slightly below expected contributions. There is a downward trend in both variables, which is expected given previous results – see Neugebauer et al. (2009), Fischbacher and Gächter (2010), Bayer et al. (2013) and Gächter et al. (2017).

²⁰ Recall that leaders were allocated randomly and so it is likely that some of them are actually free rider types, that is, not motivated by conditional cooperation. This is likely, given an abundance of evidence showing that people differ strongly in their social preferences (Blanco et al., 2011; Beranek et al., 2015) and cooperative disposition (see references in footnote 10). However, our experimental design does not allow us to disentangle motivations (cooperative dispositions) and behavior; we only observe the leader's behavior. See Gächter et al. (2012) for an analysis that disentangles leaders' cooperative dispositions and their actual leader behavior. They find that leaders with cooperative dispositions are the better leaders in the sense that they achieve higher levels of cooperation and earnings than leaders with free rider dispositions.

²¹ Linear regressions with robust standard errors clustered by group support these claims: (1) A regression of leader contributions on leader beliefs and period returns a coefficient on beliefs of 0.955 ($p < 0.001$); the constant and period are insignificant ($p = 0.928$ and 0.208 , resp.). (2) The same regression for follower contributions on their beliefs and period returns a coefficient on beliefs of 0.917 ($p < 0.001$); period and constant are insignificant ($p > 0.903$). (3) A regression of contributions on a leader dummy and period shows that the average of 1.65 tokens per round is marginally insignificant ($p = 0.105$); the coefficient on period (-0.447) and the constant (11.69) are significant ($p = 0.026$ and $p < 0.001$, resp.).

The results from Fig. 4a–c explain why a comparison of group average contributions in the no-leader treatment (10.24) and the leader-treatment (9.64), illustrated in Fig. 4d, shows no significant difference.²² Because leaders are conditional cooperators too, and followers tend to free ride to some extent on the leader's contributions, leaders are unwilling to uphold high levels of contribution and hence to lead their groups to higher contribution levels than those achieved by groups with no leaders.

5. Summary and concluding discussion

In this paper, we analyzed the role of beliefs about other's behavior for own pro-social behavior. As we showed in Section 2, there is plenty of anecdotal and scientific evidence from the field and the lab that suggests a link between beliefs and pro-social behavior. If people's pro-social behavior is belief-dependent, any factor that shifts people's beliefs will shift their behavior. In this paper, we looked at leaders as a potentially strong belief-shifters and compared the leader-setting to a setup without a leader (our 'no-leader treatment').

Our most important results are as follows. In both treatments, we find strong belief effects: the higher the beliefs, the higher are contributions. Moreover, for a given belief, contributions are identical between treatments. We find strong path dependency effects in both treatments: groups that start at high (low) cooperation maintain high (low) cooperation. In our no-leader treatment beliefs and contributions only depend on other group member's past contributions. In the leader treatment leading by example works in the sense that leaders shape the followers' initial beliefs (and contributions) very strongly, but from then on followers, in forming their beliefs (and deciding on their contributions) put more weight on the other followers' past contributions than on the leader's current one. This observation implies that the leader's initial behavior has long-lasting effects. Finally, we found evidence for a 'leader's curse': although followers follow the leader's example and contribute more the more the leader contributes, the leader is nevertheless the 'sucker' in this game. As a consequence, leaders reduce their contributions over time, and cooperation collapses, much like in the no-leader treatment.

We conclude our paper by discussing a few implications of our results for understanding issues in public policy and management. We begin with our last result, the 'leader's curse'. Our findings suggest that good leaders need to be 'thick-skinned' and accept being 'exploited'. Put differently, good leaders need to resist the temptation to give in if their followers do not play ball to the extent the leader does. This is difficult, given that many leaders (who are randomly assigned to their role) are also conditional cooperators who only want to cooperate if others do so too and hence are averse to being exploited by others (Cubitt et al., 2017); this is even true for people who are not motivated by conditional cooperation (Weber et al., 2018).

Second, since leaders are role models, the behavior of politicians, top officials and managers may matter strongly for the morale of citizens and employees. Thus, our findings from tightly controlled laboratory experiments underscore the observations made in our introductory quotes and the field evidence we discussed in Section 2. An interesting new insight of our laboratory approach is that there is a 'multiplier effect', because a bad example (dishonesty in tax matters, corruption, and unethical behavior in other domains) may not only have direct effects on a follower but may also trigger belief effects about how others will react. The path-dependency effect may affect morale adversely in the long-run. Leaders should thus be role models for whom high moral standards should hold.

An implication of our path dependency result is that leaders have the greatest direct impact of influencing their followers' behavior at the beginning of a relationship (see Figs. 1 and 2). The fact that later on the impact of leaders on followers' beliefs is diminished may explain why in reality corporate cultures are hard to change or why tax evasion and corruption are hard to fight.

In our view, the behavioral relevance of our findings extends beyond leadership by specific individuals. Belief management happens not only through leaders, but also through effects like the perceived fairness of the tax system, fair treatment by authorities, and democratic participation rights. For instance, there is evidence that the perception of the fairness of the tax system and the treatment by authorities matter for tax morale (Seidl and Traub, 2001; Pommerehne and Weck-Hannemann, 1996; Goette and Kucher, 1998; Scholz and Lubell, 1998; Feld and Frey, 2002). More generally, tax morale is significantly positively correlated with trust in the parliament and the justice system (e.g., Alm et al., 2006; Frey and Torgler, 2007). Similarly, tax morale is positively affected by various governance variables, like political stability, government effectiveness, rule of law, voice and accountability, regulatory quality and control of corruption (Frey and Torgler, 2007). A further interesting observation is that tax evasion at the Swiss cantonal level is lower in cantons where citizens have more direct democratic rights (e.g., Feld and Frey, 2002).

How can our observations explain such findings? First, with regard to tax morale (similar conclusions may hold for the abuse of the welfare state and corruption), there may be a *direct* effect by the concerned individual who may reciprocate unfair treatment by authorities and/or the tax system by lower tax morale, simply because the taxpayer resents unfair treatment (Smith, 1992). Second, there may be an *indirect* effect of tax authorities (and the government in general), via the beliefs on other tax payers' behavior. The reason is that if many people share similar feelings and experiences, this will

²² A linear regression with robust standard errors clustered on groups of contributions on period and a dummy for the leader treatment returns an insignificant coefficient for the leader treatment dummy ($p = 0.735$) and a significantly negative coefficient for period (-0.388 , $p = 0.001$). The constant is 12.37 ($p < 0.001$). The lack of a difference in contributions between the leader and the no-leader treatment holds for the first and the second half, and even for period 1.

lower the belief that others have a high tax morale, which further undermines tax morale. Similarly, the government's trust in the honesty of its citizens may lead to a direct effect of "trust breeds trust" (Feld and Frey, 2002), presumably because people like to be considered trustworthy. Again, if such feelings are widespread, they may shape beliefs about other citizen's tax morale and hence reinforce the tax payer's morale. Direct-democratic procedures may influence tax morale positively because direct democracy may affect the beliefs about other people's tax morale once a tax law is passed in a referendum. A referendum signals people's opinion about a topic and the dissemination of opinions via the result of a referendum may shape people's beliefs about others' behavior (Feld and Tyran, 2002; Stutzer and Lalive, 2004).

Previous research (see Section 2) has focused primarily on the direct reciprocity effects mentioned above; indirect effects (via beliefs) are understudied. Put differently, there is only little evidence on how governments, politicians, and authorities influence people's perceptions on how pro-socially their fellow citizens will behave. We are only aware of one study, by Hammar et al. (2009), that investigated indirect effects by looking at the impact of trust in politicians on people's perceptions of tax morale. In conclusion, our results encourage further investigations of belief effects in economically interesting field data. mmc1.pdf

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.jebo.2018.08.001](https://doi.org/10.1016/j.jebo.2018.08.001).

References

- Albrecht, F., Kube, S., Traxler, C., 2018. Cooperation and punishment: the individual-level perspective. *J. Public Econ.* 165, 1–16.
- Alm, J., Martinez-Vazquez, J., Torgler, B., 2006. Russian attitudes toward paying taxes - before, during, and after the transition. *Int. J. Social Econ.* 33 (12), 832–857.
- Alpizar, F., Carlsson, F., Johansson-Stenman, O., 2008. Anonymity, reciprocity, and conformity: evidence from voluntary contributions to a national park in Costa Rica. *J. Public Econ.* 92 (5–6), 1047–1060.
- Andreoni, J., Erard, B., Feinstein, J., 1998. Tax compliance. *J. Econ. Lit.* 36 (2), 818–860.
- Andreoni, J., Petrie, R., 2004. Public goods experiments without confidentiality: a glimpse into fund-raising. *J. Public Econ.* 88 (7–8), 1605–1623.
- Andreoni, J., Scholz, J.K., 1998. An econometric analysis of charitable giving with interdependent preferences. *Econ. Inq.* 36 (3), 410–428.
- Arbak, E., Villeval, M.C., 2013. Voluntary leadership: motivation and influence. *Social Choice Welf.* 40 (3), 635–662.
- Arce, D.G., 2001. Leadership and the aggregation of international collective action. *Oxf. Econ. Pap.* 53 (1), 114–137.
- Bayer, R.-C., Renner, E., Sausgruber, R., 2013. Confusion and learning in the voluntary contributions game. *Exp. Econ.* 16 (4), 478–496.
- Beranek, B., Cubitt, R., Gächter, S., 2015. Stated and revealed inequality aversion in three subject pools. *J. Econ. Sci. Assoc.* 1 (1), 43–58.
- Bianco, W.T., Bates, R.H., 1990. Cooperation by design: leadership, structure, and collective dilemmas. *Am. Polit. Sci. Rev.* 84 (1), 133–147.
- Blanco, M., Engelmann, D., Koch, A., Normann, H.-T., 2010. Belief elicitation in experiments: is there a hedging problem? *Exp. Econ.* 13(4), 412–438.
- Blanco, M., Engelmann, D., Normann, H.T., 2011. A within-subject analysis of other-regarding preferences. *Games Econ. Behav.* 72 (2), 321–338.
- Bordignon, M., 1993. A fairness approach to income tax evasion. *J. Public Econ.* 52 (3), 345–362.
- Bruttel, L., Fischbacher, U., 2013. Taking the initiative. What characterizes leaders? *Eur. Econ. Rev.* 64 (0), 147–168.
- Cameron, C.A., Miller, D.L., 2015. A practitioner's guide to cluster-robust inference. *J. Human Resour.* 50 (2), 317–372.
- Chaudhuri, A., 2011. Sustaining cooperation in laboratory public goods experiments: a selective survey of the literature. *Exp. Econ.* 14 (1), 47–83.
- Chen, Y., Harper, F.M., Konstan, J., Li, S.X., 2010. Social comparisons and contributions to online communities: a field experiment on MovieLens. *Am. Econ. Rev.* 100 (4), 1358–1398.
- Cialdini, R.B., Reno, R., Kallgren, C., 1990. A focus theory of normative conduct: recycling the concept of norms to reduce littering in public places. *J. Pers. Social Psychol.* 58 (6), 1015–1026.
- Cowell, F.A., 1990. *Cheating the Government: The Economics of Evasion*. The MIT Press, Cambridge, Mass.
- Crosan, R., 2000. Thinking like a game theorist: factors affecting the frequency of equilibrium play. *J. Econ. Behav. Organ.* 41 (3), 299–314.
- Crosan, R., 2007. Theories of commitment, altruism and reciprocity: evidence from linear public goods games. *Econ. Inq.* 45 (2), 199–216.
- Crosan, R., Shang, J., 2008. The impact of downward social information on contribution decisions. *Exp. Econ.* 11 (3), 221–233.
- Cubitt, R., Gächter, S., Quercia, S., 2017. Conditional cooperation and betrayal aversion. *J. Econ. Behav. Organ.* 141, 110–121.
- d'Adda, G., Darai, D., Pavanini, N., Weber, R.A., 2017. Do leaders affect ethical conduct? *J. Eur. Econ. Assoc.* 15 (6), 1177–1213.
- Drouvelis, M., Nosenzo, D., 2013. Group identity and leading-by-example. *J. Econ. Psychol.* 39, 414–425.
- Drouvelis, M., Nosenzo, D., Sefton, M., 2017. Team incentives and leadership. *J. Econ. Psychol.* 62, 173–185.
- Dufwenberg, M., Gächter, S., Hennig-Schmidt, H., 2011. The framing of games and the psychology of play. *Games Econ. Behav.* 73 (2), 459–478.
- Dur, R., Vollaard, B., 2015. The power of a bad example. *Environ. Behav.* 47 (9), 970–1000.
- Falk, A., Fischbacher, U., 2002. "Crime" in the lab-detecting social interaction. *Eur. Econ. Rev.* 46 (4–5), 859–869.
- Feld, L., Frey, B.S., 2002. Trust breeds trust: how taxpayers are treated. *Econ. Governance* 3 (1), 87–99.
- Feld, L.P., Tyran, J.-R., 2002. Tax evasion and voting: an experimental analysis. *Kyklos* 55 (2), 197–221.
- Fellner, G., Sausgruber, R., Traxler, C., 2013. Testing enforcement strategies in the field: threat, moral appeal and social information. *J. Eur. Econ. Assoc.* 11 (3), 634–660.
- Fischbacher, U., 2007. z-Tree: Zurich toolbox for readymade economic experiments. *Exp. Econ.* 10 (2), 171–178.
- Fischbacher, U., Gächter, S., 2010. Social preferences, beliefs, and the dynamics of free riding in public good experiments. *Am. Econ. Rev.* 100 (1), 541–556.
- Fischbacher, U., Gächter, S., Fehr, E., 2001. Are people conditionally cooperative? Evidence from a public goods experiment. *Econ. Lett.* 71 (3), 397–404.
- Fischbacher, U., Gächter, S., Quercia, S., 2012. The behavioral validity of the strategy method in public good experiments. *J. Econ. Psychol.* 33 (4), 897–913.
- Fisman, R., Golden, M.A., 2017. *Corruption. What Everyone Needs to Know*. Oxford University Press, Oxford.
- Foss, N.J., 2001. Leadership, beliefs and coordination: an explorative discussion. *Ind. Corp. Change* 10 (2), 357–388.

- Frey, B.S., Meier, S., 2004. Social comparisons and pro-social behavior. Testing 'conditional cooperation' in a field experiment. *Am. Econ. Rev.* 94 (5), 1717–1722.
- Frey, B.S., Torgler, B., 2007. Tax morale and conditional cooperation. *J. Comp. Econ.* 35 (1), 136–159.
- Gächter, S., Kölle, F., Quercia, S., 2017. Reciprocity and the tragedies of maintaining and providing the commons. *Nat. Human Behav.* 1 (9), 650–656.
- Gächter, S., Nosenzo, D., Renner, E., Sefton, M., 2012. Who makes a good leader? Cooperativeness, optimism, and leading-by-example. *Econ. Inq.* 50 (4), 953–967.
- Gächter, S., Renner, E., 2003. Leading by example in the presence of free rider incentives. Manuscript.
- Gächter, S., Renner, E., 2010. The effects of (incentivized) belief elicitation in public goods experiments. *Exp. Econ.* 13 (3), 364–377.
- Gächter, S., Schulz, J.F., 2016. Intrinsic honesty and the prevalence of rule violations across societies. *Nature* 531 (7595), 496–499.
- Goette, L., Kucher, M., 1998. Trust Me. An empirical analysis of taxpayer honesty. *Finanzarchiv* 55 (3), 429–444.
- Güth, W., Levati, M.V., Sutter, M., Van der Heijden, E., 2007. Leading by example with and without exclusion power in voluntary contribution experiments. *J. Public Econ.* 91 (5–6), 1023–1042.
- Haigner, S.D., Wakolbinger, F., 2010. To lead or not to lead Endogenous sequencing in public goods games. *Econ. Lett.* 108 (1), 93–95.
- Hallsworth, M., List, J.A., Metcalfe, R.D., Vlaev, I., 2017. The behavioralist as tax collector: using natural field experiments to enhance tax compliance. *J. Public Econ.* 148, 14–31.
- Hammar, H., Jagers, S.C., Nordblom, K., 2009. Perceived tax evasion and the importance of trust. *J. Socio-Econ.* 38 (2), 238–245.
- Hermalin, B.E., 1998. Toward an economic theory of leadership: leading by example. *Am. Econ. Rev.* 88 (5), 1188–1206.
- Herrmann, B., Thöni, C., 2009. Measuring conditional cooperation: a replication study in Russia. *Exp. Econ.* 12 (1), 87–92.
- Herrmann, B., Thöni, C., Gächter, S., 2008. Antisocial punishment across societies. *Science* 319 (5868), 1362–1367.
- Houser, D., Levy, D.M., Padgitt, K., Peart, S.J., Xiao, E., 2014. Raising the price of talk: an experimental analysis of transparent leadership. *J. Econ. Behav. Organ.* 105, 208–218.
- Huang, P., Wu, H.-M., 1994. More order without more law: a theory of social norms and organizational cultures. *J. Law Econ. Organ.* 10 (2), 390–406.
- Huck, S., Rey-Biel, P., 2006. Endogenous leadership in teams. *J. Inst. Theor. Econ.* 162, 253–261.
- Jack, B.K., Recalde, M.P., 2015. Leadership and the voluntary provision of public goods: field evidence from Bolivia. *J. Public Econ.* 122 (Supplement C), 80–93.
- Kahan, D., 1997. Social influence, social meaning, and deterrence. *Va. Law Rev.* 83 (2), 349–395.
- Keizer, K., Lindenberg, S., Steg, L., 2008. The spreading of disorder. *Science* 322 (5908), 1681–1685.
- Kelley, H., Stahelski, A., 1970. Social interaction basis of cooperators' and competitors' beliefs about others. *J. Pers. Social Psychol.* 16 (1), 190–219.
- Keser, C., van Winden, F., 2000. Conditional cooperation and voluntary contributions to public goods. *Scand. J. Econ.* 102 (1), 23–39.
- Klitgaard, R., 1988. *Controlling Corruption*. University of California Press, Los Angeles.
- Kocher, M.G., Cherry, T., Kroll, S., Netzer, R.J., Sutter, M., 2008. Conditional cooperation on three continents. *Econ. Lett.* 101 (3), 175–178.
- Kocher, M.G., Martinsson, P., Matzat, D., Wollbrant, C., 2015. The role of beliefs, trust, and risk in contributions to a public good. *J. Econ. Psychol.* 51, 236–244.
- Komai, M., Stegeman, M., Hermalin, B.E., 2007. Leadership and information. *Am. Econ. Rev.* 97 (3), 944–947.
- Kumru, C.S., Vesterlund, L., 2010. The effect of status on charitable giving. *J. Public Econ. Theory* 12 (4), 709–735.
- Kurzban, R., Houser, D., 2005. Experiments investigating cooperative types in humans: a complement to evolutionary theory and simulations. *Proc. Natl. Acad. Sci. USA* 102 (5), 1803–1807.
- Levy, D.M., Padgitt, K., Peart, S.J., Houser, D., Xiao, E., 2011. Leadership, cheap talk and really cheap talk. *J. Econ. Behav. Organ.* 77 (1), 40–52.
- List, J., Lucking-Reiley, D., 2002. The effects of seed money and refunds on charitable giving: experimental evidence from a university capital campaign. *J. Polit. Econ.* 110 (1), 215–233.
- Loerakker, B., van Winden, F., 2017. Emotional leadership in an intergroup conflict game experiment. *J. Econ. Psychol.* 63, 143–167.
- Luttmer, E.F.P., Singhal, M., 2014. Tax morale. *J. Econ. Perspect.* 28 (4), 149–168.
- Manski, C.F., 2000. Economic analysis of social interactions. *J. Econ. Perspect.* 13 (3), 115–136.
- Martin, R., Randal, J., 2008. How is donation behaviour affected by the donations of others? *J. Econ. Behav. Organ.* 67 (1), 228–238.
- Martinsson, P., Pham-Khanh, N., Villegas-Palacio, C., 2013. Conditional cooperation and disclosure in developing countries. *J. Econ. Psychol.* 34 (0), 148–155.
- Meier, S., 2006. Does framing matter for conditional cooperation? Evidence from a natural field experiment. *Contrib. Econ. Anal. Policy* 5 (2), 1. available at: <http://www.bepress.com/bejeap/contributions/vol5/iss2/art1>.
- Moxnes, E., van der Heijden, E., 2003. The effect of leadership in a public bad experiment. *J. Confl. Resol.* 47 (6), 773–795.
- Muller, L., Sefton, M., Steinberg, R., Vesterlund, L., 2008. Strategic behavior and learning in repeated voluntary-contribution experiments. *J. Econ. Behav. Organ.* 67 (3–4), 782–793.
- Neugebauer, T., Perote, J., Schmidt, U., Loos, M., 2009. Self-biased conditional cooperation: on the decline of cooperation in repeated public goods experiments. *J. Econ. Psychol.* 30 (1), 52–60.
- Ockenfels, A., 1999. Fairness, Reziprozität und Eigennutz - Ökonomische Theorie und Experimentelle Evidenz, 108. Mohr Siebeck, Tübingen.
- Pommerehne, W.W., Weck-Hannemann, H., 1996. Tax rates, tax administration and income tax evasion in Switzerland. *Public Choice* 88 (1), 161–170.
- Potters, J., Sefton, M., Vesterlund, L., 2005. After you—endogenous sequencing in voluntary contribution games. *J. Public Econ.* 89 (8), 1399–1419.
- Potters, J., Sefton, M., Vesterlund, L., 2007. Leading-by-example and signaling in voluntary contribution games: an experimental study. *Econ. Theory* 33, 169–182.
- Préget, R., Nguyen-Van, P., Willinger, M., 2016. Who are the voluntary leaders? Experimental evidence from a sequential contribution game. *Theory Decis.* 81 (4), 581–599.
- Rivas, M.F., Sutter, M., 2011. The benefits of voluntary leadership in experimental public goods games. *Econ. Lett.* 112 (2), 176–178.
- Rotemberg, J.J., Saloner, G., 1993. Leadership style and incentives. *Manag. Sci.* 39 (11), 1299–1318.
- Rustagi, D., Engel, S., Kosfeld, M., 2010. Conditional cooperation and costly monitoring explain success in forest commons management. *Science* 330 (6006), 961–965.
- Scholz, J.T., Lubell, M., 1998. Trust and taxpaying: testing the heuristic approach to collective action. *Am. J. Polit. Sci.* 42 (2), 398–417.
- Seidl, C., Traub, S., 2001. Taxpayers' attitudes, behavior, and perception of fairness. *Pac. Econ. Rev.* 6 (2), 255–267.
- Skogan, W.G., 1990. *Disorder and Decline: Crime and the Spiral of Decay in American Neighborhoods*. University of California Press, Berkeley.
- Slemrod, J., 1992. *Why People Pay Taxes: Tax Compliance and Enforcement*. University of Michigan Press, Ann Arbor.
- Smith, A., 2013. Estimating the causal effect of belief on contributions in repeated public good games. *Exp. Econ.* 16 (3), 414–425.
- Smith, K.W., 1992. Reciprocity and fairness: positive incentives for tax compliance. In: Slemrod, J. (Ed.), *Why People Pay Taxes: Tax Compliance and Enforcement*. University of Michigan Press, Ann Arbor.
- Stutzer, A., Lalive, R., 2004. The role of social work norms in job searching and subjective well-being. *J. Eur. Econ. Assoc.* 2 (4), 696–719.
- Thöni, C., Tyran, J.-R., Wengström, E., 2012. Microfoundations of social capital. *J. Public Econ.* 96 (7–8), 635–643.
- Thöni, C., Volk, S., 2018. Conditional cooperation: review and refinement. *Econ. Lett.* 171, 37–40.
- Traxler, C., 2010. Social norms and conditional cooperative taxpayers. *Eur. J. Polit. Econ.* 26 (1), 89–103.
- Van Vugt, M., Ahuja, A., 2010. *Selected: Why some People lead, Why Others follow, and Why It matters: What Evolutionary Psychology Tells Us About Leadership and What Makes an Outstanding Leader*. Profile Books, London.
- Van Vugt, M., De Cremer, D., 2002. Leadership and cooperation in groups: integrating the social dilemma and social identity perspectives. *Eur. Rev. Social Psychol.* 13, 155–184.
- Vesterlund, L., 2003. The informational value of sequential fundraising. *J. Public Econ.* 87 (3–4), 627–657.
- Volk, S., Thöni, C., Ruigrok, W., 2012. Temporal stability and psychological foundations of cooperation preferences. *J. Econ. Behav. Organ.* 81 (2), 664–676.

- Weber, R., Camerer, C.F., Rottenstreich, Y., Knez, M., 2001. The illusion of leadership: misattribution of cause in coordination games. *Organ. Sci.* 12 (5), 582–598.
- Weber, T., Weisel, O., Gächter, S., 2018. Dispositional free riders do not free ride on punishment. *Nat. Commun.* 9 (1), art. 2390.