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Betrayal Aversion and the Effectiveness of Incentive Contracts

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Abstract

In this paper we study the impact of betrayal aversion on agents' effort provision, when principals have discretion regarding agents' remuneration. We show theoretically that agents who work under a nonbinding bonus contract face a trade off in their effort choice between the likelihood and the level of betrayal. Thus, depending on which effect predominates, betrayal aversion may either undermine or underpin the effectiveness of bonus contracts to induce effort. The data of our experiment reveal a strong detrimental effect of betrayal aversion. If the principal promises to pay a bonus for sufficiently high effort, the message is ineffective when agents are characterized by a high degree of betrayal aversion. In strong contrast, employees with a low degree of betrayal aversion increase their performance by more than 50%, if they received this message. The findings in this article identify an additional hidden cost of economic incentives.

JEL Classification numbers: C91, D03, D81

Keywords: Betrayal Aversion, Principal Agent Problem, Experiment

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1 Introduction

The majority of economic relations is at best incompletely specified by formal contracts. Hence, mutual trust is an important prerequisite to realize the potential gains from exchange, investments or cooperation. Recent research in behavioral economics (Bohnet and Zeckhauser, 2004; Bohnet et al., 2008; Aimone and Houser, 2012) and neuroeconomics (Kosfeld et al., 2005; Aimone et al., 2014) has emphasized the concept of “betrayal aversion” as an important driver for decision making in such contexts. Betrayal aversion refers to a preference which reflects the disutility from a trusting person when being betrayed by another person. The preference captures the psychological cost of being betrayed, above the purely pecuniary consequences. Despite a growing number of neuroeconomic studies and laboratory experiments, there is mixed evidence whether this human trait is detrimental or beneficial for the emergence of cooperation. This dual nature of betrayal aversion is illustrated by Aimone and Houser (2011) who report data from a laboratory trust game. They show that on the one hand betrayal aversion reduces investors’ willingness of trust. On the other hand, they find that betrayal aversion interacts with other-regarding preferences of trustees and increases the rate of reciprocation and cooperation.

Despite these important contributions, we identify a gap between the domain of relevance of betrayal aversion and the narrow perspective in these studies,¹ which is based on different variations of the trust game (Berg et al., 1995). First, a common feature of these experiments is that the relation of betrayal aversion and trust is measured in the same trust game. This may raise the question to what extent these findings can be generalized to all other important domains of economic interactions involving trust. Second, most interpersonal trust-related interactions involve a personal engagement beyond financial investments, which is the core of standard trust games. The prevailing hypothesis is that betrayal aversion results from the negative emotions evoked, if one’s trust was betrayed. Thus, we believe that such emotions and humans’ attempts to avoid it, are even more pronounced in interactions additionally characterized by physical and psychological effort. Putting all these arguments together, it is essential to study whether and how betrayal aversion affects subjects’ decisions in an applied setting different from standard investment games. A particularly relevant scenario for modern economies is a labor-market setting, where employees exert physical effort and have to trust that this will be reciprocated by their employer.

¹One recent paper extending the domain of betrayal aversion is the study of Cubitt et al. (2017) which relates betrayal aversion to conditional cooperation in a public goods experiment. They find that those who expect others to contribute little to the public good are significantly betrayal averse.

In this paper we follow this approach, i.e., we theoretically and experimentally study the impact of betrayal aversion on the effectiveness of incentive contracts in an employer-employee relation. We extend the scope of betrayal aversion to important labor market settings, which are not only based on the exchange of pecuniary wagers. More precisely, we explore how betrayal aversion may influence agents' effort provision under a bonus contract, where the bonus payment is based on a cheap-talk promise from the employer's side. That is, employers are not obliged to pay the bonus. In our theoretical analysis we analyze a simple one-shot principal agent model, where the agent believes that a higher provision of non-observable effort increases the likelihood for the receipt of the bonus. We provide a rationalization, why an agent might hold such a belief in equilibrium. The model identifies a trade off between the agent's willingness to insure himself against the disutility from being betrayed and the level of betrayal at stake. Higher effort on the one hand makes the receipt of the bonus and the avoidance of betrayal more likely, but also it increases the evoked negative emotions in case the bonus is not paid. Betrayal aversion is positively correlated with effort provision, if the marginal insurance effect exceeds the marginal level effect. By contrast, betrayal aversion lowers effort, if the opposite is true.

We conduct a laboratory experiment to study the relevance and the direction of the identified potential interaction effect between betrayal aversion and incentives. Our experimental design resembles a one-shot principal agent setting. In this scenario an agent's effort is beneficial for the principal, who may pay or not pay a pre-specified bonus after the completion of the task. Subjects who were randomly assigned the role of employees performed a real-effort task similar to Niederle and Vesterlund (2007). We run two treatments. In our main treatment the employer could send a message saying: "if you make an effort, you will receive a bonus of €5." Whereas, employers could not make use of this option in our control treatment. Given our theoretical result, betrayal aversion may underpin or undermine the effectiveness of a voluntary bonus to induce higher effort provision. We hypothesize that either effect should be only observable in the message treatment, because an employer making a promise is a prerequisite for the feeling of being betrayed. Our first main result is that employees, who received the message provide significantly more effort. Secondly, we find that this effect is driven by subjects with a low degree of betrayal aversion. Indeed, the positive effect of a promised bonus on employees' performance is completely offset for subjects with a high degree of betrayal aversion. Thus, we provide evidence for the detrimental effect of betrayal aversion on the effectiveness of bonus contracts to induce higher effort.

We bring together the literature on the determinants of trust and its distinction from

risk-taking behavior and the extensive literature on the relation between economic incentives and social preferences (See Bowles and Polania-Reyes, 2012 for a survey). Since most economic interactions built to some extent on trust, we consider the concept of betrayal aversion as a particular relevant social preference for the effectiveness of incentives aiming at higher effort provision. Thus, we point to an seemingly omnipresent potential hidden cost or benefit of economic incentives. Despite our lab findings, more research is needed on the substitutability or complementary between betrayal aversion and financial incentive, before conclusions can be drawn for the institutional design of economic exchange.

2 Theoretical Framework

2.1 The Problem of the Agent

In this section we focus on the implication of betrayal aversion on an agent's effort provision in a principal agent relationship. To isolate the effects from mechanisms like reputation or punishment in repeated games, we focus on one-shot interactions. We therefore consider an agent who is hired for a one-time project. The agent incurs private cost for exerting effort which generates profits for the principal. Note that for betrayal aversion to be relevant, the payment scheme must leave some discretion to the principal regarding the monetary compensation to allow for the betrayal of the agent's trust. If any variation in the agent's payment cannot be attributed to the principal's decision then by definition an agent should not feel betrayed.

We assume that the agent works under a bonus contract, i.e., he receives a fixed wage w and may receive an additional bonus $b \geq 0$ after completion of the project. We focus on this type of contract because it is widely used in reality and has been proven to be the optimal payment scheme in a variety of settings. Most real-life bonus contracts leave some discretion to the principal as they specify not fully quantifiable conditions for the eligibility of the agent to receive the bonus. Indeed, such a discretion might be in the very interest of the principal as a punishment instrument for non-cooperative behavior in the realm of the working relation but outside the scope of the contract. However, there are multiple ways to rationalize such a belief in equilibrium. We refrain from making the specific assumptions associated with each of the mechanisms. The reason is that we focus on the impact of betrayal aversion on the agent's effort provision under the assumption that in equilibrium the principal finds it optimal to choose or is restricted to a bonus contract which is not fully binding.

The agent gains utility from income and suffers from effort. For illustrative purposes

we make the standard assumption that the agent's von Neumann-Morgenstern utility function is additive separable with respect to these two dimensions. Thus, the expected utility associated with effort level e of a risk-neutral agent who is not betrayal averse is given by

$$u^A(e, b) = p^A(e)b - c(e), \quad (1)$$

where we normalize $w \equiv 0$ since it is relevant only with respect to the agent's participation but not for the optimal effort choice, $p^A(e)$ denotes the agent's belief to receive the fixed bonus b , and $c(e)$ denotes the monetary cost of effort provision.

We incorporate the concept of betrayal aversion by introducing a term in the agent's utility function which reflects the agents additional disutility from not receiving the bonus when he feels to deserve it. The monetary equivalent of the potential level of betrayal is denoted by $f(e, b) \geq 0$. It is assumed to increase in the level of the bonus and in the level of exerted effort and materializes only in case the bonus is not paid, i.e., with probability $1 - p^A(e)$. If the bonus equals zero, or when no effort is exerted, then potential betrayal also vanishes (i.e., $f(\cdot, 0) = f(0, \cdot) = 0$). For expositional purposes we parameterize this cost of betrayal by an agent-specific parameter γ . This gives rise to the following expected utility associated with effort level e , where a non-betrayal averse agent is characterized by $\gamma = 0$.

$$u^A(e, b) = p^A(e)b - c(e) - (1 - p^A(e))f(e, b)\gamma \quad (2)$$

We assume that the belief of the agent to receive the bonus is increasing and strictly concave in his effort level and that the total cost of effort is increasing and strictly convex in effort. Of course, an agent may have other motives which might additionally motivate him to exert effort like social preferences towards the principal, moral obligations or he might simply enjoy the work. However, all we need to assume is that he is at least partially motivated by the monetary incentive of a bonus.

In this simple framework, if the agent finds it optimal to exert any effort he selects an effort level $e^* > 0$ which equalizes marginal benefits and marginal cost of effort according to $p_e^A(e)(b + f(e, b)\gamma) = c_e(e) + (1 - p^A(e))f_e(e, b)\gamma$, where subscripts denote partial derivatives. The term on the left-hand side reflects the increase in the likelihood to receive the bonus and to save the potential cost of betrayal. The right-hand side captures the marginal effect of effort on the total cost, where the first term reflects the direct cost of effort provision and the second the indirect cost which occur because of the increase in the betrayal potential and materialize if the bonus is not received.

We are primarily interested in the impact of γ on the optimal effort level e^* . Taking

the total derivative of the first order condition at e^* gives us:

$$\frac{de^*}{d\gamma} = - \frac{p_e^A(e)f(e, b) - f_e(e, b)(1 - p^A(e))}{p_{ee}^A(e)b - (c_{ee}(e) - 2p_e^A(e)f_e(e, b) - p_{ee}^A(e)f(e, b)\gamma + f_{ee}(e, b)(1 - p^A(e))\gamma)} \quad (3)$$

Note that the sign of the denominator is negative which results from the assumption of convex total cost of effort and concave beliefs.² Hence, the impact of the degree of betrayal aversion on the exerted level of effort depends on the relation of the two positive terms in the numerator. The first term captures the marginal insurance effect, i.e., an increase in effort increases the likelihood to receive the bonus and thus saves the agent the cost of betrayal $f(e, b)$. The second term reflects the marginal level effect, i.e., the increase in the potential cost of betrayal due to higher effort which materialize with probability $1 - p^A(e)$. If the former exceeds the latter, the optimal level of effort will increase in the degree of betrayal aversion. If the reverse is true, effort provision will decrease in the degree of betrayal aversion.

To summarize, we formally incorporated betrayal aversion into a standard payoff function for an agent in a principal agent model with some compensatory discretion for the principal. The findings confirm our intuition that betrayal aversion alters the incentives of bonus contracts in two opposing ways: (i) it might undermine or (ii) underpin the effectiveness of incentive contracts depending on whether the insurance effect or the level effect predominates.

2.2 Rationalization of Agent's Belief

Consider the following situation, which mirrors the experimental setting we will test in this paper. An employer and an employee engage in a one-time interaction. The employee receives an unconditional fixed payment. On top the employer may or may not pay a prespecified bonus $b > 0$ to the employee after he observes his payoff generated by the agent's effort. As in our experiment, we assume that the two parties cannot form a binding contract. For simplicity we assume that the agent can choose among a finite number of increasing effort levels $e \in \{0, e_1, \dots, e_N\}$. Effort is not observable, it is costly and it deterministically translates to increasing payoffs $\{0, \pi_1, \dots, \pi_N\}$.³ An employer with

²Increasing and strictly concave belief implies $p_e > 0$ and $p_{ee} < 0$. Increasing and strictly convex total cost of effort implies $c_e - p_e f \gamma + (1 - p) f_e \gamma > 0$ and $c_{ee} - p_{ee} f \gamma - 2p_e f_e \gamma + (1 - p) f_{ee} \gamma > 0$.

³If our goal would be to derive the optimal contract, then for nonobservability of effort to have any consequences, we would have to make the standard assumption that effort is not perfectly deductible from the observation of profits. However, we instead want to rationalize a certain belief given a not fully binding bonus contract. Assuming that profits are only partially informative about the agent's effort

standard preferences would never pay the voluntary bonus. Anticipating this an employee with preferences similar to those represented by (1) or (2) would never exert effort in this one-shot interaction.

What could motivate a principal to pay the bonus? We believe that employers may feel guilty, if they decide not to pay a promised bonus, to which the employee feels entitled to. We consider the concept of guilt aversion (Charness and Dufwenberg, 2006; Battigalli and Dufwenberg, 2007) not coincidental. Instead, we believe that guilt aversion and betrayal aversion are just two sides of the same coin. This is because guilt in this context is nothing else than a partner's negative feeling of betrayal transmitted through empathy. Hence, assuming one without the other, would give an incomplete picture of the psychology of trust-related interpersonal relations. We therefore incorporate a preference for guilt aversion into the utility function of the employer.

Let the function $g(e, b) > 0$ denote the disutility reflecting an employer's potential guilt. We assume that $g(e, b)$ increases in effort exerted by the agent and the bonus. Following Battigalli and Dufwenberg (2007), we parameterize the principal's guilt sensitivity by $\theta \geq 0$. The authors' argued that belief dependent motivations involving higher order beliefs can either be modeled by a player's own belief or by a belief of another player involving one degree lower order. Although not decisive for our argument, a good candidate for the principal's cost of guilt is the (first order belief of the) agent's cost of betrayal $f(e, b)\gamma$, in the case of the bonus is not paid. Let a risk-neutral principal's preferences therefore be represented by $u^P(e, b) = \pi(e) - \mathbb{1}b - (1 - \mathbb{1}b)g(e, b)\theta$, where $\mathbb{1}$ is the indicator function which equals 1 if the bonus is paid and zero otherwise.

We assume that θ is private information of the employer. Let $\Theta = \{\theta_1, \dots, \theta_M\}$ denote the finite set of types, with $\theta_i < \theta_j$ for $i < j$. Let $p(\theta)$ denote a probability measure on Θ reflecting the agent's belief about the distribution of types. Assuming that the employer pays the bonus whenever he is indifferent, i.e., if and only if $b \leq g(e, b)\theta$. Thus, an employer who is not prone to guilt aversion would never pay the bonus. The condition $b \leq g(e, b)\theta$ defines a lower bound $\underline{\theta}(e) = \frac{b}{g(e, b)}$ such that any employer with $\theta \geq \underline{\theta}(e)$ will pay the bonus if he observes $\pi(e)$. Note that $\underline{\theta}(e)$ decreases in e since an employer's guilt increases with the effort exerted by the agent. As a consequence, in any perfect Bayesian equilibrium sequential rationality implies that the agent's belief to receive the bonus is given by $\sum_{\theta \geq \underline{\theta}(e)} p(\theta)$. The belief is non-decreasing and strictly increases in e in some range if $\theta_M \geq \underline{\theta}(e_N)$, i.e., if at least for the highest effort some employer would pay the bonus. Hence, an employer's guilt aversion could justify the belief of an agent working under a

would not add any further insights.

non-binding bonus contract that the likelihood of the bonus payment increases in effort.

3 Experiment

3.1 Experimental Design

Our within-subjects experiment comprises eight parts. Subjects knew that at the end of the experiment the computer would randomly select one part which will be payoff relevant. Our main experiment took place in part five. The other parts were needed to elicit subjects' preferences. In parts one and two we measure betrayal aversion, in part six we control for risk preferences, whereas we elicit subjects' aversion to disadvantageous and advantageous inequality (Fehr and Schmidt, 1999) in parts seven and eight. In the remaining parts (three and four) we conduct experimental tests of a betrayal-aversion theory, which belongs to another study (Müller et al., 2018).

Elicitation of Betrayal Aversion

In part one and two we follow the approach of Bohnet and Zeckhauser (2004) to elicit subjects' betrayal-aversion attitudes. In both parts we employ a binary-choice decision problem, where a first mover (trustor) decides whether to *trust* or not. In part one of our experiment, a second mover (trustee) decides to behave *trustworthy* or not (*betrayal*), when the first mover trusted her. The game resembles a basic trust game. By contrast, in part two, the action whether the second plays the trustworthy action is randomly determined by nature. In both versions of the binary-choice game it immediately ends, if the first mover chooses the *sure* action. Figure 1 overviews the sequence of the game in parts one and two. The diagram also depicts the possible profit of the players in Talers. We applied an exchange rate of: 1.5 Talers = €1.

In Bohnet and Zeckhauser (2004) it is shown that trustors' incur an additional non-monetary loss when a second mover behaves not trustworthy after they trusted them. As a consequence, they are more reluctant to play this game when another individual decides in the role of a trustee, as compared to the situation when a second mover's decision is determined by a random device. Following Bohnet and Zeckhauser (2004) we measure this effect with the elicitation of subjects' "Minimum Acceptable Probabilities" (MAP) in situations where they play with trustees deciding themselves (part one) and in situations where the computer randomly chooses a trustee's action (part two).

The MAP elicitation works as follows. In part one, one half of the subjects was

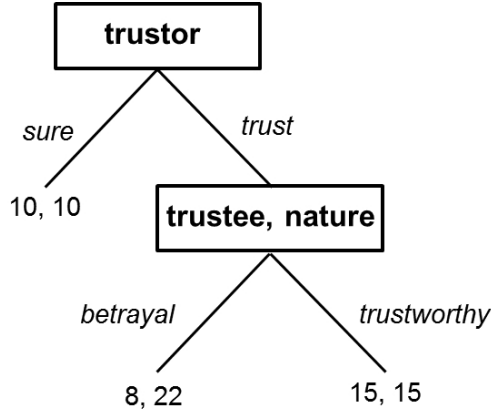


Figure 1: Binary-choice decision game of parts one and two. First (second) numbers are the payoffs in Talers of the trustor (trustee).

randomly assigned the role of trustors in the binary-choice game. They were told that they would be matched to another subject who moves second. In a next step, trustors had to indicate the minimum percentage of *trustworthy* behavior (MAP) among trustees they require to play *trust* in the game. We called this minimum percentage: p . The trustors also knew that in the meanwhile all subjects in the role of trustees had to state whether they would play the *betrayal* or the *trustworthy* action. We labeled all players and actions in a neutral way.⁴ The trustors knew that the level of trustworthiness would be determined as a mean of all the decisions of trustees. We informed them that if the average frequency of trustees choosing action “1” would be at least as high as p , then we would select action B (*trust*) for them. Otherwise they play action A (*sure*). They knew that the computer then would check which action (1 or 2) their matched trustee has chosen.

In part three subjects remained in the same roles and participated in the same binary-choice game as depicted by Figure 1. The crucial difference to part two was that in this part subjects knew that trustees have no choice. That is, they can merely earn the profits displayed in Figure 1 when the corresponding action was chosen. More precisely, the action of trustees is determined by a random draw. To utilize this we determined a probability: p^* (0-100) before the part started. Subjects knew that this probability was pre-determined by the experimenter and that it was written down on a sheet in a sealed enveloped. This enveloped was put on the white board before the experiment started. Again, trustors had to indicate the minimum percentage of p^* they require to

⁴Trustors (trustees) were labeled as “person S” (“person Y”). Trustors had to choose between action “A” (*sure*) and “B” (*trust*). Whereas, trustees had to choose between actions “1” (*trustworthy*) and “2” (*betrayal*).

play *trust* in the game. They also knew that we would afterwards open the envelope. We told them that if the pre-determined p^* succeeds their stated MAP, we would select action B (*trust*) for them. Otherwise they would play action A (*sure*). All subjects knew that we would afterwards compose a lottery urn, consisting of green and blue lottery lots which resembles the pre-determined probability that trustees would choose action “1.” We informed all subjects that we would fill an urn with exactly 100 lottery lots. It was made clear that the number of green lots will exactly correspond to p^* . Whereas, we would fill the urn with a number of: $100-p^*$ blue lottery lots. Afterwards, we randomly selected one participant of the experiment to draw a lottery lot out of the urn. If the drawn color was green, all trustees would play action “1” (*trustworthy*). Otherwise, they played action “2” (*betrayal*). After the public realization of the lottery, we entered the outcome in the experimenter computer. Finally, the payoffs of all subjects (trustors and trustees) were determined accordingly to their played actions.

Principal-Agent Game

In part five all subjects who played as trustors in parts one and two, were now assigned the roles of agents. All subjects who played as trustees were assigned the roles of principals. Each agent was matched with a principal. The agents were informed that they will get a payment of €5 for the participation in a mathematical real-effort task based on Niederle and Vesterlund (2007). At the same time, principals were also endowed with €5. In the real-effort task agents had to add sets of five two-digits numbers for five minutes. They were told that they would increase their principal’s income by €0.75 for every correctly solved problem. They also knew that after they finished working in the task, their principal was informed on this. Subjects knew that the principal would ultimately decide whether she sends an additional payment of €5 to the agent.

In order that a trusting agent can be betrayed by the principal, a trusting relation must be formed in the first place. Based on this agreement the agent will have the normative expectation that the principal will keep his promise, if he fulfills his part. For this reason in treatment *message* we gave the principal the opportunity to send a “cheap-talk” message before the agent started working. All subjects were informed on this. The message was pre-defined by the experimenter and all subjects knew about its content. It said: “If you make an effort you will receive a bonus of €5.” We refrained from specifying an exact performance goal as participants’ ability in the task is very heterogeneous (Niederle and Vesterlund, 2007). Hence, if we would apply a specific pre-defined number, it is likely that it will be easily achieved by some participants, whereas some of them will hardly have

a chance to make it. Since employees work only once, we obtain no additional unbiased measure for subjects’ ability. However, it is important to isolate between ability based and betrayal-aversion based influences on effort choice.

We also run a *control* treatment. The goal was to test whether a principal’s promise is indeed required to establish a relation, which implies a sufficiently high load of trust such that betrayal aversion is relevant. In the control treatment, the only difference is that the message option is disabled. We expect that betrayal aversion under the sole presence of a potential additional payment will have no impact on agents’ effort choice. This follows from the missing or much weaker link between effort and the agent’s entitlement to the bonus payment.

In the end of this part, principals were reported their agents’ performance and decided about paying a bonus to them. Finally, agents were informed whether they received a bonus payment from their principal.

Elicitation of Preferences

In part six we measured subjects’ risk tolerance. We applied a lottery-choice task based on the setting used in Müller and Rau (2016). In the risk-elicitation task subjects have to choose one of nine lotteries. The lotteries realize under a certain probability either a high payoff (Event A) or a payoff of €0.10 (Event B).

Choice	Event	Probability (%)	Payoff (€)	Exp. payoff	r ranges
1	A	100	5.00	5.00	$r > 2.55$
	B	0	0.10		
2	A	90	8.05	7.26	$2.00 < r < 2.55$
	B	10	0.10		
3	A	80	10.25	8.22	$1.50 < r < 2.00$
	B	20	0.10		
4	A	70	12.46	8.75	$1.05 < r < 1.50$
	B	30	0.10		
5	A	60	15.15	9.13	$0.64 < r < 1.05$
	B	40	0.10		
6	A	50	18.80	9.45	$0.30 < r < 0.64$
	B	50	0.10		
7	A	40	24.08	9.69	$0.00 < r < 0.30$
	B	60	0.10		
8	A	30	32.07	9.69	$-0.75 < r < 0.00$
	B	70	0.10		
9	A	20	40.88	8.26	$r < -0.75$
	B	80	0.10		

Table 1: Subjects’ gamble choices and the corresponding expected payoffs.

Table 1 gives an overview of the choice set, i.e., the nine lotteries and their expected payoffs. The risk-elicitation task enables us to measure risk-averse behavior (lotteries 1–6), risk-neutral behavior (lottery 7), and risk-seeking behavior (lotteries 8 and 9).

In part seven we measured subjects’ aversion to disadvantageous inequality (Fehr and Schmidt, 1999) with the method of Blanco et al. (2011). In an ultimatum game participants have to make decisions in the role of first and second movers. They know that after the experiment is finished, the computer will randomly pair two players and determine their role (dictator or recipient) and the payoff-relevant decision. At the beginning, all subjects act as proposers. They have to decide how much of €19 they are willing to offer to the second mover. Afterwards, all subjects decide in the role of responders. In this respect, they indicate which minimum first-mover offer they would accept. Subjects are presented a table with 19 rows of different proposals (for each possible integer proposal between €1 and €19). They have to indicate for each of these proposals whether they would reject or accept it. Therefore, all proposals have to be marked for rejection or acceptance. The goal is to find out when subjects switch from rejecting an offer to accepting it. Therefore, the table contains 20 buttons which are each located above each proposal. Subjects are told that clicking on a button would mean that all proposals below the button would be marked for acceptance, whereas all proposals above the button would be marked for rejection. For instance, if a subject wants to accept all proposals between 1 and 19, she has to click on the first button. Whereas, if she wants to accept all proposals starting from €4, she would click on button 4. The earlier a subject accepts an offer, the lower is her aversion to disadvantageous inequality.

In part eight, the modified dictator game (MDG) of Blanco et al. (2011) was used to measure subjects’ aversion to advantageous inequality. In the MDG, participants are given a list with 20 pairs of payoff vectors (see instructions in the appendix). They have to choose one of the two payoff vectors for all 20 pairs. Both vectors represent a money split between the dictator and the recipient. The left vector is constant and always (19, 1). If the participants choose this vector they receive €19 and the recipients earn €1. All vectors on the right-hand side are increasing equal-money splits: from (1, 1) to (20, 20). The goal is to determine each participant’s switching point, i.e., when do they switch from (19, 1) to the equal split? The table contains 21 buttons, located above all decisions between an unequal and equal split. Subjects know that clicking on a button has the effect that all equal splits below the button are marked for selection and all unequal splits above the button are also marked for selection. For instance, if a subject would prefer all equal splits from (3, 3) to (20, 20) over the unequal split, she should click on the third

button. Whereas, if a subject only prefers all equal splits starting from (9, 9) she should click on button 9. The earlier a subject switches to the equal split, the more pronounced is her aversion to advantageous inequality.

Experimental Procedures

Subjects were informed in the instructions that the experiment consisted of eight separate parts. They also knew that they would receive a new set of instructions after each part was finished. We explicitly explained that the computer would randomly select one of the eight stages to be payoff-relevant. The experiments were programmed in z-Tree (Fischbacher, 2007) and conducted in the mLab of Mannheim University. In total, 226 subjects (116 men and 110 women) participated in 11 sessions. Our participants were from different fields of studies and were recruited with ORSEE (Greiner, 2015). The sessions lasted 90 minutes and the average payment was €13.83.

3.2 Experimental Results

In this section we present the results of our laboratory experiment. We first report statistics on subjects' betrayal aversion followed by an analysis of the relations between employees beliefs, employers bonus payments and effort. Thereafter, we focus on our main question, i.e., the impact of betrayal aversion on effort provision. We report betrayal aversion as the difference between subjects' MAP stated in part one (when the trustees decided actively) and part two (when a random draw determined trustees' actions).

Betrayal Aversion

Figure 2 presents the distribution of participants' betrayal aversion. When paired with a human deciding, participants on average state a MAP of 63.7%. It is significantly higher than their MAP (56,1%) if the action of the paired player is randomly determined by the computer (Wilcoxon signed-rank test, $p < 0.001$). The difference (7.6%) between these two MAPs can be interpreted as the average level of betrayal aversion. It corresponds to a substantial "risk premium," which is demanded by trustors for taking the social risk of trust. This average level of betrayal aversion is lower by 22% as the findings reported in Bohnet and Zeckhauser (2004). However, our findings are in line with the data of Quercia (2016) who report levels between 4%–7%. Figure 2 shows the distribution of our participants' betrayal aversion, i.e., the difference between the MAPs in the two trust games. We find in our data the majority of subjects (54.9%) show a strictly positive

betrayal aversion. Whereas, 26.6% subjects are not betrayal averse and 18.6% of our pool show a strictly negative betrayal aversion. In the remainder of the paper we focus on the behavior of the subjects with a betrayal aversion greater or equal to zero.

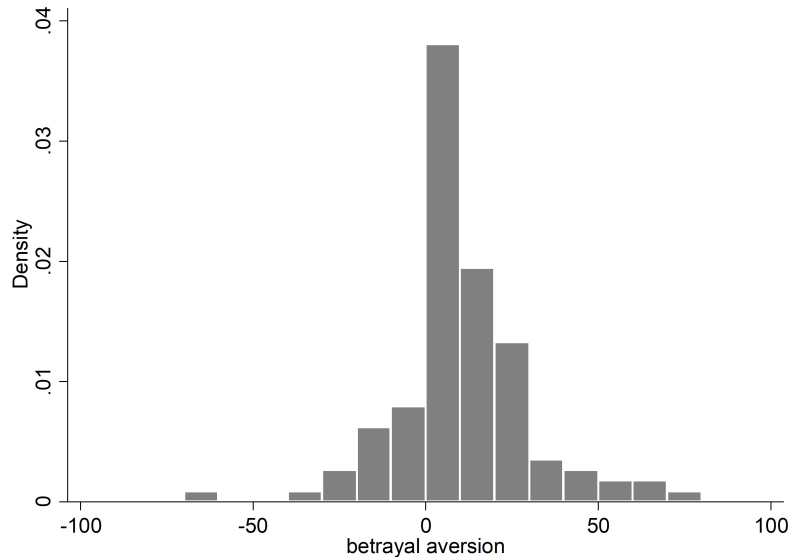


Figure 2: Distribution of betrayal aversion.

Employees' Beliefs / Relation of Performance and Bonus Payments

The central assumption in our theoretical analysis was that an employee's belief to receive the bonus is increasing in his effort. In our experiment employees had to state their belief after the completion of the task. Thus, we have only a single observation on the graph of the individual belief function. However, if individual beliefs on the relation between effort and the bonus probability are not too heterogeneous, then the pattern of effort-probability pairs of the employee population should be informative for the individual pattern. Figure 3 depicts the pairs of beliefs and the real effort performance for our population of employees. It also contains two fitted lines of a correlation between employees belief and their real-effort performance. In one case we consider the data for subjects' performing below the average performance. Whereas, in the other case we focus on subjects' with a performance above the average. We find a significant positive correlation for below average performance (Pearson's $\rho=0.335$, $p=0.007$) and a positive insignificant correlation for above average performance (Pearson's $\rho=0.066$, $p=0.733$). Finally, Figure 3 reveals not only an increasing pattern but also indicates concavity on the population level.

Next, we analyze whether bonus payments of the employers can rationalize an increasing belief of the employees. The data show a significantly higher performance among

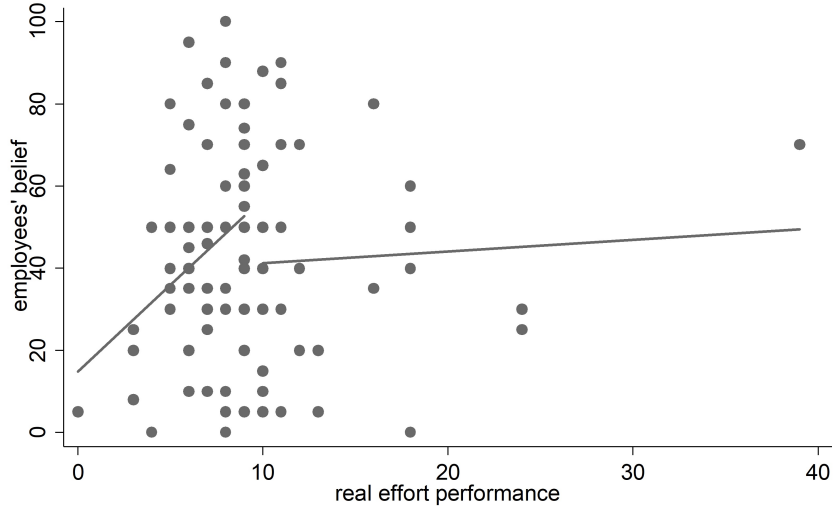


Figure 3: Employees' belief and real effort performance.

employees who received a bonus (Mann Whitney test, $p=0.022$) which is also confirmed by a probit regression on employers' bonus payment. Thus, we find evidence which indicates that employees believe that exerting more effort translates to a higher probability to receive the bonus. Moreover, such a belief is supported by employers' payment pattern of the voluntary bonus.

Betrayal Aversion and Performance

We now turn to the analysis of employees' performance in our two treatments and its relation to their level of betrayal aversion. Recall, that we hypothesized that if at all we expect only a weak effect of betrayal aversion on effort provision in the no-message treatment. This is because we believe that the mere presence of an additional payment without making any reference to the employees' performance does not constitute a promise of the employer. As a consequence, the employee cannot feel betrayed if the bonus is not paid. However, in the message treatment if an employer decides to send a message this qualifies as a promise to the employee for paying the bonus. If the principal does not keep the promise, it will not only cause a cost of guilt for the principle, but it will particularly make the employee feel betrayed.

In our experiment 62.5% of the employers sent the message. Figure 4 depicts the average performance conditional on whether an employee received a message or not. We pooled the data for subjects who did not receive a message in the *message* treatment with the data of the control treatment, since there is no difference in performance.⁵ We

⁵We find that no statistical significant difference between employees' performance who did not receive

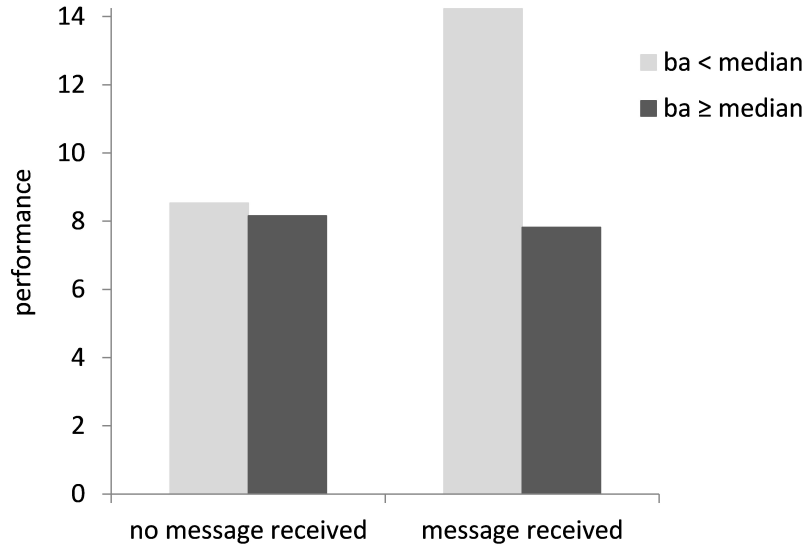


Figure 4: Subjects performance across treatments conditioned on the receipt of the message. Light gray bars correspond to subjects with a below-median level of betrayal aversion, dark gray bars correspond to subjects with an above-median level of betrayal aversion.

classified subjects in two groups of betrayal aversion below and above the median of betrayal aversion.

A conspicuous finding is the outstanding performance (14.23) of below-median subjects who received a message which is higher by more than 70% when compared to all other employees (Mann Whitney, $p=0.012$). Importantly, it is also significantly higher than the average performance of employees with above-median betrayal aversion among those who received a message (black bar in the right panel) (Mann Whitney, $p=0.044$). This finding not only highlights the economic relevance of the theoretically identified interdependence between betrayal aversion and incentives. But it also provides first evidence for our hypothesis that betrayal aversion ought to have an impact only if a promise was made by the principal. Despite the ambiguous theoretical results betrayal aversion in our data has a detrimental effect on the effectiveness of non-binding bonus contracts in providing incentives for higher performance. Indeed, the significant positive effect for below-mean subjects is completely offset such that we find no difference in performance between employees with above-median betrayal aversion and employees in the no-message treatment.

To test whether our nonparametric results are independent of the classification of a message in *message* (8.29) and the employees' performance in the control treatment (8.09) (Mann-Whitney test, $p=0.679$).

employees according to the median of employees' betrayal aversion we additionally run OLS regression on subjects' real effort performance represented in Table 2. Model (1) contains only subjects' betrayal aversion (*ba*) as an regressor. Model (2) separates the effect of betrayal aversion on effort across treatments by inclusion of the interaction of betrayal aversion with *control*, a dummy which equals one for the no-message treatment. Model (3) tests our hypothesis by accounting for the creation of a trust-relation through an employer's promise that a bonus is paid, if a sufficiently high level of effort is exerted. We thus additionally include the interaction of betrayal aversion with *message*, a dummy which equals one, if a message was received by the employee. Finally, models (4)–(6) are similar to models (1)–(3), but they additionally include several control variables. This set of controls contains two dummies, one controlling for subjects' gender, one indicating whether subjects' are students of economics or business administration; subjects' age; a measure of their risk tolerance; and two measures of their aversion to inequality, one for favorable inequality aversion, one for unfavorable inequality aversion.

	real effort performance					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>ba</i>	-0.052*	-0.126**	0.013	-0.070**	-0.129*	0.034
	(0.028)	(0.062)	(0.070)	(0.035)	(0.066)	(0.064)
<i>control</i>		-3.295*	0.565		-2.467	1.878
		(1.746)	(1.312)		(2.020)	(1.712)
<i>ba</i> \times <i>control</i>		0.118*	-0.022		0.099	-0.066
		(0.066)	(0.074)		(0.070)	(0.072)
<i>message</i>			5.544**			6.220**
			(2.464)			(2.386)
<i>ba</i> \times <i>message</i>			-0.207**			-0.242***
			(0.104)			(0.091)
<i>controls</i>				y	y	y
<i>constant</i>	9.791***	11.782***	7.922***	5.308**	7.036***	2.577
	(0.782)	(1.626)	(1.142)	(2.459)	(2.578)	(3.078)
observations	92	92	92	86	86	86
R^2	0.027	0.086	0.145	0.115	0.146	0.223
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Table 2: OLS regressions on employees' real effort performance.

Models (1) and (4) indicate a general negative relation between subjects' betrayal aversion and their real effort performance. Models (2) and (5) highlight that this is

driven by the data of the message treatment. Most importantly, model (3) and (6) reveal that the effect in the message treatment stems from the negative interaction effect between betrayal aversion and a promise of a bonus by the employee. Regression (3) and (6) also show a significant positive effect of message on the employees' motivation to exert effort. The inclusion of our set of controls generally increases the magnitude and the significance of our results. With two exceptions, none of the controls are significant. First, results from model (4) and (6) indicate that older subjects perform better in the real effort task. Second, in model (3) subject's aversion to unfavorable inequality shows a significant negative effect on subjects' performance.

Taken together, the promise to pay a bonus in exchange for high effort increases employees' work performance, but this positive incentive is vulnerable to subjects' degree of betrayal aversion. As a consequence, the effectiveness of a non-binding bonus contract is undermined by employees' aversion to betrayal. According to the OLS estimates the positive effect of a promised bonus for a non-betrayal averse subject is reduced by more than one half for an employee with average betrayal aversion.⁶

4 Conclusion

In this paper we study the consequences of a preference to avoid being betrayed when trusting another person for the effectiveness of non-binding incentive contracts. There is no doubt that work relations between employers and employees do depend on mutual trust. This is particularly the case if the employer has some discretion about the employee's monetary compensation. Consequently, betrayal aversion might underpin or undermine the effectiveness of the incentives to induce a higher performance. In our analysis we focus on a widely used payment scheme of a not fully binding bonus contract. We show theoretically that an employee who believes that higher effort increases the likelihood of the bonus payment is facing a trade off. On the one hand he can insure himself against the betrayal of his trust by exerting more effort and thereby increasing the probability of the bonus payment. On the other hand higher effort will evoke more negative emotions, if the bonus is not paid and consequently increases the level of betrayal at stake. Despite this theoretical ambiguity, in our laboratory experiment we find a strong detrimental effect of employees' betrayal aversion on workers' performance, when it was promised to them that they would receive a bonus in exchange for making an effort.

⁶The average level of betrayal aversion for participants with positive betrayal aversion is 13.37 and $-0.242 \cdot 13.37 = 3.24$ which accounts for 52% of the effect size of *message*.

Our findings contribute to the understanding of the determinants of trust which is indispensable for cooperation in real-life relations despite the existence of formal contracts and because of their inevitable incompleteness. We extend the scope for betrayal aversion as an important behavioral determinant of trust beyond the narrow perspective of past research to the domain of trust-related relations in the labor market. We add to the literature on the interaction between economic incentives and social preferences by demonstrating the potential interdependency between incentives for effort provision and betrayal aversion. The identified interdependency put the equivalence of certain payment schemes with respect to the induced incentives into question. If, for example, contracts differ in their reliance on trust, betrayal aversion may have a nonnegligible leverage on the relative effectiveness of those contracts. The substantial detrimental effect of betrayal aversion on the effectiveness of incentives, observed in our experimental data highlight a potential additional hidden cost of incentives. Work incentives may not only be limited by the crowding out of intrinsic motivation or by inducing asocial behavior among peers, but also they may be limited by the negative emotions evoked among humans by the betrayal of their trust.

Recent experimental literature on trust has taken an institutional perspective and started to explore mechanisms to contain the cost or harness the benefits from betrayal aversion (Aimone and Houser, 2012; Aimone and Houser, 2013). Their data on a laboratory investment game indicates that participants prefer to trade in environments where it is difficult to know that their trust was betrayed. The authors deduce the importance of impersonal, institution-mediated exchange for economic efficiency. Applied to our labor market setting, this could point towards incentive schemes which minimize principals' discretion regarding monetary rewards. However, if the discretion is of strategic importance and thereby enables cooperation in the first place, then the restriction to impersonal arrangements could backfire. As an important and interesting line of future research, we suggest the extension of this institutional perspective to other important economic areas characterized by a high degree of required mutual trust. Examples may be areas such as R&D cooperation, and relations between, for example, employers and employees, lawyers and clients, lenders and borrowers.

Acknowledgments

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Appendix

Translated from German (on-screen) instructions not intended for publication

Instructions

Welcome to this experiment. The experiment consists of **8 parts**. In each of these parts you can earn money. At the of the experiment the computer will **randomly** determine **one of the 8 parts** which will be payoff relevant. Before each part starts you will be given a new set of instructions on the computer screen. Here, you will be given information on the procedures of this part. You will get **5 Euros** for your participation in this experiment. You will receive any additional profits of the experiment, after the experiment was finished. You receive these payments in cash. All decisions of this experiment will be chosen anonymously. This will hold true in the course of the experiment and after it was finished. Now, please stop talking and switch off your cell phone.

Instructions: Part 1

[Instructions which were shown to subjects in the role of "**Person S**"]

In the first part you can earn Talers. At the end of the experiment the Talers will be converted to Euros. The following exchange rate applies:

$$1.5 \text{ Talers} = 1\text{€}$$

How this part will be conducted:

In this part we will call all participants who are in the same role as you: "**Person S**." Half of the participants in this experiment are in the role of **Person S**. The other half is in the role of **Person Y**. All participants will act in the same role in the whole experiment (and in all parts). In what follows, the computer will randomly match you with another participant in the role of Person Y. You will never be informed on the identity of this person.

What will happen in this part?

In this part you will be confronted with two alternatives (**A** und **B**).

- **A** guarantees that you will get a save payoff. In this case **Person Y** will not have to decide.
- **B** leads to an outcome which will depend on the behavior of **Person Y**. In this respect, **Person Y** will choose between options **1** and **2**.

On the next screen you will be given more information about the alternatives A and B.

Payoff table

Your choice	nature of the choice	your payoff	Person Y's payoff
A	certainty	10	10
B	Person Y 1	15	15
	2	8	22

The payoff table reads as follows:

- If you choose A, then you and Person Y will each receive 10 Talers.
- If you choose B and Person Y chooses 1, then you and Person Y will each receive 15 Talers.
- If you choose B and Person Y chooses 2, then you will receive 8 Talers and Person Y will receive 22 Talers.

In what follows, we will present you the key question which you have to answer in part 1. After you finished reading the instructions you will have to answer it.

KEY QUESTION: What is the minimum probability in percent (p) that you face a Person Y who chooses option 1, such that you would choose alternative B instead of alternative A (this probability must lie between 0 and 100 percent).

YOUR ANSWER: I choose B, if the probability is at least _____ percent (p).

Remark: You do not know the actual value of p . Your choice does not influence the value of p . The value will be determined by the share of Person Y who choose option 1. With YOUR ANSWER you state how large the share of Person Ys must be such that you would choose B instead of A.

[Instructions which were shown to subjects in the role of "Person Y"]

In the first part you can earn Talers. At the end of the experiment the Talers will be converted to Euros. The following exchange rate applies:

$$1.5 \text{ Talers} = 1\text{€}$$

How this part will be conducted:

In this part we will call all participants who are in the same role as you: "**Person Y.**" Half of the participants in this experiment are in the role of **Person Y.** The other half is in the role of **Person S.** All participants will act in the same role in the whole experiment (and in all parts). In what follows, the computer will randomly match you with another participant in the role of Person S. You will never be informed on the identity of this person.

What will happen in this part?

Person S will be confronted with two alternatives (**A** und **B**).

- **A** guarantees that you and **Person S** will get a save payoff. You will not have to decide.
- If the decision of **Person S** will lead to alternative **B**, then you will have to choose between options **1** and **2**.

On the next screen you will be given more information about the alternatives A and B.

Payoff table

Outcome of Person S's choice	nature of the choice	your payoff	Person S's payoff
A	certainty	10	10
B	Person Y		
	1	15	15
B	2	8	22

The payoff table reads as follows:

- If Person S chooses A, then you and Person S will each receive 10 Talers.
- If Person S chooses B and you choose 1, then you and Person S will each receive 15 Talers.
- If Person S chooses B and you choose 2, then you will receive 22 Talers and Person S will receive 8 Talers.

In what follows, we will present you the key question which you have to answer in part 1. After you finished reading the instructions you will have to answer it.

KEY QUESTION: Which option will you choose, in case of B?

YOUR ANSWER: I choose_____

[Instructions which were shown to subjects in the role of "**Person S**"]

Conduction of the part:

1. While you are answering the key question, all subjects in the role of Person Y have to answer the following questions: "Which option would you play in the case of B?"
2. After you and your matched participant have decided, the computer will calculate the percentage p^* of the Persons Y, who have chosen option 1. We will inform all participants on the level of p^* . p^* equals the probability that you will be matched with a Person Y who chooses option 1.
3. If p^* is at least as high the value (p) which was state by you (this follows from the answer in the KEYQUESTION), then alternative B will be chosen for you. In this case this means that your profits will be

determined by Person Y's choice.

- a. If your matched Person Y: has chosen 1, then you will both receive 15 Talers.
- b. If your matched Person Y: has chosen 2, then you will receive 8 Talers and Person Y will receive 22 Talers.

4. **If p^* is smaller than the value (p) which was stated by you (this follows from the answer in the KEYQUESTION), then alternative A will be chosen for you. In this case this means that you and the matched Person Y will receive 10 Talers with certainty.**

Before we start with this part, you will have to answer some control questions which are displayed on the screen. This part will be conducted as soon as all participants have correctly answered the control questions.

[Instructions which were shown to subjects in the role of "**Person S**"]

Instructions: Part 2

[Instructions which were shown to subjects in the role of "**Person S**"]

In the second part you can earn Talers. At the end of the experiment the Talers will be converted to Euros. The following exchange rate applies:

$$1.5 \text{ Talers} = 1\text{€}$$

How this part will be conducted:

In this part we will call all participants who are in the same role as you: "**Person S.**" Half of the participants in this experiment are in the role of **Person S**. The other half is in the role of **Person Y**. All participants will act in the same role in the whole experiment (and in all parts). In what follows, the computer will randomly match you with another participant in the role of Person Y. You will never be informed on the identity of this person.

What will happen in this part:

In this part you will be confronted with two alternatives (**A** und **B**).

- **A** guarantees that you will get a save payoff. In this case **Person Y** will not have to decide.
- **B** leads to an outcome which will depend on a lottery. The lottery can lead to options **1** and **2**.

On the next screen you will be given more information about the alternatives A and B.

Payoff table

Your choice	nature of the choice	your payoff	Person Y's payoff
A	certainty	10	10
B	Lottery leads to 1	15	15
	2	8	22

The payoff table reads as follows:

- If you choose A, then you and Person Y will each receive 10 Talers.
- If you choose B and the lottery ends in 1, then you and Person Y will each receive 15 Talers.
- If you choose B and the lottery ends in 2, then you will receive 8 Talers and Person Y will receive 22 Talers.

In what follows, we will present you the key question which you have to answer in part 1. After you finished reading the instructions you will have to answer it.

KEY QUESTION: What is the minimum probability in percent (p) that the lottery leads to option 1, such that you would choose alternative B instead of alternative A (this probability must lie between 0 and 100 percent).

YOUR ANSWER: I choose B, if the probability is at least _____ percent (p).

Remark: You do not know the actual value of p. Your choice does not influence the value of p. The value was determined before the experiment started. The information on this value is contained in a sealed enveloped. With YOUR ANSWER you state how large p must be such that you would choose B instead of A.

Instructions: Part 2

[Instructions which were shown to subjects in the role of “Person Y”]

In the second part you can earn Talers. At the end of the experiment the Talers will be converted to Euros. The following exchange rate applies:

$$1.5 \text{ Talers} = 1\text{€}$$

How this part will be conducted:

In this part we will call all participants who are in the same role as you: “Person Y.” Half of the participants in this experiment are in the role of **Person Y**. The other half is in the role of **Person S**. All participants will act in the same role in the whole experiment (and in all parts). In what follows, the computer will randomly match you with another participant in the role of Person S. You will never be informed on the identity of this person.

What will happen in this part?

In this part you will be confronted with two alternatives (**A** und **B**).

- In this part your matched Person S makes a decision. If Person S chooses alternative A, then you and the other person will get a save payoff.
- If Person S chooses alternative B, then the outcome which will depend on a lottery. The lottery can lead to options **1** and **2**.

On the next screen you will be given more information about the alternatives A and B.

Payoff table

Outcome of Person S's choice	nature of the choice	your payoff	Person S's payoff
A	certainty	10	10
B	Lottery leads to 1	15	15
	2	8	22

The payoff table reads as follows:

- If Person S chooses A, then you and Person S will each receive 10 Talers.
- If Person S chooses B and the lottery leads to 1, then you and Person S will each receive 15 Talers.
- If Person S chooses B and the lottery leads to 2, then you will receive 22 Talers and Person S will receive 8 Talers.

Remark: You do not know the actual value of p . Your choice does not influence the value of p . The value was determined before the experiment started. The information on this value is contained in a sealed enveloped.

In this part you will not make any decision. Instead you have to wait until Person S has made their decision.

[Instructions which were shown to subjects in the role of "**Person S**"]

Conduction of the part:

1. While you are answering the key question, we will put the envelope on the whiteboard.
2. After you have made your decision, we will open the sealed envelope and inform you on the level of p^* . This will be the probability p^* such that option 1 will be received.
3. If p^* is at least as high the value (p) which was state by you (this follows from the answer in the **KEYQUESTION**), then alternative **B** will be chosen for you. In this case this means that your profits will be determined by the lottery.

We will then generate the lottery and conduct it. In doing so we will put green and blue lottery lots in a box. The number of green lots will correspond to p^* . The remaining lots will be blue lots. In a next step, we will randomly draw a lot out of this box.

a. If the drawn lot is of green color, then you and your matched Person Y will both receive 15 Talers.

b. If the drawn lot is of blue color, then you will receive 8 Talers and your matched Person Y will receive 22 Talers.

We will enter the outcome in a randomly drawn computer terminal. This is needed that the computer program knows the result.

4. **If p^* is smaller than the value (p) which was stated by you (this follows from the answer in the KEYQUESTION), then alternative A will be chosen for you. In this case this means that you and the matched Person Y will receive 10 Talers with certainty.**

Before we start with this part, you will have to answer some control questions which are displayed on the screen. This part will be conducted as soon as all participants have correctly answered the control questions.

[Instructions which were shown to subjects in the role of “Person Y”]

Conduction of the part:

1. While you are waiting, every participant in the role of **Person S** has to answer the following question:
“Which option would you choose in case of B?”
2. After all Persons S have decided, we will open the sealed envelope and inform you on the level of p . We relabel p^* to p .
3. **If p^* is at least as high the value (p) which was state by Person S, then you and Person S will participate in the lottery.** We will then generate the lottery and conduct it. In doing so we will put green and blue lottery lots in a box. The number of green lots will correspond to p^* . The remaining lots will be blue lots. In a next step, we will randomly draw a lot out of this box.
 - a. If the drawn lot is of green color, then you and your matched Person Y will both receive 15 Talers.
 - b. If the drawn lot is of blue color, then you will receive 22 Talers and your matched Person Y will receive 8 Talers.We will enter the outcome in a randomly drawn computer terminal. This is needed that the computer program knows the result.
4. **If p^* is smaller than the value (p) which was stated by Person S, then alternative A will be chosen for you. In this case this means that you and the matched Person S will receive 10 Talers with certainty.**

Before we start with this part, you will have to answer some control questions which are displayed on the screen. This part will be conducted as soon as all participants have correctly answered the control questions.

Instructions: Part 5

In this part the computer allocates an employee (Person S) to each employer (Person Y). The employees are given the opportunity to participate in a work task for **5 minutes**.

Work task: way of functioning

- The work task will be conducted on the computer. Here, you have to sum up **five** randomly chosen **two-digit numbers**.
- In total, you are given **five minutes** for the task.
- You are not allowed to use a pocket calculator.
- You will be given scratch paper and a pen, which can be used to make your calculations.
- You directly enter your answers with the keyboard in the box: "sum." Afterwards you click the "OK" button.

Here, you can see an example, how a possible problem is displayed on the computer screen.



38 + 80 + 13 + 77 + 79 =

OK

- The employees are given **5€** for participation in the work task.
- The profit of the employer depends on the performance of the employees. The employer receives **0.75€** for each problem which is correctly solved by the employee.

[Instructions: Message Treatment]

0. Before the employee starts to work, the employer has the possibility to inform the employee that she will be given a **bonus of 5€**, if she makes an effort. Alternatively, the employer can decide to send no message.
1. The employee will work for 5 minutes in the task. In the meanwhile the employer has to wait.
2. After the work task was finished, the employer is **informed** on the **performance** of the employee and the resulting profits.
3. Now, the employer has to decide whether she makes a **bonus payment of 5€** to the employee.
4. The employee is informed about whether the employer has made a bonus payment (of 5€) to her. She will also be informed whether the employer has sent a message in advance. Thus, she can examine whether the employer has behaved in line with her announcement.

Overview of payoffs:

Employee: 5€ (for participation in the work task) + *possible* bonus payment (of 5€)

Employers: $0.75\text{€} \times \text{number of correctly solved problems by the employee}$ + (endowment of 5€ - *possible* bonus payment of 5€).

[exact wording of the message]

[when deciding in the message treatment, employers were shown the following question:]

Please decide whether you want to send your employee the following message:

“if you make an effort, you will receive a bonus of 5€.”

[Instructions: Control Treatment]

1. The employee will work for 5 minutes in the task. In the meanwhile the employer has to wait.
2. After the work task was finished, the employer is **informed** on the **performance** of the employee and the resulting profits.
3. Now, the employer has to decide whether she makes a **bonus payment** of **5€** to the employee.
4. The employee is informed about whether the employer has made a bonus payment (of 5€) to her.

Overview of payoffs:

Employee: 5€ (for participation in the work task) + *possible* bonus payment (of 5€)

Employers: $0.75\text{€} \times \text{number of correctly solved problems by the employee}$ + (endowment of 5€ - *possible* bonus payment of 5€).

Part 6

Decision to reach:

You will have to choose **one** out of nine lotteries. Your profits in part 6 depend on the occurrence of state A and state B. In each row, states A and B materialize with **different probabilities**.

The lotteries differ in the following way: the probability of occurrence of state A decreases for increasing lotteries. Whereas, the probability of occurrence of state B increases.

Moreover, the possible payoff of state A increases for higher lotteries, whereas state B always yields a payoff of €0.10.

Procedure:

First, choose a lottery. Afterwards, the computer will conduct another random which determines the payoff of the chosen lottery in line with the underlying probabilities. The following nine lotteries can be chosen:

State A		State B	
Payoff	Probability of Occurrence	Payoff	Probability of Occurrence
5.00€	100%	0.10€	0%
8.05€	90%	0.10€	10%
10.25€	80%	0.10€	20%
12.46€	70%	0.10€	30%
15.15€	60%	0.10€	40%
18.80€	50%	0.10€	50%
24.08€	40%	0.10€	60%
32.07€	30%	0.10€	70%
40.88€	20%	0.10€	80%

In case that this part will be payoff relevant, you will be informed on the materialized state of the lottery. At the end of the experiment.

Part 7

In part 7 the computer randomly matches you with a participant of this room. In this part you and your matched participant decide simultaneously. The identities of both participants will not be revealed at any time (also not after the experiment).

Here, you will find the following situation:

Person A has to select one out of 19 possible money splits (in Euro) between person A and B. Person B knows that person A has to reach this decision. Person B can either accept or reject the proposal made by person A.

- The proposal will be implemented if person B accepts the proposal made by person A.
- Both persons will receive 1 Euro, if person B rejects the proposal.

The roles of person A and B will randomly determined by the computer.

Please carefully read the subsequent paragraphs, **before you reach your decision.**

The computer will randomly match you with one person of this room, **if this part will become payoff relevant.**

Furthermore, the computer will randomly determine which participants will act as person A and person B. This role allocation will not revealed at any time (also not after the experiment). You will reach your decisions in the roles of person A and B.

- Initially, you have to make a proposal in the role of person A. The proposal has to be an integer between 1 and 19 Euros.
- In a next step, you have to decide in the role of person B. Here, you have to decide for each of the possible 19 proposals whether you would accept or reject it.

Therefore you will presented 20 buttons. Clicking on one of the buttons, determines the minimum proposal of person A you would be willing to accept. After you clicked one of the buttons, the proposals become marked in different colors. All proposals you would be willing to accept will be marked in green. Whereas, all proposals you would be willing to reject will be marked in blue.

The first button will mark all proposals with “acceptance.” Whereas, the last button will mark all buttons with “rejection.” All buttons in between will mark all proposals (starting from the next row) with “acceptance.”

The screenshot on the next page illustrates the choice set.

Please decide in the role of **Person B**, starting from which row would be willing to accept

Acceptance: Payoff Person A/B

Rejection: Payoff Person A/B

Entscheiden Sie nun in der Rolle von **Person B** ab welcher Zeile Sie annehmen würden

Acceptance

ANNAHME: Auszahlung Person A/B

always accept

ABLEHNUNG: Auszahlung Person A/B

ANNAHME Person A: 19 / Person B: 1	(Immer ANNEHMEN)	ABLEHNUNG Person A: 19 / Person B: 1 Beide Personen erhalten 1
[ANNAHME Person A: 18 / Person B: 2]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 18 / Person B: 2] Beide Personen erhalten 1
[ANNAHME Person A: 17 / Person B: 3]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 17 / Person B: 3] Beide Personen erhalten 1
[ANNAHME Person A: 16 / Person B: 4]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 16 / Person B: 4] Beide Personen erhalten 1
[ANNAHME Person A: 15 / Person B: 5]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 15 / Person B: 5] Beide Personen erhalten 1
[ANNAHME Person A: 14 / Person B: 6]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 14 / Person B: 6] Beide Personen erhalten 1
[ANNAHME Person A: 13 / Person B: 7]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 13 / Person B: 7] Beide Personen erhalten 1
[ANNAHME Person A: 12 / Person B: 8]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 12 / Person B: 8] Beide Personen erhalten 1
[ANNAHME Person A: 11 / Person B: 9]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 11 / Person B: 9] Beide Personen erhalten 1
[ANNAHME Person A: 10 / Person B: 10]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 10 / Person B: 10] Beide Personen erhalten 1
[ANNAHME Person A: 9 / Person B: 11]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 9 / Person B: 11] Beide Personen erhalten 1
[ANNAHME Person A: 8 / Person B: 12]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 8 / Person B: 12] Beide Personen erhalten 1
[ANNAHME Person A: 7 / Person B: 13]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 7 / Person B: 13] Beide Personen erhalten 1
[ANNAHME Person A: 6 / Person B: 14]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 6 / Person B: 14] Beide Personen erhalten 1
[ANNAHME Person A: 5 / Person B: 15]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 5 / Person B: 15] Beide Personen erhalten 1
[ANNAHME Person A: 4 / Person B: 16]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 4 / Person B: 16] Beide Personen erhalten 1
[ANNAHME Person A: 3 / Person B: 17]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 3 / Person B: 17] Beide Personen erhalten 1
[ANNAHME Person A: 2 / Person B: 18]	(ANNAHME ab der nächsten Zeile)	[ABLEHNUNG Person A: 2 / Person B: 18] Beide Personen erhalten 1
[ANNAHME Person A: 1 / Person B: 19]	(Nie ANNEHMEN)	[ABLEHNUNG Person A: 1 / Person B: 19] Beide Personen erhalten 1

Accept, starting from the next row

never accept

rejection

Ok

Both p
receiv

Press “ok”, after you indicated starting from which row would be willing to accept person B’s proposals. In this case your decision will be binding.

In the end, **if** you were selected for the role of person A, you will get the **payoff**, which you have selected for yourself. This is true, if person B accepts your proposal. **If person B rejects** your proposal, you and person B will both receive 1 Euro.

In the end, **if** you were selected for the role of person B, you will get the **payoff** which corresponds to the proposal made by **person A**. **If** this proposal will be rejected (due to your decisions), you and person A will both receive 1 Euro.

In case that this part will be payoff relevant, you will be informed at the end of the experiment on your role, the relevant selection and the corresponding payoff in this part.

Part 8

In part 8 the computer randomly matches you with a participant of this room. In this part you and your matched participant decide simultaneously. The identities of both participants will not be revealed at any time (also not after the experiment).

Here, you will find the following situation:

Person A has to decide between two money splits between her and player B. This decision has to be made for 20 cases. Person B knows that person A has to make these decisions. Moreover, person B knows that she cannot make any decisions and has to accept the decision of person A.

The computer will randomly determine the players' roles after the end of the experiment.

Please carefully read the subsequent paragraphs **before you reach your decisions**.

The decision problems will be listed in a table. Each of the decision problems will look the following way:

LEFT: Payoff Person A/B	RIGHT: Payoff Person A/B
[CHOICE Person A: 19 / Person B: 1]	[CHOICE Person A: 5 / Person B: 5]

Here, you will make your decisions in the role of person A. In the decision problem presented above, choosing "LEFT" means that you keep 19 Euros for your own. The consequence is that person B would receive 1 Euro. At the same time, choosing "RIGHT" means that you and person B each get 5 Euros.

You have to decide about choosing "LEFT" or "RIGHT" in each of the 20 rows. Therefore you will be presented 21 buttons. You can define the money split when you would start to choose „RIGHT.“ Therefore you click on the button above the corresponding row. All money splits will be marked by a color, after you clicked a button. All money splits where you prefer to choose „LEFT“ will be marked with green. Whereas, all money splits where you prefer to choose „RIGHT“ will be marked with blue.

The first button will mark all money splits with "RIGHT." Whereas, the last button will mark all buttons with "LEFT." All buttons in between will mark all money splits (starting from the next row) with "RIGHT."

The screenshot on the next page illustrates the choice set.

Please decide in the role of **Person A** when you would start to choose the split “RIGHT”

LEFT: Payoff Person A/B Entscheiden Sie nun in der Rolle von **Person A**, ab wann Sie die Aufteilung RECHTS wählen RIGHT: Payoff Person A/B

LINKS: Auszahlung Person A/B	(Immer RECHTS)	RECHTS: Auszahlung Person A/B
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 1 / Person B: 1]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 2 / Person B: 2]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 3 / Person B: 3]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 4 / Person B: 4]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 5 / Person B: 5]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 6 / Person B: 6]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 7 / Person B: 7]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 8 / Person B: 8]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 9 / Person B: 9]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 10 / Person B: 10]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 11 / Person B: 11]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 12 / Person B: 12]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 13 / Person B: 13]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 14 / Person B: 14]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 15 / Person B: 15]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 16 / Person B: 16]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 17 / Person B: 17]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 18 / Person B: 18]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 19 / Person B: 19]
[WAHL Person A: 19 / Person B: 1]	IRECHTS ab der nächsten Zeile	[WAHL Person A: 20 / Person B: 20]
	(Immer LINKS)	

always “right”

Right, starting from the next row

always “left”

OK

At the end of the experiment the computer will randomly draw one of the 20 rows. The marked selection in this row will determine your payoff in Euros.

Furthermore, the computer will randomly match you with another participant of the room. Moreover, will randomly determine the roles of person A and B to the participants. The matching of the participant and their roles will remain anonymous. Please note that, you reach all your decisions in the role of person A. However, it may be that the computer will allocate the role of person B to you.

If you will be selected as person A, then you will earn the **amount in Euros, you selected as person A** in the corresponding relevant situation. Furthermore the other person will earn the amount in Euros , you selected for person B.

If you will be selected as Person B, then you will earn the **amount in Euros, which was selected by your matched person B** in the relevant situation.

In case that this part will be payoff relevant, you will be informed at the end of the experiment on your role, the relevant selection and the corresponding payoff in this part.

Control questions (Part 1)

[Instructions which were shown to subjects in the role of "Person S"]

Question 1:

Assume that you have stated that the probability (p) to be matched with a Player Y who chooses option 1, has to be at least 60% (key question). Furthermore, assume that you will be informed that 70% of the Players Y have chosen option 1.

Does your payoff depend on the decision which was chosen by your randomly matched Player Y?

Question 2:

Assume that you have stated that the probability (p) to be matched with a Player Y who chooses option 1, has to be at least 60% (key question). Furthermore, assume that you will be informed that 70% of the Players Y have chosen option 1.

What is the probability that your randomly matched Player Y has chosen option 1?

Question 3:

Assume that your randomly matched Player Y has chosen option 1.

What is your profit?

Question 4:

Assume that your randomly matched Player Y has chosen option 1.

What is the profit of Player Y?

Question 5:

Assume that your randomly matched Player Y has chosen option 2.

What is your profit?

Question 6:

Assume that your randomly matched Player Y has chosen option 2.

What is the profit of Player Y?

Question 7:

Assume that you have stated that the probability (p) to be matched with a Player Y who chooses option 1, has to be at

least 30% (key question). Furthermore, assume that you will be informed that 20% of the Players Y have chosen option 1.

Does your payoff depend on the decision which was chosen by your randomly matched Player Y?

Question 8:

Assume that your randomly matched Player Y has chosen option 1.

What is your profit?

Question 9:

Assume that your randomly matched Player Y has chosen option 1.

What is the profit of Player Y?

Question 10:

Assume that your randomly matched Player Y has chosen option 1.

What is your profit?

Question 11:

Assume that your randomly matched Player Y has chosen option 1.

What is the profit of Player Y?

Control questions (Part 2)

[Instructions which were shown to subjects in the role of “**Person S**”]

Question 1:

Assume that you have stated that the probability (p) for which the lottery ends with option 1, has to be at least 60% (key question). Furthermore, assume that you will be informed that the probability (p^*) which was pre-determined before the experiment is 70%.

Will you participate in the lottery?

Question 2:

Assume that you have stated that the probability (p) to be matched with a Player Y who chooses option 1, has to be at least 60% (key question). Furthermore, assume that you will be informed that 70% of the Players Y have chosen option 1.

What is the probability that a green lot will be drawn?

Question 3:

Assume that you have stated that the probability (p) to be matched with a Player Y who chooses option 1, has to be at least 60% (key question). Furthermore, assume that you will be informed that 70% of the Players Y have chosen option 1.

What is your profit, if a green lot will be drawn?

Question 4:

Assume that you have stated that the probability (p) to be matched with a Player Y who chooses option 1, has to be at least 60% (key question). Furthermore, assume that you will be informed that 70% of the Players Y have chosen option 1.

What is the profit of your matched Person Y, if a green lot will be drawn?

Question 5:

Assume that you have stated that the probability (p) to be matched with a Player Y who chooses option 1, has to be at least 60% (key question). Furthermore, assume that you will be informed that 70% of the Players Y have chosen option 1.

What is your profit, if a blue lot will be drawn?

Question 6:

Assume that you have stated that the probability (p) to be matched with a Player Y who chooses option 1, has to be at least 60% (key question). Furthermore, assume that you will be informed that 70% of the Players Y have chosen option 1.

What is the profit of your matched Person Y, if a blue lot will be drawn?

Question 7:

Assume that you have stated that the probability (p) for which the lottery ends with option 1, has to be at least 30% (key question). Furthermore, assume that you will be informed that the probability (p^*) which was pre-determined before the experiment is 30%.

Will you participate in the lottery?

Question 8:

Assume that you have stated that the probability (p) for which the lottery ends with option 1, has to be at least 30% (key

question). Furthermore, assume that you will be informed that the probability (p^*) which was pre-determined before the experiment is 30%.

What is the probability that a green lot will be drawn?

Question 9:

Assume that you have stated that the probability (p) for which the lottery ends with option 1, has to be at least 30% (key question). Furthermore, assume that you will be informed that the probability (p^*) which was pre-determined before the experiment is 30%.

What is your profit, if a green lot will be drawn?

Question 10:

Assume that you have stated that the probability (p) for which the lottery ends with option 1, has to be at least 30% (key question). Furthermore, assume that you will be informed that the probability (p^*) which was pre-determined before the experiment is 30%.

What is the profit of your matched Person Y, if a green lot will be drawn?

Question 11:

Assume that you have stated that the probability (p) for which the lottery ends with option 1, has to be at least 30% (key question). Furthermore, assume that you will be informed that the probability (p^*) which was pre-determined before the experiment is 30%.

What is your profit, if a blue lot will be drawn?

Question 11:

Assume that you have stated that the probability (p) for which the lottery ends with option 1, has to be at least 30% (key question). Furthermore, assume that you will be informed that the probability (p^*) which was pre-determined before the experiment is 30%.

What is the profit of your matched Person Y, if a green lot will be drawn?