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Abstract

Many jobs are connected to a prosocial mission, i.e., they have a positive impact on society beyond profit-maximization. This paper uses a modified principal-agent gift-exchange game with positive externality (mission treatment) to study how the mission interacts with the use of efficiency wages in motivating effort. We find that, compared to a standard gift-exchange game (GE treatment), the presence of the mission shifts the agents' effort choice function upwards without affecting its slope. This means that mission and efficiency wages are independent in motivating effort and, thus, that if principals were profit-maximizers, wage offers should be the same in both treatments. However, principals offer higher wages in the mission treatment. We show that this is due to principals in the GE treatment highly underestimating agents' reciprocity and thereby offering wages below the profit-maximizing level. The results from two robustness-checks further suggest that our findings are unlikely to be driven by a simple efficiency effect but, rather, by the presence of the positive externality -- independently, however, from the quality of the mission-matching.

JEL Classification: D23, M52

Keywords: Mission motivation, Gift exchange, Biased beliefs, Efficiency wages

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Efficiency Wages with Motivated Agents

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January 27, 2023

Abstract

Many jobs are connected to a prosocial mission, i.e., they have a positive impact on society beyond profit-maximization. This paper uses a modified principal-agent gift-exchange game with positive externality (mission treatment) to study how the mission interacts with the use of efficiency wages in motivating effort. We find that, compared to a standard gift-exchange game (GE treatment), the presence of the mission shifts the agents' effort choice function upwards without affecting its slope. This means that mission and efficiency wages are independent in motivating effort and, thus, that if principals were profit-maximizers, wage offers should be the same in both treatments. However, principals offer higher wages in the mission treatment. We show that this is due to principals in the GE treatment highly underestimating agents' reciprocity and thereby offering wages below the profit-maximizing level. The results from two robustness-checks further suggest that our findings are unlikely to be driven by a simple efficiency effect but, rather, by the presence of the positive externality – independently, however, from the quality of the mission-matching.
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Recent empirical evidence shows that workers' motivation is often driven by different nonfinancial motives in addition to financial compensation, such as the willingness to contribute to a social mission, as well as social preferences induced concerns (e.g., of reciprocity and fairness) towards the employer and colleagues (for a recent review on this topic see Cassar and Meier (2018)). However, the implications of these multiple non-monetary motives for incentive theory

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and Human Resource Management (HRM) are still unclear. To date, most economic research has either studied one of these two non-monetary aspects in isolation or ignored non-financial motives altogether. Are workers' mission motivation and reciprocity concerns complementary, substitutes or independent? How does the shape of this relationship affect wage contracts? Do principals correctly predict workers' preferences and thus offer the right wage? The answers to these questions can provide useful guidance for the design of compensation packages in mission-oriented organizations. They can also provide new insights to the debate about the existence of a wage differential between profit and non-profit organizations.

This paper takes the first steps in addressing these questions by studying contracting in a laboratory setting where agents can be motivated both by the social mission of their job and by social preferences towards the principal. More specifically, we use experimental tools to investigate whether and how the presence of a social mission affects the emergence of a specific type of efficiency wage, namely, those wages that are set above the competitive level with the aim of motivating effort *by appealing to workers' sense of fairness and reciprocity.*[1] The social mission and efficiency wages appeal to two fundamental – but clearly distinct – aspects of workers' intrinsic motivation. The mission relates to the social impact that the workers' effort has on third parties and may motivate workers who care about the social cause underlying the mission (e.g., Murdock, 2002; Benabou and Tirole, 2003; Besley and Ghatak, 2005; Delfgaauw and Dur, 2007, 2008; Ashraf et al., 2014; Prendergast, 2008; Besley and Ghatak, 2018; Cassar and Armouti-Hansen, 2019). Examples include doctors who are committed to saving lives, researchers to advancing knowledge, teachers to transferring knowledge and values to students, journalists to reporting information to the world, engineers to promoting green technology and so on. Efficiency wages relate to the relationship between the employer and employees, who can be motivated to exert effort by reciprocity and fairness concerns (e.g., Fehr et al., 1993, 1998; Levine, 1998; Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Charness and Rabin, 2002; Brown et al., 2004; Fehr and Falk, 1999a; Gneezy and List, 2006).

Our laboratory experiment consists of a modified version of the (one-shot) principal-agent gift-exchange game, in which the agent's effort, in addition to generating revenues to the principal, also generates a positive externality on society in the form of a donation to a charity chosen by the agent. As in the standard gift-exchange game, the principal offers the agent a fixed wage contract, the agent decides whether to accept the contract or not, and conditional on accepting, decides how much effort to exert. Payoffs realize accordingly and the game ends.

[1]There are, of course, also other microfoundations for why managers may want to pay efficiency wages. The most notable one is the payment of efficiency wages to increase the cost of job loss and thus to make the threat of firing in case of shirking more effective (Shapiro and Stiglitz, 1984). For the sake of exposition, throughout the paper we will refer to "efficiency wages" more generally, but it must be clear that we refer to efficiency wages that are microfounded on social preferences.

In this setting the agent may be driven to exert positive effort by his motivation to reciprocate the principal's high wage offer and/or by his motivation to contribute to the charitable mission. In order to test the effect of the mission on the realized effort and wage contract, we then compare the participants' behavior in this modified version of the gift-exchange game (henceforth, mission treatment) to the behavior of other participants in a standard gift-exchange game without donation, and thus without mission (henceforth, GE treatment). In particular, in each treatment we use the strategy method to elicit agents' effort level for each possible wage offer, which allows us to construct an optimal effort function for each agent.[2]

Our experimental findings show that the social mission decreases the agents' minimum acceptable wage offer and shifts the optimal effort choice function upwards without affecting its slope. This means that from the point of view of the agents' preferences, mission and reciprocity are independent in motivating effort. According to our theoretical predictions, if principals were profit-maximizers, we should observe no difference in wage offers between the mission and GE treatment. Surprisingly, however, we observe that principals in the mission treatment offer a significantly higher wage than principals in the GE treatment. After ruling out other explanations (including that principals are not profit-maximizers and have their own mission preferences) we show that the effect is clearly driven by the principals' distorted beliefs about the agents' effort function in the GE treatment. More specifically, in the GE treatment principals highly underestimate the agents' social preferences (i.e., the slope of the effort-wage function) and, in turn, offer a wage that is significantly lower than the profit-maximizing wage. Interestingly, this is not the case for the principals in the mission treatment: they correctly predict the slope of the effort-wage function, and they offer a wage that is not significantly different from the profit-maximizing wage. In other words, we show that in both treatments principals act as profit-maximizers based on their beliefs. However, given that in the GE treatment principals' beliefs are too pessimistic, they end up offering wages that are too low.

Finally, as robustness-checks, we run two additional treatments with the aim of investigating whether these results are purely driven by a simple "efficiency effect", that is by the simple fact the total surplus is higher in the mission than in the GE treatment, or whether it is the mission, namely, the presence of the positive externality (the fact that the beneficiary of the extra-surplus is a third-party) which drives the results. In the first new treatment, the beneficiary

[2]One disadvantage of the strategy method ist that it can lead to "cold" decisions by pushing the workers to think strategically. However, previous evidence comparing decisions elicited using the strategy method vs the direct response method find no qualitative difference between the two (Brandts and Charness, 2011). In fact, no case was found where a significant effect was detected by the strategy method but disappeared under the direct response method (Charness and Kuhn, 2011). Thus, if anything, the strategy method is more conservative and is likely to provide a lower bound for the size of the effects. Furthermore, there is no reason to believe that the strategy method would affect the two treatments differently and, therefore, invalidate our results.

of the donation is no longer the agent's chosen charity but a more "neutral" recipient, namely, another student from a different experiment or a charity to whom the agent allocated the least number of points in a series of dictator games played at the beginning of the experiment. In the second new treatment, we keep the same overall efficiency as in the mission treatment but remove the externality completely by letting the principals receive the extra-surplus generated by the agents' effort. Taken together, the findings from these two additional treatments suggest that our results are not purely driven by a simple efficiency effect and that the presence of an externality (i.e., of a third party benefiting from the agents' effort) is necessary to generate our results. However, consistent with previous laboratory evidence (Cassar, 2019), the quality of the mission-matching (i.e., the specific third-party who benefits from the externality) does not seem to play a significant role.

This paper makes several contributions to the literature. Most broadly, it contributes to the economics literatures that study workers' preferences for monetary and non-monetary job attributes and their implications for performance and contracting. This includes literature on prosocial motivation (e.g., Bénabou and Tirole, 2006; Ariely et al., 2009), on fairness and identity (e.g., Akerlof and Kranton, 2008; Fehr et al., 2009), on awards and recognition (e.g., Kosfeld and Neckermann, 2011; Gallus and Frey, 2016), and on autonomy and alternative work arrangements (e.g., Mas and Pallais, 2017). By being grounded on richer theories of human's motivation than the traditional Homo Oeconomicus view, all these literatures make important contributions to our understanding of behavior in organizations.

However, one limitation of these literatures is that they often remain disconnected. In fact, while different non-financial motives are likely to coexist in the workplace, economists typically study them in isolation, thereby overlooking their potential interaction. An early exception is the study by Ichniowski et al. (1997), which showed in an industrial context that the combination of incentive pay and a flexible job assignment increases productivity, which implies that for one context, at least, the complementarities between monetary and nonmonetary incentives are important. More recently, Bartling et al. (2012) show in an experimental study that such complementarities can endogenously lead to two different types of jobs: "'bad' jobs with low discretion, low wages, and little rent-sharing, and 'good' jobs with high discretion, high wages, and substantial rent-sharing" (p. 834). Within this experimental setting, low wages cannot be offset by non-monetary attributes - in this case a contract with full discretion - if they violate fairness norms. Additionally, Kvaløy et al. (2015) found a positive correlation between performance pay and motivational talk in a field experiment. Motivational talk is defined here as words that may evoke agents' intrinsic motivation. Furthermore, they find that performance pay without being accompanied by motivation talk actually decreased effort. Finally, the experimental work by

Kosfeld et al. (2017) shows that while job purpose and monetary incentives are independent in motivating effort, purpose and recognition interact negatively, which suggests that they might operate through the same channel of image-seeking. We add to this literature by providing evidence that mission motivation and wage reciprocity are independent in motivating agents' effort and, therefore, that in these settings workers' preferences can be represented by utility functions which are additively separable in the mission and wage-reciprocity.

Within these broad streams of literature, we contribute in particular to the expanding literature on performance and contracting in mission-oriented organizations by revealing a new hidden benefit of the social mission. While the focus of many of these studies is on how the social mission allows economizing on monetary incentives (Besley and Ghatak, 2005; Cassar, 2019), we show that when contracts are incomplete, the presence of the mission fosters the emergence of efficiency wages. In other words, while monetary incentives and an organization's social mission can be used as substitutes in incentivizing effort, we show that because of the principals' biased beliefs, efficiency wages and an organization's social mission are complements in motivating effort. Furthermore, our results suggest that the contribution of a social mission to the creation of more trusting and cooperative environments is likely to go beyond the self-selection effects documented by previous studies (Fehrler and Kosfeld, 2013, 2014; Friebel et al., 2019).[3]

Our results also provide new insights for the debate about the existence of a wage differential between the profit and non-profit sector, whose evidence is mixed. On the one hand, wages offered by non-profit organizations are expected to be lower because of the labor donation argument. Consistent with this argument, Handy and Katz (1998) finds evidence of a negative wage premium in the non-profit sector. On the other hand, different evidence has shown that such wage differentials only exist for certain positions or certain industries, that they are rather small and that their existence depends on competitive forces, such as the share of meaning-driven workers in the market (Preston, 1988; Leete, 2001; Ruhm and Borkoski, 2003; Jones, 2015). Consistent with the property right theory argument that managers in non-profit organizations are accountable to no owner and thus may pay higher rent, Mocan and Tekin (2003) finds a positive wage premium in non-profit organizations compared to their for-profit counterparts. Similarly, Børsting and Thomsen (2017) finds that foundation-owned companies (i.e., companies with non-profit ownership) pay higher wages and have higher retention. We contribute to this literature by showing that this latter evidence is consistent with our results that efficiency wages are more likely to emerge in mission-oriented organizations. Hence, we

[3]A recent literature on corporate social responsibility (CSR) also shows that CSR can sometimes backfire and reduce workers' effort (List and Momeni, 2021; Cassar and Meier, 2020). We discuss how the present article differs from these studies in Section 6.

identify a new channel (to be tested in the field) that can affect the wage differential between the profit and non-profit sector.

Our results also contribute to the ongoing debate about the relevance of reciprocity in motivating effort provision when contracts are incomplete (e.g., Fehr et al., 1993, 1996, 1997, 1998; Fehr and Gächter, 1998; Fehr and Falk, 1999b; Fehr and Gächter, 2000; Fehr and Falk, 2002; Brown et al., 2004; List, 2009). Our results provide a new explanation for why efficiency levels in a one-shot gift-exchange game are typically lower than in a repeated setting: Contrary to the argument that social preferences play no role and that reputation is all that matters for motivating effort when contracts are incomplete (List, 2009), we show that agents exhibit social preferences which, if they had been predicted correctly by the principals, would have led to a higher level of efficiency even in a one-shot setting with no scope for reputation. Hence, our findings provide strong support in favor of the role of social preferences as a motivator for effort, in the laboratory. In the field, however, the evidence for gift-exchange has been rather mixed (see e.g., Gneezy and List, 2006; Hennig-Schmidt et al., 2010; Esteves-Sorenson, 2017) and more recently DellaVigna et al. (2022), which finds evidence for moderate levels of reciprocity in the field). Given our goal of studying contracting with motivated agents, it was important to test, in addition to agents' behavior, also principals' offered wage contracts. Hence, for the purpose of our study, the laboratory setting – despite its limitations in terms of external validity compared to field experiments – was the most appropriate choice.

Finally, our paper provides some novel insights to the literature on belief formation in prosocial contexts (Fehr et al., 2005; Fehr, 2009; Schwerter and Zimmermann, 2020). To the best of our knowledge, this is one of the very few studies to elicit principals' beliefs of returned effort in a gift-exchange game, and we are one of the first to do so in an incentivized manner.[4] Our results suggest that employers are likely to underestimate workers' reciprocity in the work context, which is consistent with the recent finding by Caria and Falco (2022) that small employers in urban Ghana systematically underestimate workers' reciprocity in a real-effort task. We contribute to this related literature by showing that in jobs with a prosocial mission, such a bias is less likely to emerge.

The remainder of the paper is organized as follows. Section 1 derives the predictions based on a theoretical benchmark. Section 2 describes our experimental design. Section 3 presents the main experimental findings. Section 4 investigates the behavioral mechanisms underlying our findings. Section 5 present the results from two robustness checks. Section 6 discusses the

[4]Brown et al. (2004) also elicits the principals' beliefs in a repeated gift-exchange game; however, their elicitation was not incentivized and was not based on the strategy method. In an unpublished paper, Guido et al. (2020) elicit beliefs in an incentivized manner with the strategy method in a repeated gift-exchange game looking at endowment shocks and information asymmetry, but without a baseline condition excluding shocks.

implications, limitations, and potential extensions of our study. Section 7 concludes the paper.

1. Theoretical Framework

In this section we generate our theoretical predictions by analysing the effect of an exogenous increase in the prosociality of an organization's mission on (i) the minimum wage offer that the agent would accept, (ii) the agent's optimal effort provision, , and (iii) the principal's wage offer, in a one-shot principal-agent framework with incomplete contracts. This model should be taken as a theoretical benchmark to which we will then compare our experimental findings.

Let $m \in \mathbb{R}_+$ be the exogenous social mission,[5] $w \in \mathbb{R}_+$ the wage that the principal can offer to the agent, and $e \in \mathbb{R}_+$ the effort choice of the agent. A given contract in this setting is simply given by the wage w, whereas the environment in which an agent may be employed is given by the tuple (w, m). The positive social external impact in the environment (w, m) is assumed to be increasing in the agent's effort choice e. This is a key factor in mapping the model to the experimental design. Last, when offering a contract to the agent, the principal must take into consideration the outside option of the agent in the form of a transfer valuated at τ for any agent.

Let $U(w, m, e; \theta)$ be the agent's utility function. We assume that by entering a contract, the agent derives an extrinsic benefit depending on the wage received and the effort exerted. In addition to the wage and effort, the agent derives a potential intrinsic benefit depending on the mission. We assume that these two terms are additively separable such that his utility may be specified as

$$U(w, m, e; \theta) = w - \frac{c}{2}e^2 + M(w, m, e; \theta) \tag{1}$$

where the two first terms are the standard way of representing the extrinsic benefit, with $\frac{c}{2}e^2$ being an increasing and convex function capturing the disutility of exerting effort.[6] The last term, $M(w, m, e; \theta) \geq 0$, is the intrinsic benefit of an agent endowed with θ working in the present environment (w, m) and exerting effort e. The magnitude with which the intrinsic benefit impacts the agent's utility is governed by θ, which is distributed according to F_θ, and has well-defined first two moments. As in Cassar and Meier (2018), θ is a vector of parameters indicating the weights assigned to different intrinsic benefits. Thus, any heterogeneity in the

[5] That is, if $m' > m''$ then m' is more pro-social than m''.

[6] Note that whereas this functional form does not completely capture the effort costs as listed in Table 1, by setting $c \approx 0.38$, the costs of effort in the experiment are very well approximated ($R^2 \approx 0.98$). Hence, this functional form provides a simple and effective mapping to the experiment. Although the comparative statics would increase in complexity, our results are, however, robust to a more general cost function, $c(e)$ with $c'(e) > 0$ for $e > 0$, $c'(0) \geq 0$, $c''(e) > 0$ and $c'''(e) \geq 0$ for all e.

utility of agents stems from this vector of parameters. Mission motivation and/or social preferences towards the principal stem from the function M. Social preferences toward the principal may consist of distributional concerns (as in Fehr and Schmidt, 1999; Charness and Rabin, 2002) as well as reciprocity (as in Rabin, 1993; Dufwenberg and Kirchsteiger, 2004; Falk and Fischbacher, 2005) where the agent cares more about the principal if he judges an action taken by her as kind. Additionally, mission motivation may, in addition to pure altruism, contain impure motives such as warm glow (as in Andreoni, 1989, 1990). The meaning of - and the assumptions imposed on - the (cross-) partial derivatives of M are as follows:

- The marginal intrinsic utility of increasing the mission is captured by the sign and magnitude of the partial derivative M_m and mission motivation is captured by the sign and magnitude of the cross derivative M_{em}, both assumed to be non-negative for all w, m, e, θ and positive in expectation for all w, m, e. The latter assumption corresponds to assuming that no worker is "antisocial." Furthermore, to simplify the comparative statics, we assume that $M_{eem} = 0$ for all w, m, e, θ.

- The marginal intrinsic utility of exerting effort is given by M_e, which is assumed to be (i) non-negative for all w, m, e, θ; (ii) positive in expectation for all m, e and $w > 0$; (iii) weakly decreasing for all w, m, e, θ and (iv) strictly decreasing in e in expectation for all w, m, e. Thus, given an environment with a social mission and positive wage, the average worker derives an intrinsic benefit by exerting effort. We will also assume that $M_{eee} = 0$.[7]

- The marginal intrinsic utility of increasing the wage is captured by the sign and magnitude of the partial derivative M_w, and reciprocity is captured by the sign and magnitude of the cross derivative M_{ew}, both assumed to be non-negative for all w, m, e, θ and positive in expectation for all w, m, e. Furthermore, as a technicality, we assume that $M_{eew} = 0$ and $M_{eww} \leq 0$ for all w, m, e, θ.

- The potential additional (de)motivation arising from the interaction between reciprocity and mission motivation is captured by the sign and magnitude of M_{ewm}. As the subsequent analysis will show, this will be the term of main interest.

As the scope of the model is to provide a theoretical benchmark, the principal is assumed to be a risk-neutral profit-maximizer. For this, denote the expected effort choice of the agent given (w, m) by $\bar{e}^*(w, m)$, the expected lowest acceptable wage to the agent given m by $\underline{\bar{w}}_m(m, e^*)$,

[7]This assumption simplifies the comparative statics and the intuition behind our results significantly. However, as we show in the Online Appendix, our results do not significantly change by the weaker assumption, $M_{eee} \leq 0$

and the agent's expected intrinsic utility given (w, m) by $\bar{M}(w, m, e^*)$, where expectation is taken over θ.[8] Thus, the principal offers the wage w which maximizes her expected profits given by $r\bar{e}^*(w, m) - w$, with $r > 0$. In the analysis, we assume that the principal cannot observe the agent's type vector θ but that the distribution F_θ and the functional form of M are common knowledge. Note that because the intrinsic benefit is assumed to be increasing in m, it immediately follows that the lowest acceptable wage, that is, the wage that binds the participation constraint, decreases by an exogenous increase in the mission:

Prediction 1 *The expected lowest acceptable wage to the agents decreases with the social mission. That is,* $\underline{\bar{w}}_m(m, e^*) < 0$.[9]

In addition, since the agent chooses the effort level which equalizes his marginal intrinsic benefit and his marginal cost of exerting effort, it follows that an exogenous increase in the mission increases the effort choice, if the participation constraint is satisfied:

Prediction 2 *For any given wage* w*, the expected optimal effort choice of agents increases with the social mission. That is,* $\bar{e}^*_m(w, m) > 0$.[10]

Finally, notice that a change in the profit-maximizing wage $w^*(m, e^*)$, by an exogenous increase in the mission, is fully determined by the change in the agent's effort-wage slope, $e^*_{wm}(w, m; \theta)$. As the type of the agent is unknown to the principal, the change in the expected profit-maximizing wage, $\bar{w}^*(m, e^*)$, is determined by the expected change in the agent's effort-wage slope, $\bar{e}^*_{wm}(w, m)$. As any reaction to the mission comes from the agent's intrinsic benefit function M, it follows that the expected profit-maximizing wage increases if and only if expected additional motivation from the interaction between wages and mission motivation, $\bar{M}_{ewm}(w, m, e^*)$, is positive:

Prediction 3 *In the interior, the profit-maximizing wage offer,* w^**, increases (decreases) if the expected additional motivation from the interaction between wages and mission motivation (or mission and reciprocity),* $\bar{M}_{ewm}(w, m, e^*)$*, is positive (negative).*[11]

Figure 1 illustrates three possible examples of the profit-maximizing wage offer before and after an increase in the mission, depending on the agent's expected optimal effort choice as a function of the wage. In Case 1, the slope of the expected effort choices remains constant,

[8] Specifically, $\bar{e}^*(w, m) = E_\theta[e^*(w, m; \theta)]$, $\underline{\bar{w}}_m(m, e^*) = E_\theta[\underline{w}(m, e^*(\underline{w}, m; \theta); \theta)]$ and $\bar{M}(w, m, e^*) = E_\theta[M(w, m, e^*(w, m; \theta); \theta)]$.

[9] Please see Section 1.1 in the Online Appendix for the derivation.

[10] Please see Section 1.1 in the Online Appendix for the derivation.

[11] Please see Section 1.2 in the Online Appendix for the derivation.

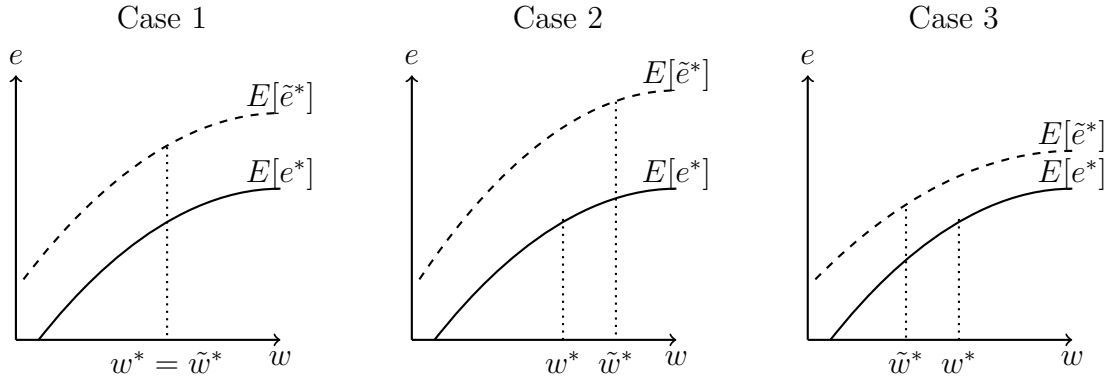

FIGURE 1: Examples of expected effort wage slopes and optimal wage offers for $E[e^*_{wm}] = 0$ in Case 1, $E[e^*_{wm}] > 0$ in Case 2 and $E[e^*_{wm}] < 0$ in Case 3.

Note: $E[e^*]$: expected slope before an increase of the mission; $E[\tilde{e}^*]$: expected slope after an increase of the mission. w^*: optimal wage before an increase of the mission; $\tilde{w}^*$: optimal wage after an increase of the mission.

leading to the profit-maximizing wage being identical before and after an increase in the mission. In Case 2, the slope of the expected effort choices increases, which in turn leads to an increase in the profit-maximizing wage offer. Finally, in Case 3, there is a flattening in the expected effort slope and hence a decrease in the profit-maximizing wage offer. In Section 1.3. of the Online Appendix, we also provide examples of explicit functional forms of the intrinsic utility function M and provide behavioral explanations of their meaning. Thus, all three situations are rationalizable rendering a a priori prediction vacuous.

We conclude our theoretical exposition as follows: Although we are able to make reasonable predictions on (i) change in the minimum acceptable wage offer and (ii) change in the effort exerted for any given wage offer following an increase in the prosociality of the exogenous mission, (iii) it *is unclear a priori what happens to the slope of the agent's optimal effort function* and thus to the profit-maximizing wage offer following an increase in the mission. What we can say is that it will depend on the interaction between the agent's social preferences towards the principal and his mission motivation.

2. Experimental design

The objective of the experiment is to investigate empirically the relationship between social mission and efficiency wage. It was designed specifically to test our theoretical predictions on how the social mission affects (i) agents' acceptance rates, (ii) agents' effort provisions and (iii) the principals' wage offers. Furthermore, we will also look at how the mission affects the overall level of efficiency achieved.

We collected experimental data in six separate sessions. At the beginning of each session,

participants were informed that the experiment comprised two stages, and were told also that their decisions in one stage would be irrelevant for the other stage except for their chosen charity (see below). In each session, a single treatment variation was implemented. Participants were not given details about the second stage until they had completed the first stage. In the first stage, we elicited participants' mission motivation and social preferences using a dictator game with a donation to a charity and an ultimatum game, respectively. In the second stage, the main part of the experiment, we implemented a stylized version of a contractual setting using a principal-agent gift-exchange game, with or without a social mission. The social mission was implemented by letting the agent's effort generate a positive externality in the form of a donation to a charity of the agent's choice. In each session, participants completed both stages. Which stage counted towards the payment was determined randomly. The selected stage was the same for all participants in a given session. Individual payoffs and earnings were revealed only after both stages were completed. All participants were asked to choose their preferred charitable organization from a list of 12 charities (see Online Appendix). They were informed that all donations they generated in the stage chosen for payment would be paid to the organization of their choice.

2.1. Dictator and ultimatum game

We elicited participants' social preferences before the main experiment, using a dictator game with a donation to charity, and an ultimatum game. In the dictator game, all participants were asked to divide 100 points (in multiples of 10) between themselves and their chosen charitable organization. In the ultimatum game, participants were randomly assigned to the roles of either proposer or responder and were randomly matched in pairs. The proposer received an endowment of 100 points and was asked to propose a split of these points (in multiples of 10) between himself/herself and the responder. Beforehand, the responder was asked to indicate acceptance or not for each possible split. If the proposed allocation was accepted, the players received the corresponding amounts. If the proposal was rejected, neither player of the pair received anything. The resulting individual payoffs were revealed only at the end of the experiment.

2.2. Gift-exchange game and treatment variation

We used the same random assignment of roles in the ultimatum game to divide participants between principals and agents. In other words, those in the role of the proposers were now principals, while those in the role of the responders were now agents. Principals and agents were then matched randomly in pairs, and depending on the session, were allocated to one of

the two treatments: GE treatment or mission treatment. Those in the GE treatment played a standard gift-exchange game where the agent decided whether or not to accept the wage contract offered by the principal, and conditional on acceptance what level of effort to exert. The only difference in the mission treatment was that the agent's effort generated a donation to the charity that was chosen at the beginning of the experiment. The donation was an externality paid by the experimenter.

Timings and payoffs in both treatments were as follows. The principal chose a lump-sum wage offer w. Meanwhile, the agent chose, for each possible wage offer, whether he would accept the contract and, conditional on accepting, a costly level of effort e.[12] As in Fehr et al. (1993), the set of possible wages is given by $w \in \{1, 3, 5, 10, 15, \ldots, 65, 75, 85, 95\}$, and the set of possible effort levels is given by $e \in \{1, \ldots, 10\}$. In the case of rejection of a given wage offer, we code $e = 0$. Both parties received an initial endowment of 100 points to ensure a non-negative return for all participants. There was an additional 5-point outside option available to the agent, should the contract not be concluded: i.e. if the principal offered a wage which the agent did not accept. There was no such outside option for the principal. Thus, in the case that the agent rejected the contract, the monetary payoffs to the principal and agent were respectively 100 and 105 points. If the contract was accepted by the agent, then the principal's and the agent's monetary payoffs from concluding the contract were respectively

$$\begin{aligned} \Pi_{P|e>0} &= 10e - w + 100 \\ \Pi_{A|e>0} &= w - c(e) + 100 \end{aligned} \tag{2}$$

where the first term of the principal's monetary payoff constituted her revenue based on the agent's chosen effort level multiplied by 10, and the last term her endowment. If the contract was accepted, the principal was bound to pay the wage to the agent. The agent's monetary payoffs consisted of the wage offered and his endowment minus the cost of the chosen effort level. Table 1 presents the costs of each effort level, which are the same as in Fehr et al. (1993) and Brown et al. (2004). Since the marginal cost is increasing with the effort, it corresponds to a large extend to the quadratic cost function considered in the examples in section 1.

TABLE 1: Effort and corresponding costs of effort

e	1	2	3	4	5	6	7	8	9	10
$c(e)$	0	1	2	4	6	8	10	12	15	18

Additionally, in the mission treatment, if the principal-agent pair concluded a contract, the

[12] The use of the strategy method allows us to reconstruct an optimal effort function of the wage for each agent, which is essential to testing how the slope of this function varies across treatments.

charitable organization received a donation:

$$\Pi_C = 25e \tag{3}$$

Thus, the charitable organization received the agent's chosen effort level multiplied by 25.

Note that if both parties were maximizing their monetary payoffs, the payoffs corresponding to the unique Nash equilibrium were $(105, 105)$. This corresponds to the principal offering a wage that matches the outside option, i.e. $w = 5$, making the agent indifferent between rejecting the contract and receiving 105, or accepting it and exerting the minimum effort $e = 1$, which comes at a cost of 0. This applies because the agent's best response was to reject the contract for any wage offer below the outside option, and to accept the contract by exerting minimum effort level for any wage offer above the outside option. Thus, a wage offer of 5 maximized the principal's payoff.

2.3. Elicitation of principals' beliefs

Following the principals' wage choices, we elicited their beliefs about the agents' effort responses. The use of beliefs elicitation to explain behavior has, however, its limitations. First, the casuality is not clear. Second, subjects might engage in hedging behavior or report biased beliefs to justify their own actions. We tried to minimize these limitations in two ways. First, to avoid priming the participants, the instructions did not mention that we would elicit principals' beliefs. This may also help reduce the risk of planned hedging behavior as principals did not expect to be asked about their beliefs. Second, and more importantly, the beliefs elicitation was incentivized. Hence, it was costly for the subjects to report wrong beliefs just to be consistent with their previous actions. Specifically, for each possible wage offer, we asked principals to guess whether the matched agents would accept the contract, and conditional on accepting, what effort level would most likely be chosen. Principals received 0.5 points for correctly guessing (i) each wage that was not accepted, and (ii) each accepted wage and chosen effort by the agent. Thus, we elicited the modal effort choice for each possible wage offer.[13] After eliciting principals' beliefs about agents' effort, we asked principals to guess the wage that, given her beliefs, maximizes profit. In the empirical analysis, we will refer to this variable as the "guessed profit-maximizing wage". The question we posed was: "Based on your guesses of what wages the worker would accept and how much effort he/she would put, what wage level do you think gives you the highest income?". The principal received 0.5 points for a correct guess.

[13]By imposing the assumption that the mode coincides with the mean (e.g., as with a symmetric unimodal distribution), we have elicited the principals' conditional expectation in a risk-robust manner (Hurley and Shogren, 2005).

2.4. Trust questionnaire

At the end of the experiment but before the payoffs were revealed, we administered a socio-economic questionnaire.[14] Specifically, we elicited a measure of trust by asking: "I assume that people have only the best intentions" (1-10 points). Additionally, we collected variables on fairness considerations and social preferences. None of these measures was incentivized.

2.5. Procedural details

The six laboratory sessions were conducted at the University of Cologne in September 2016. In total, 190 students participated in this between-subject design experiment, none of whom participated in more than one session. In five of the six sessions, 32 subjects participated, whereas 30 subjects participated in the remaining session. Among the 190 participants, 94 were assigned to the GE treatment and 96 were assigned to the mission treatment. The experiment was programmed in and used z-Tree software (Fischbacher, 1999).[15] Participants in the experiments received points with a conversion rate of 1/12. Average earnings were 13.72 euro with a standard deviation of 2.14 and a minimum earning of 5.66 euro.[16]

3. Results

3.1. Agents' acceptance rates and effort choices

We start by looking at the agents' wage acceptance rates across treatments. According to our theoretical model, the average minimum acceptable wage should decrease in the mission treatment compared to the GE treatment. Figure A.1 summarizes the percentage of agents accepting the offer for each possible wage across the two treatments. We find no significant treatment differences in acceptance rates for the vast majority of wages above the agents' outside option, of 5. Additionally, the acceptance rate increases with the wage. However, at wage offers below the outside option of 5, we find marginally significant treatment differences. Below wage offers of 5, approximately 4 percent of the agents in the GE treatment accepted a wage offer (for both wages equal to 1 and 3) compared to approximately 17 and 19 percent in the mission treatment (respectively for wages equal to 1 and 3). This difference is marginally significant for both wage levels using the two-sample Wilcoxon rank-sum test ($p = 0.07$).[17]

[14] We used a shortened version of the Global Preference Survey as in (Falk et al., 2018).

[15] For instructions, please see section 3. Supplemental Material in the Online Appendix.

[16] Summary statistics of subjects' *age, gender* and *study subject* across treatments is given in Table A.1 in the Online Appendix.

[17] For the rest of the analysis, we continue to use the Wilcoxon rank-sum test, unless otherwise specified.

Thus, consistent with the theory, the presence of the social mission reduces the agent's average minimum acceptable wage.

The regressions in Table 2 provide further (weak) evidence that agents are more likely to accept a wage below their outside option in the mission treatment than in the GE treatment. The interaction term between the dummy variable "mission treatment" and " a wage below 5" is positive and marginally significant in the logic regressions.

TABLE 2: Wage Acceptance

	(1)	(2)	(3)	(4)	(5)	(6)
Wage<5	−0.707***	−0.759***	−0.759***	−5.417***	−6.474***	−6.516***
	(0.033)	(0.040)	(0.040)	(0.402)	(0.756)	(0.753)
Mission treatment		0.031	0.035		0.415	0.477
		(0.041)	(0.040)		(0.426)	(0.418)
Wage<5∗Mission treatment		0.103	0.103		1.667*	1.714*
		(0.065)	(0.065)		(0.908)	(0.904)
Constant	0.818***	0.802***	0.757***	2.237***	2.012***	1.333
	(0.021)	(0.033)	(0.147)	(0.253)	(0.284)	(1.386)
Controls	No	No	Yes	No	No	Yes
(Pseudo) R^2	0.256	0.260	0.263	0.269	0.273	0.274
Observations	1710	1710	1710	1710	1710	1710

Note: Random effects linear regressions in Columns (1) to (3). Random effects logistic regression in Columns (4) to (6). Controls include gender, age and study subject. All regressions are estimated with standard errors clustered on the individual level. Significance levels: *p<0.1; **p<0.05; ***p<0.01

In summary, the presence of a social mission leads more agents to accept a contract with which they are losing money, as compared to the outside option. However, the effect is rather weak. We conclude:

Result 1 *In line with Prediction 1, the average minimum acceptable wage offer is marginally smaller in the mission treatment compared to the GE treatment.*

After investigating agents' acceptance rates, we characterize their effort choices. Figure 2 shows the mean effort choice for each potential wage offer in both treatments. Since we observe the chosen effort levels for all agents at every wage level, this graph provides an approximation of the agents' optimal effort function in each treatment. It shows that the social mission shifted the agents' optimal effort function upwards. For each possible wage offer, the average effort is higher in the mission treatment than in the GE treatment (the difference is significant or marginally significant for most wages below 55).

Next, we investigate whether the presence of a mission also affects the slope of the agents' optimal effort function. We test for treatment differences investigating the change in effort with increasing wage. For example, we start by testing whether the change in effort level following

an increase in the wage from 1 to 3 is different across treatments, and conduct the same analysis for all remaining wage differentials. We find no significant differences over most of the wage intervals, except at wages 3, 45 and 55. As expected, and based on our previous results, in the mission treatment agents exert more effort than in the GE treatment in response to an increase in the wage from 1 to 3 ($p = 0.08$). This is because wages 1 and 3 are below the outside option and very few agents are motivated to accept such offers in the GE treatment. However, in the case of middle-level wages such as 45 and 55, the agents' effort responses to an increase in the wage are significantly lower in the mission treatment compared to the GE treatment, suggesting that at these points the agents' reaction is flatter in the mission treatment than in the GE treatment ($p = 0.02$ for both wage levels).[18]

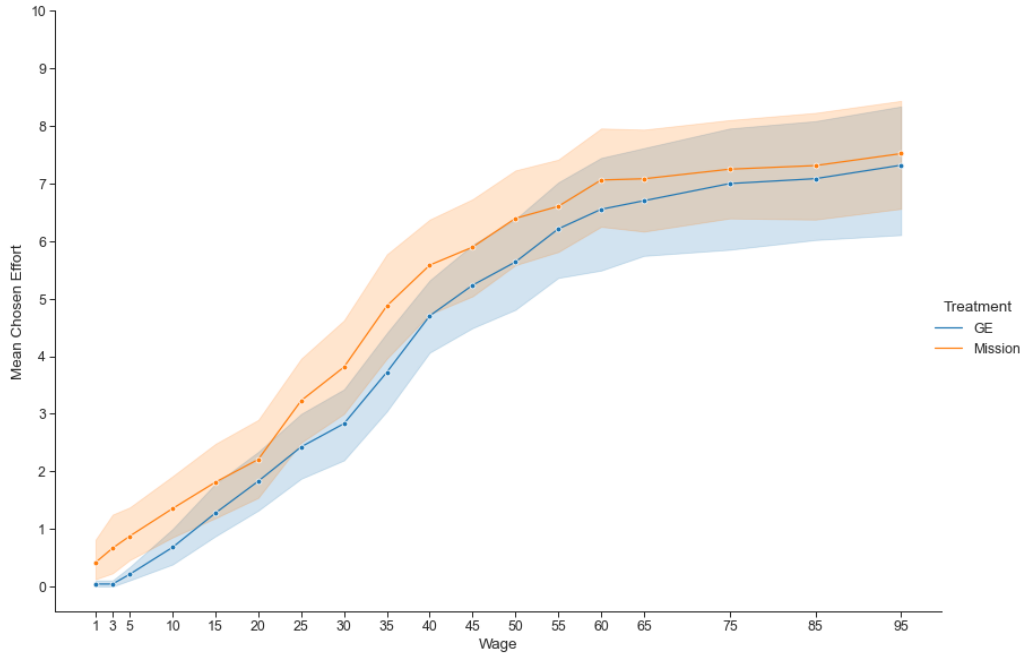

FIGURE 2: Mean chosen effort for each wage across treatments

We complement our non-parametric analysis by running OLS and Tobit regressions of the agents' effort choices on the wage level, with a treatment dummy and the wage-treatment interaction (see Table 3). The coefficient of the mission treatment dummy is positive and either significant or marginally significant when adding controls, which confirms that the mission shifts the agents' optimal effort function upwards. On the contrary, we find no change in the slope. The coefficient of the interaction between the mission treatment dummy and the wage is very close to 0 and largely insignificant.[19] These results suggest that the mission shifts the agents'

[18]See Figure A.8 and Figure A.9 for the individual effort choice function of each agent in the GE and mission treatment, respectively. As can be seen, there are 7 non-reciprocal agents (i.e., agents whose effort-wage curve is basically flat) in the GE treatment and 6 in the mission treatment.

[19]Note that if we only focus on the effort choices conditionally on accepting the contract, the results strengthen,

effort function upwards without affecting its slope. We conclude:

Result 2 *In line with Prediction 2, effort provision tends to be larger for any given wage in the mission treatment compared to the GE treatment. Furthermore, we find no difference in the slope of the optimal effort function in the mission treatment compared to the GE treatment. Hence, mission and wages are independent in motivating agents' effort.*

TABLE 3: Effort

	(1)	(2)	(3)	(4)	(5)	(6)
Wage	0.089***	0.091***	0.091***	0.138***	0.145***	0.145***
	(0.005)	(0.007)	(0.007)	(0.008)	(0.011)	(0.011)
Mission treatment		0.749**	0.634*		1.431**	1.340*
		(0.302)	(0.374)		(0.626)	(0.707)
Wage∗Mission treatment		−0.004	−0.004		−0.013	−0.014
		(0.009)	(0.009)		(0.016)	(0.016)
Constant	0.620***	0.242*	−2.993**	−1.826***	−2.552***	−7.608***
	(0.157)	(0.142)	(1.239)	(0.360)	(0.413)	(1.946)
Controls	No	No	Yes	No	No	Yes
(Psuedo) R^2	0.459	0.466	0.491	0.138	0.141	0.150
Observations	1710	1710	1710	1710	1710	1710

Note: Random effects linear regressions in Columns (1) to (3). Random effects tobit regression in Columns (4) to (6). Controls include gender, age and study subject. All regressions are estimated with standard errors clustered on the individual level. Significance levels: *p<0.1; **p<0.05; ***p<0.01

3.2. Principals' behavior

Next, we look at the behavior of the principals. Note that Result 2 suggests that we are in Case 1 of our model; that is, the agents' utility function is additively separable in mission and wage. Our theory predicts that in this case the optimal wage is independent of the mission. Hence, in our experiment, if principals were profit-maximizers, we should observe no significant differences in the wage offers across treatments.

However, contrary to our predictions, in the GE treatment principals offer on average a wage of 26 points, while in the mission treatment the average offered wage is about 36 points, hence 10 points higher. The difference is statistically significant ($p = 0.01$). OLS regressions in Table 4 provide similar results.Thus, we conclude:

Result 3 *Contrary to our predictions, principals in the GE treatment offer significantly lower wages than principals in the mission treatment.*

and the negative interaction term also becomes significant. However, given that this regression does not control for selection into the contract, we chose to exclude it from the analysis.

The next question arises: who is getting it wrong? Are the principals in the GE treatment or in the mission treatment (or both) sacrificing profits? Surprised by Result 3, we investigate the potential mechanism(s) underlying the principals' behavior. We discuss and test two possible behavioral channels for this result in Section 4 below.

TABLE 4: Regressions (Offered Wage)

	(1)	(2)	(3)	(4)
Mission treatment	10.196**	10.187**	14.593***	13.218**
	(3.952)	(3.958)	(5.668)	(5.669)
Altruism		0.098	0.250**	0.145
		(0.110)	(0.124)	(0.149)
Mission treatment*Altruism			−0.287	−0.182
			(0.204)	(0.203)
Constant	25.574***	24.072***	21.740***	21.360
	(2.443)	(3.161)	(3.589)	(13.294)
Controls	No	No	No	Yes
R^2	0.066	0.073	0.088	0.115
Observations	95	95	95	95

Ordinary least-squares (OLS) Regressions with robust standard errors in columns (1) to (4). Controls include gender, age and study subject. Significance levels: *p<0.1; **p<0.05; ***p<0.01

4. Principals' behavioral channels

There are two potential channels that can explain the principals' behavior: (i) principals are motivated by the mission themselves and the presence of a social mission induces these motivated principals to offer a higher wage in the mission treatment in order to boost the agent's effort and thus increase the size of the donation; or (ii) principals act as profit-maximizers based on biased beliefs about the agents' effort response. These potential explanations are not mutually exclusive, and our results might be due to the combination of both of them. We subsequently show that the latter channel is the only possible explanation.

4.1. Mission motivation and profit-maximizing wage

First, if the principals were motivated by the mission, our measure of "mission motivation" (or "altruism") elicited at the beginning of the experiment through a dictator game with charity should enter significantly in the principals' wage-setting. In particular, we should observe a positive interaction between the mission treatment and the principals' altruism. Results from OLS regressions are reported in columns 3 and 4 of Table 4. Since the interaction term is

insignificant and the point estimate is slightly negative, we can conclude that the principals' mission motivation does not lead to higher wage offers in the mission treatment.

Second, if the principals' mission motivation were the main mechanism underlying Result 3, we should observe principals maximizing profits in the GE treatment, while sacrificing profits in the mission treatment. To test this, we compare the wage offered by the principals to what they believed was the profit-maximizing wage, which we elicited at the end of the experiment in an incentivized manner and denoted as the principal's "guessed profit-maximizing wage". If the principals were motivated to sacrifice profit to benefit the charity in the mission treatment, they should offer a wage that is significantly higher than what they believe to be the profit-maximizing wage. However, Figure 3 shows that this is not case. In both treatments, principals offer wages that are not significantly higher than their guessed profit-maximizing wage (Wilcoxon signed-rank test $p > 0.42$ in both treatments).

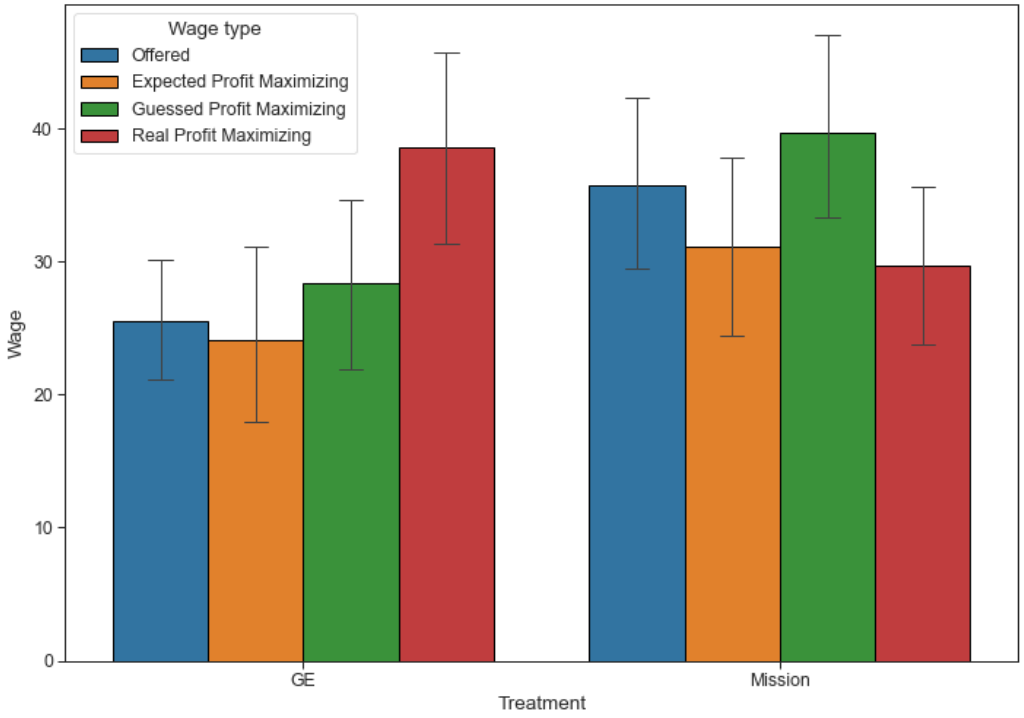

FIGURE 3: Mean offered wage and mean expected, guessed, and average real profit-maximizing wage across treatments

4.2. Biased beliefs

Finally, we investigate the second possible explanation, which is that principals are profit-maximizers but have biased beliefs about the agents' optimal effort response. Figure 4 compares the difference between the average effort chosen by the agent and the average effort expected by the principal for each treatment and wage. We see that in both treatments and for most

wage levels, principals underestimate the agents' effort: The expected effort was always equal to or lower than the chosen effort.

However, as our theory clearly shows, what matters for determining the profit-maximizing wage is not the absolute value of the exerted effort but the slope of the optimal effort function. The left-hand panel of Figure 4 clearly shows that in the GE treatment, the difference between the real and expected effort increases significantly with the wage. Principals are good at predicting the effort for low wage levels but increasingly underestimate the effort response to an increase in the wage – to the point that at a wage of 95 the expected effort is approximately 60 percent lower than the real effort. In other words, principals underestimate the role of wages in motivating effort, i.e., agents' reciprocity. This implies that in the GE treatment the principals' expected optimal effort function is flatter than the real average optimal effort function. This result is also confirmed by rank-sum tests, which compare the variations in the chosen effort to the variations in the expected effort following an increase in the wage: Significant differences in the slope emerge at wage levels equal to 15, 35, 40, 45, 50 and 60.

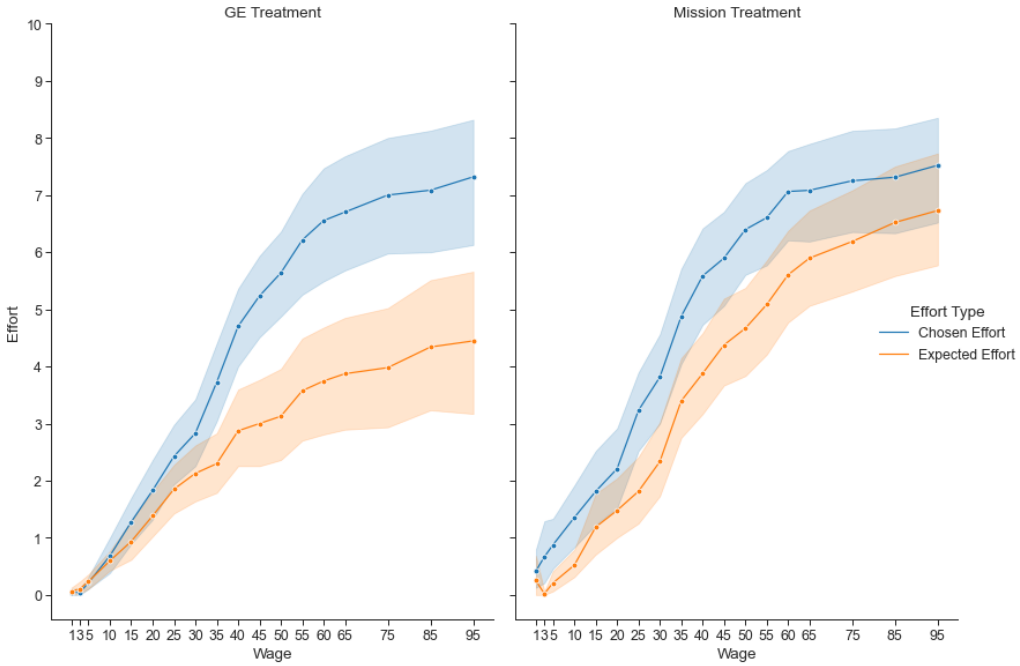

FIGURE 4: Mean chosen and expected effort for each wage across treatments

We obtain similar findings from the regression analysis. Columns 1 and 2 in Table A.2 present the respective chosen effort and expected effort regressions on wage levels in the GE treatment. The wage coefficient in column 1 is almost twice as large as the wage coefficient in Column 2, suggesting that the linear approximation of the agents' optimal effort function is almost twice as steep as the principals' average expected effort function. Thus, it is not surprising that principals in the GE treatment offer a wage that is too low compared to the

profit-maximizing wage.[20]

Additionally we calculate for each principal-agent pair the profit-maximizing wage based on the principal's elicited beliefs (henceforth, "beliefs-based profit-maximizing wage")[21], which are depicted in Figure 3. It shows that in the GE treatment the beliefs-based profit-maximizing wage is neither significantly different from the offered wage (Wilcoxon signed-rank test, $p = 0.73$), nor from the guessed profit-maximizing wage (Wilcoxon signed-rank test, $p = 0.45$). However, all these three wages are significantly lower than the real profit-maximizing wage in the GE treatment (Wilcoxon signed-rank tests, $p = 0.01$ compared to the offered wage and the belief-based profit-maximizing wage and $p = 0.02$ compared to the guessed profit-maximizing wage). This suggests that in the GE treatment principals consciously maximize profits based on their beliefs but these beliefs are wrong.

Remarkably, we do not find the same belief distortion in the mission treatment. The right-hand panel in Figure 4 clearly shows that in the mission treatment the difference between the real and the expected effort is not strictly increasing with the wage. Rank-sum tests comparing the changes in chosen effort to the changes in expected effort following an increase in the wage, reveal a significant difference only at wages 3, 25, 65 and 85. Furthermore, among these four wage levels, the difference is positive for the first two and negative for the last two. The regression analysis provides similar findings. OLS regressions in Columns 3 and 4 of Table A.2 present, respectively, regressions for the chosen effort and the expected effort on the wage level in the mission treatment. In contrast to the GE treatment, the coefficient of the wage in Column 3 is almost the same as the coefficient of the wage in Column 4, suggesting that the linear approximation of the agents' real effort function is as steep as the principals' expected effort function. Lastly, also in the mission treatment, the beliefs-based profit-maximizing wage is neither significantly different from the offered wage (Wilcoxon signed-rank test $p > 0.33$), nor from the guessed profit-maximizing wage (Wilcoxon signed-rank test $p > 0.15$). However, differently from the GE treatment, the profit-maximizing wage in the mission treatment is not statistically different from the offered wage (Wilcoxon signed-rank test $p > 0.21$), nor from the belief-based profit-maximizing wage (Wilcoxon signed-rank test $p > 0.18$) and only marginally so from the guessed profit-maximizing wage (Wilcoxon signed-rank test $p = 0.07$). Hence, we conclude:

[20]Naturally, one criticism here may be that expected efforts are not the main driver of principals' wage-setting. We show in Figure A.5 in the Online Appendix that this is indeed the case. In particular, the figure shows that principals with more optimistic beliefs offer higher wages in both treatments.

[21]Note that while the guessed profit-maximizing wage is the optimal wage guessed by the principal, the beliefs-based profit-maximizing wage is the wage that gives the highest profit given the principal's expressed beliefs about acceptance rate and effort response. While the guessed profit-maximizing wage is reported directly, the believed profit-maximizing wage is calculated based on principals' report of expected returned effort for each wage level.

Result 4 *In both treatments, principals act on average as profit-maximizers based on their effort-beliefs. The reason why the offered wage is lower in the GE treatment than in the mission treatment is that principals in the GE treatment have biased beliefs. This bias is such that they highly underestimate the role of reciprocity in motivating effort provision.*

5. Robustness checks: Efficiency or externality?

In this section we report the results of two robustness checks which serve to rule out that our results are purely driven by a "simple efficiency effect", i.e., by the simple fact that the total efficiency is higher in the mission treatment than in the GE treatment. Note that the presence of a social mission, by generating a positive externality for a third-party, necessarily implies higher efficiency. Hence, the question is whether our results are driven by the presence of the externality, i.e., by the fact that the extra surplus benefits a *third party*, or by pure efficiency, namely, by the size of the total surplus independent of who benefits from it. To answer this question, we ran two additional treatments, each of which has some limitations, but which, taken together, hopefully can give a coherent picture of the role of efficiency vs. externality in driving our results.

5.1. Treatment with a neutral third-party

In the first new treatment (henceforth, "neutral treatment"), we replace the charity chosen by the agents with a "neutral third-party" as the new recipient of the donation while keeping everything else constant.[22] The neutral third-party was selected as follows: In the first stage of the experiment, the agents played five standard dictator games, in each of which they had to allocate points between themselves and a student from another experiment or between themselves and each of four other relatively unknown charities whose cause is unlikely to be particularly appealing to German students in Cologne.[23] In the second stage of the experiment, subjects were again randomly divided into agents and principals. For each principal-agent pair, the recipient who received the least number of points in the dictator games by the agent was then selected to be the neutral third-party for that pair. In case of ties, the recipient was randomly selected among those who received the least numbers of points in the dictator game.[24]

[22]We thank two anonymous referees for suggesting this additional treatment.

[23]The causes of these charities were the fight against addiction (Deutsche Hauptstelle fuer Suchtfragen e.V.), the preservation and restoration of historic organs in Protestant churches (Stiftung Orgelklang), the species-appropriate husbandry of rats (Rattenhilfe Nordwest e.V.), and the improvement of the lives of people with adiposity (Adipositas Stiftung Deutschland).

[24]Note that, in Stage 1 of the experiment, subjects still didn't know what would happen in Stage 2. In Stage 1, they were simply informed that after Stage 1 is over, they will receive the instructions for Stage 2, and that

We conducted the treatment in May 2022 at the experimental lab of the University of Cologne. We recruited our subjects from the same subject pool as before, but excluded those that had participated in an earlier session. In total, 90 subjects took part in the "neutral treatment". A limitation of this treatment is that it is just a weaker version of the mission treatment: the externality towards the third-party is still present (there is still a mission having "a positive impact on society beyond profit-maximization"). However, the main difference between this treatment and the mission treatment, as also described in previous studies with a similar design (Cassar, 2019), is that the quality of the mission-match is lower.

We start by comparing the agents' behavior in the neutral treatment to their respective behavior in the mission and GE treatments. As can be seen in Table A.4, consistent with our Result 1, agents are less (more) likely to accept a wage below their outside option in the neutral treatment than in the mission (GE) treatment. However, the differences remain insignificant. As far as effort is concerned, Figure A.2 gives a graphical representation of the agents' effort function in each of the three treatments. As can be seen, starting from wage 25, the agents' effort function in the neutral treatment lies very close to the respective function in the GE treatment and below the respective function in the mission treatment.[25] Consistent with this graphical overview and with our Result 2, Table A.6 shows that for any given wage, agents exert lower (higher) effort in the neutral treatment than in the mission (GE) treatment – although these differences remain again insignificant. Taken together, these results suggest that the agents' behavior in the neutral treatment lies somehow "in the middle" between the behavior in the mission treatment and the behavior in a standard gift-exchange. The direction of the results is consistent with our previous findings, but we lose the (marginal) significance. This is not surprising given that the neutral treatment is just a weaker version of the mission treatment and the differences between the mission and GE treatments were only marginally significant since the beginning. Furthermore, previous laboratory findings by Cassar (2019) also show that the quality of the mission-match plays no additional role in motivating effort: exerted effort is the same independent of whether the charity is chosen by the agent, the principal, or randomly determined.

As far as the principals' behavior is concerned, we find that principals in the neutral treatment behave more closely to the mission treatment than to the GE treatment. This is not surprising given that, for the principals, the difference between the mission and the neutral treatment is even weaker than for the agents.[26] As can be seen in Table A.8 they offer a wage

either Stage 1 or Stage 2 will count for payment. Principals were informed how the neutral third-party was selected.

[25]See Figure A.10 for the individual effort choice function of each agent in neutral treatment. As can be seen, there are about 8 non-reciprocal agents.

[26]For the principals, the only difference is that in the mission (neutral) treatment principals are told that the

that is only slightly below the offered wage in the mission treatment but significantly higher than the wage offered in the GE treatment. Furthermore, a comparison between the effort chosen by the agents and the expected effort guessed by the principals (see Columns 1 and 2 in Table A.3 and the 3rd quadrant of Fig. A.6 for the regressions' and graphics' results, respectively) suggest that, in line with the findings in the mission treatment, principals do not underestimate agents' reciprocity towards an increase in wage. The slope of the linear approximation of the real effort function is identical to the linear approximation of the slope of the principals' expected effort function. Finally, similar to the mission treatment, the offered wage in the neutral treatment is not different from the guessed profit-maximizing wage (Wilcoxon signed-rank test, $p > 0.91$), namely, from the wage that the principals believe maximize their profits, and the offered wage is only marginally higher than the real profit-maximizing wage (Wilcoxon signed-rank test, $p = 0.06$). Thus, overall, it is clear that principals in the neutral treatment – similarly to their counterpart in the mission treatment – do not have biased beliefs about the agents' effort function. This suggests that it is not the quality of the mission-match that drives our results. These new findings, however, cannot really tell us whether it is efficiency or the presence of the externality itself that drives the differences observed between the mission and GE treatments. To investigate this issue further, we ran a second new treatment, which we describe below.

5.2. Efficiency treatment with no externality

In the second new treatment (henceforth, "efficiency treatment"), we keep the same overall efficiency as in the mission treatment but remove the externality completely as in the GE treatment. This is achieved by modifying the principals' payoff from (10*effort - wage) in the mission treatment to (35*effort - wage) in the efficiency treatment. Given that in the mission treatment the agent's effort also generates a donation to a third-party equal to (25*effort), total efficiency is the same in both treatments. However, as in the GE treatment, in the efficiency treatment there is no social mission/externality/third party because the "extra generated surplus" (i.e., 25*effort) is given to the principal. This mimics well the difference between "equally efficient" organizations, one in which the entire surplus goes to the employer (standard profit-maximizing organization), and the other one in which part of the surplus is devoted to the social good (mission-oriented organization). The downside of this treatment, however, is that it may trigger some inequity aversion that is specific to the principal but not to the third party

recipient of the donation is the one who was allocated the highest (lowest) number of point form the dictator game.

benefiting from the externality.[27] Nevertheless, we think that if our whole findings were purely driven by a simple efficiency effect, we should not find any difference between the mission and the efficiency treatment. We conducted the "efficiency treatment" in October 2022 at the experimental lab of the University of Cologne. We recruited our subjects from the same subject pool as before, but excluded those that had participated in an earlier session. In total, 120 subjects took part in the "efficiency treatment".

The regression results on the agents' acceptance wages are reported in Table A.5. Consistent with our Result 1, we find that agents are willing to accept a significantly lower wage in the mission treatment than in the efficiency treatment ($p < 0.01$). This holds true more generally, and not only for the wages below the outside options. As far as effort is concerned, Figure A.2 gives a graphical representation of the agents' effort function in each of the treatments.[28] As can be seen, the agents' effort function in the efficiency treatment lies well below the respective function in the mission treatment in the whole wage domain. Consistent with this graphical overview and with our Result 2, Table A.7 further shows that for any given wage, agents exert significantly lower effort in the efficiency treatment than in the mission treatment ($p \leq 0.016$ for all comparisons). We also find that the agents' effort function in the efficiency treatment is slightly flatter than in the mission treatment but the effect is very small, with the coefficient of the interaction between the treatment dummy and wage being very close to zero (-0.018) and only significant in the random effects linear regressions but not in the Tobit regressions. So overall, all these new findings are very much consistent with our original findings concerning the agents' behavior. We now turn to the principals' behavior.

Based on the theoretical predictions, given that the principals' returns from the agents' effort are higher in the efficiency treatment than in the mission treatment, offered wages should be higher in the former than in the latter. Figure A.4, which depicts the four types of wages – offered wage, profit-maximizing wage, beliefs-based profit-maximizing wage and guessed profit-maximizing wages – within each of our four treatments, shows that this is indeed case. Similar results are found in the regressions reported in Columns 1 and 2 of Table A.9. However, Columns 3 and 4 of the same table also show that once we control for the principals' altruism (elicited through the dictator game with charity at the beginning of the experiment), the difference in wages across the two treatments is no longer significant.[29]. Relatedly, Figure A.4 also shows that

[27]Note that also in the mission and neutral treatments agents could be inequity averse towards the third-party benefitting from the externality. The comparison with the efficiency treatment becomes more difficult if we assume that there is some inequity aversion which is specific to the principal and thus not comparable with inequity aversion towards a third party.

[28]See Figure A.11 for the individual effort choice function of each agent in efficiency treatment. As can be seen, there are about 10 non-reciprocal agents.

[29]Principals in the efficiency treatment seem indeed to be more altruistic than principals in the mission treatment based on their allocations in the dictator game with charity (two-sample Kolmogorov-Smirnov test

the four types of wages in the efficiency treatment share a similar pattern than the four types of wages in the GE treatment, which is different from the pattern within the mission and the neutral treatments. As in the GE treatment, principals in the efficiency treatment offer a wage which is neither different from their guessed profit-maximizing wage (Wilcoxon signed-rank test $p = 0.67$) nor from their beliefs-based profit-maximizing wage (Wilcoxon signed-rank test $p = 0.14$) but which is, in fact, 17 points significantly lower than the actual profit-maximizing wage (Wilcoxon signed-rank test $p < 0.01$). This explains why, even though according to the theory, wages should be higher in the efficiency treatment than in mission treatment after controlling for principals' characteristics, this is not the case. Principals in the efficiency treatment are leaving some profits on the table. As in the GE treatment, this seems to be due to the principals in the efficiency treatment underestimating the slope of the agents' effort function. Columns 3 and 4 in Table A.3 present the respective chosen effort and expected effort regressions on wage levels in the efficiency treatment. The wage coefficient in Column 3 is 17 percent larger than the wage coefficient in Column 4, suggesting that, similarly to the GE treatment, the linear approximation of the agents' real effort function is steeper than the linear approximation of the principals' average expected effort function. In other words, principals in the efficiency treatment underestimate agents' reciprocity – albeit to a lower extent than in the GE treatment – which lead them to offer a wage below the profit-maximizing level.

Taken together, the results from these two robustness-checks suggest that our findings are unlikely to be driven by a simple efficiency effect but rather by the presence of a positive externality. These results, however, are independent from the quality of the mission-matching, i.e., from the specific third-party who benefits from this externality.

6. Discussion

In this section we discuss the implications, limitations and potential extensions of this study. In particular, we discuss (i) the role of trust as potential mechanism behind Result 4; (ii) the link between the model and the experiment; (iii) the potential extension to a multiple round setting with learning opportunities and (iv) the potential extensions to a setting with endogenous and costly mission and selection.

6.1. The role of trust in the mission treatment

How to explain that principals are much better able at estimating the effort returned in the mission treatment than in the GE treatment? As we did not expect Result 4, our experiment

$p = 0.09$)

was not designed to test for its potential mechanism(s). One conjecture, however, is that the presence of the social mission increased the principals' trust in the agents, which, in turn, moved their beliefs closer to the empirical truth. In fact, principals in the GE were found to underestimate agents' effort response to an increase in wage, which is similar to saying that they were not trusting that the agents would reciprocate a high wage. We test this conjecture through two approaches. First, we conduct an heterogeneity analysis to test whether the bias in the GE treatment was in fact driven by principals who we define as being "less likely to trust others" based on their behavior in Stage 1 of the experiment (so before they knew and played the GE treatments). Second, we compare principals' level of trust elicited at the end of the experiment across treatments.

For the first approach, we categorize principals as being more or less likely to trust others based on the number of points they allocated to the charity in the dictator game played in Stage 1 of the experiment.[30] More specifically, we categorized principals as being "more likely to trust others" if their level of donation was above the median, and as "less likely to trust others" if their donation was below the median. Within each treatment, we then compare the principals' mean expected effort for the two types of principals, and plot agent's actual average effort choice for comparison purposes. The two quadrants at the top of Figure A.7 illustrate the results. It emerges clearly that the distortion in beliefs was fully driven by the principals who are less likely to trust others: in the GE treatment, their expected effort function is much flatter than the real effort function, while there is almost no difference between the agents' effort function and the expected effort function of the principals who are more likely to trust others. On the contrary, in the mission treatment, the expected effort function of the principals who are less likely to trust others is very similar to both the agents' effort function and to the expected effort function of the principals who are more likely to trust others. This evidence suggests that the presence of the social mission could have moved the beliefs of the principals who are less likely to trust others towards the empirical truth.

This result is further corroborated when we test our conjecture through the second approach. As we describe in the design section, at the end of our experiment *but before the payoffs were revealed*, we elicited participants' trust in others using a survey question as in (Falk et al., 2018). Thus, any observed difference in the principals' level of trust across treatments should be the result of undergoing either the GE or mission treatment in our gift-exchange game. Note that the two treatments only differ in the presence of the mission and are otherwise identical. Figure

[30]Unfortunately, we did not have a direct measure of trust before the gift-exchange game as, in fact, we did not anticipate these results. However, previous research has shown a strong positive correlation between altruism and trust, suggesting that both conditions characterize the positive disposition toward others. Also, note that the choice of donating to a charity presumes some trust in the charity (Falk et al., 2018).

A.7 depicts the distribution of principals' trust across treatments. We find that principals in the mission treatment report higher trust levels than principals in the GE treatment, and the difference is highly significant (two-sample Kolmogorov-Smirnov test $p < 0.01$). To rule out that this effect is due to an unlucky initial unbalance across treatments, we also compare the distribution of points allocated by the principals to the charity in the dictator game played at the beginning of the experiment (i.e., our definition of being more or less likely to trust others) across treatments. We find no significant difference (two-sample K-S test $p > 0.1$).

When we turn to the comparison between the mission and the efficiency treatment, the results are, however, weaker. As shown in the 4th quadrant of Figure A.7, the expected effort function of the principals who are "less likely to trust others" is indeed flatter than both the agents' real effort function and the expected effort function of the principals who are " more likely to trust others", but the difference seems to be very marginal. Furthermore, when comparing principals' answers to the ex-post questionnaire, reported trust in the efficiency treatment is lower than the in the mission treatment but only the average difference is marginally significant (two-sample t-test $p = 0.1$) while no difference is found across the distributions (two-sample K-S test $p = 0.41$).[31] However, these weak results could be explained by the initial imbalance across treatments. As noted earlier, principals in the efficiency treatment were found to be more altruistic in the dictator game than principals in the mission treatment. This imbalance makes the comparison of the trust analysis across the two treatments problematic.

To summarize, while the data collected in the original experiment seems to suggest that the mission makes the principals more trusting, the data from the robustness checks are less conclusive. Thus, overall, we remain cautious about concluding that an increase in trust is the general channel behind our findings. We believe that future work should be specifically designed to investigate why principals underestimate agents' reciprocity in standard gift-exchange games and why the mission helps the emergence of efficiency wages.

6.2. Link between the theoretical model, the experiment and empirical facts

In section 1 we present a theoretical model whose predictions we tested in a follow-up experiment. As the purpose of the model was to provide a theoretical benchmark, we took the point of view of profit-maximizing managers; that is, we assumed that the principals could correctly predict agents' effort responses and that they did not care about the mission. Our experimental findings, however, unexpectedly revealed that in the absence of a mission, individuals tend to

[31] If we pool together the treatments with an externality (i.e., the mission and the neutral treatment) and compare them to the treatments with no externality (i.e., the GE and the efficiency treatment), the results get stronger (two-sample t-test $p = 0.04$ and two-sample K-S test $p = 0.2$), which suggests that the lack of significance might be due to a power issue.

underestimate other people's reciprocity. This discrepancy between the theoretical predictions and the experimental findings should not be interpreted as the experiment not being sufficiently related to the theoretical model. The purpose of the model was not to explain the experimental findings. Rather, the experimental findings help us to understand how human behavior in organizations can deviate from a previously defined theoretical benchmark.

6.3. Multiple rounds and learning opportunities

This paper focuses only on a one-shot interaction between the agent and the principal and, therefore, fails to capture long-term relationships between an employer and employee. This design choice was necessary in order to rule out reputation concerns. However, a potential extension of our study would be to allow multiple rounds and to rematch principals and agents at each round. While this design feature would not add external validity in terms of capturing long-term relationships, it would allow some learning opportunities to take place. Note, however, that even if agents and principals interact over a longer time-frame, biased beliefs are likely to persist. In particular, an overly pessimistic principal will not offer a higher wage and will thus never receive the counter-factual information that would leave her to offer higher wages. To that end, **?** show, with a lab experiment in urban Ghana between entrepreneurs and workers, that (i) principals significantly underestimate workers' trustworthiness in a real-effort task, and (ii) the low expectations persists.

6.4. Endogenous mission, CSR and selection

Consistent with the seminal theoretical paper by (Besley and Ghatak, 2005) and its subsequent implementations in the laboratory (Cassar, 2019), in our setting the mission of the job is exogenous and set to be equal to the agents' preferences.[32] This is meant to capture the situation in which workers derive an intrinsic benefit from doing their job; from the social value they create in providing a collective good. Examples, as stated by (Besley and Ghatak, 2005) and (Cassar, 2019), include: doctors who are committed to saving lives, researchers to advancing knowledge, judges to promoting justice, teachers to transferring knowledge and values to students, journalists to reporting information to the world, engineers to promoting green technology and so on. These workers are employed in organizations that may share their missions to a larger or to a smaller extent: hospitals, as well as schools and companies, can be more or less driven by profit-maximization than by social value creation. We derived theoretical predictions taking as benchmark the situation in which the employer is profit-maximizer. However, in our experiment, the principals' preferences are obviously endogenous (i.e., the subjects in the role of

[32]Thus, differently from Cassar and Armouti-Hansen (2019) and Besley and Ghatak (2017), this paper leaves aside questions related to the optimal choice of the mission or of the organizational form.

the principals may or may not care to generate a donation to the agents' chosen charity) but we elicit them and can control for them in the empirical analysis thanks to the dictator game played in the first stage of the experiment. We decided to let the agents, rather the principals, choose the mission/charity because the aim of the study was to look at the effect of efficiency wages when agents are mission motivated and, therefore, it was important for us that the agents in our experiment cared about the charities. This being said, the earlier experimental study by (Cassar, 2019) – which has a similar setting to the one of this paper but where the principals choose piece-rates instead of efficiency wages – finds that the choice of the charity (whether it is chosen by agent, randomly determined, or chosen by the principal) has no effect on the effort provided by the agents and on the piece-rates offered by the principals. In other words, what matters in determining behavior (at least in the laboratory) is the presence of the externality in the form of the charitable donation rather than the specific charity that receives the donation. Based on these previous results we do not think that our findings would fundamentally change if it were the employers choosing the charity. In fact, as our first robustness-check shows, even if the recipient of the donation is a neutral third-party, the results still hold.

Another characteristic of our theoretical and experimental setting is that the social mission does not entail any cost for the employer. This speaks, again, to many organizations in which employees may be more or less intrinsically motivated by the mission of their task: e.g., to schools who hire teachers who can be more or less intrinsically motivated by the mission of transferring knowledge and values to their students. This additional intrinsic drive that some teachers might have compared to others come with no additional cost for the employer.

This being said, there exist, of course, also many settings in which the social mission is costly for the employer, e.g., in the case of an investment CSR made by a company. An extension of this study could thus be to test how the agents' reaction function – and in turn the optimal wage – vary if the principals would bear the costs of the externality generated by the agents' effort. We believe that this richer setting could lead to potentially different outcomes. A costly CSR investment might induce some mission-reciprocity (in the form of indirect reciprocity) in addition to a wage-reciprocity if combined with a high wage offer. One might expect agents to be more reciprocal towards higher wages if the latter are also combined with some costly social initiatives. On the other hand, some agents might be more willing to punish a low wage if combined with a costly CSR investment because they might wonder why the company is willing to sacrifice money to help a social cause but not to increase their wage.[33] Then the question

[33]A finding along these lines (albeit in a quite different context) is documented by the field experiment in Cassar and Meier (2020) which shows that if CSR is perceived to be done strategically to increase profits, it may actually backfire and reduces workers effort. The potentially negative effects of CSR are also documented by List and Momeni (2021) which shows that CSR can backfire due to moral licensing: the "doing good" nature of

arises if employers can correctly predict these workers' responses or whether new biases emerge. New theoretical and experimental analyses should be conducted to answer these questions.

Finally, an additional natural extension of this study is to allow agents to self-select into organizations with or without a social mission. In fact, the mission plays a major role in attracting a prosocial workforce (Kosfeld and von Siemens, 2009; Fehrler and Kosfeld, 2013; Friebel et al., 2019). If the principals can anticipate this, one should expect our findings to become even stronger once we allow self-selection into organizations.

7. Conclusion

In this paper, we provide a first attempt at analyzing, both theoretically and experimentally, the interaction between two non-financial motives that are very common in the workplace and that have received high attention by the economic literature: workers' motivation to reciprocate efficiency wages and workers' intrinsic motivation to contribute to a social mission. Using a laboratory experiment instead of field data has several advantages. First, it addresses the endogeneity issue head-on: our results do capture causal effects of efficiency wages and of the social mission on agents' effort and on the principals' wage offers. We find that the social mission and efficiency wages are independent in motivating agents' effort and that, contrary to the resulting theoretical predictions, the social mission increases principals' wage offers. Second, our design allows us to elicit the effort response function of each agent and the belief profile of each principal, which, in turn, allows us to gain useful insights on the principals' behavior and the presence of potential biases. We show that the treatment difference in wage offers is the result of principals underestimating agents' reciprocity in a standard gift-exchange game and, therefore, of principals offering a wage that is below the profit-maximizing wage. On the contrary, in the presence of the social mission, principals are behaving optimally – in the sense that they are maximizing profits based on their correct beliefs.

Studying workers' motivation and wage contracting in the laboratory inevitably also has its downside. The use of the strategy method and of monetary effort levels certainly makes the environment more abstract and artificial. These design features, however, should not fundamentally affect the results (Brandts and Charness, 2011). Furthermore, the laboratory grants exogenous control over key variables, but the same control implies that many features and assumptions that are made in the theory are directly imposed. For example, our analysis does

CSR induces workers to misbehave on another dimension that hurts the firm. Differently from this latter study, our setting does not allow multiple or multidimensional tasks and, therefore, it cannot speak to the potential effect of CSR on moral licensing.

not take into account the organization's choice of the mission or workers' self-selection into organizations with a social mission. These and other extensions to our analysis are left to future research.

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