Financial Support, Moral Hazard, and Other-regarding Preferences

Stefan Neuß, Richard Peter, Christian Knoller*

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Abstract

In this paper, we provide evidence of moral hazard in an incentivized laboratory experiment. Furthermore, we hypothesize that the strength of this moral hazard effect is attenuated by the intensity of other-regarding preferences. We test this prediction in a treatment with the very same financial incentives, which we implement, however, with the help of financial support provided voluntarily by another individual. In this case, moral hazard can no longer be detected and differences in how individuals adjust effort to the intensity of financial incentives are significant between both treatments. We quantify these differences and discuss their implications.

* Stefan Neuß (neuss@bwl.lmu.de) is with the Munich Risk and Insurance Center, Ludwig-Maximilians-Universität München. Richard Peter (richard-peter@uiowa.edu) is with the University of Iowa. Christian Knoller (knoller@bwl.lmu.de) is a member of the Munich Risk and Insurance Center, Ludwig-Maximilians-Universität München.

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1. Introduction

Moral hazard is one of the key forms of information asymmetry and has received a lot of attention in economics (e.g., Pauly, 1968; Smith & Goodwin, 1996; Dionne et al., 2013). Moral hazard arises when one party can take hidden actions that affect (contractual) outcomes relevant to other parties (Mas-Colell et al., 1995). The term originates in the insurance literature where it refers to the impact of insurance in distorting incentives (Winter, 2013). Ex ante, individuals facing the risk of loss can generally take actions to reduce the risk. They can invest in prevention to reduce the probability of loss or in loss reduction to reduce the severity of loss (Ehrlich & Becker, 1972). With insurance, however, a portion of the loss is covered by the insurer so that the benefits of risk reduction are no longer completely internal to the individual resulting in reduced precautions (Shavell, 1979; Holmstrom, 1979). Ex post, once a loss has occurred, insurance coverage increases the consumption of goods or services covered under the policy (Pauly, 1968; Zeckhauser, 1970; Ma & Riordan, 2002). There is ample empirical evidence of the former in property-liability insurance, such as automobile insurance or crop insurance (e.g., Dionne et al., 2013; Smith & Goodwin, 1996), while some evidence of the latter has been reported in health insurance (Zweifel & Manning, 2000).

Moral hazard also arises in situations where individuals receive financial support in case of a loss ("free" insurance coverage). Examples of financial support are governmental disaster relief programs and private donations after the occurrence of a natural catastrophe[1] (e.g., Barnett, 1999; Brown & Minty, 2006; Zagefka et al., 2011), the financial support provided by a partner or other family member to people who lose their job (e.g., Fafchamps & Lund, 2003; Skoufias & Parker, 2006), or charity given to people who fall on hard times (e.g., List, 2011). As with insurance, anticipation of financial support will generally result in reduced precautions. Raschky et al. (2013) find that governmental relief programs crowd out the demand for private insurance. In a laboratory experiment, Bixter and Luhmann (2014) document moral hazard in the form of increased risk taking of their participants as soon as other experimental subjects had to participate in potential losses. In the vast majority of cases, moral hazard results in inefficiency because first-best outcomes are no longer obtained.

[1] For example, the governmental assistance to individuals and households after Hurricane Katrina sums up to $13.37 billion in total (FEMA, March 2016). According to the Atlas of Giving, total charitable giving in the U.S. sums up to $456.73 billion in 2014. Thereof, $339.24 billion were provided by individuals (Atlas of Giving, 2014).

This paper provides evidence of moral hazard in situations of financial support. Moreover, we show that moral hazard is less pronounced when such financial support is provided voluntarily by other individuals, even if financial incentives for effort provision are exactly identical. We show that this finding is consistent with a model of other-regarding preferences. Intuitively, if recipients of support associate its source with an individual, they are more likely to factor the giver into their own objective function. Then, overall incentives for precautions are higher than in the absence of other-regarding preferences despite the fact that financial incentives are unchanged. The reason is that an increased risk of loss also hurts the giver.

We test these effects in a controlled laboratory experiment with two separate treatments. In one treatment, financial incentives are implemented with the help of financial support, which is provided voluntarily by another participant. In the other treatment, financial incentives are given by experimental design. We argue that other-regarding preferences can only be present in the first treatment. The participants' behaviour is consistent with moral hazard only if incentives are provided by design. More specifically, the better off individuals are in the low-outcome state, the less they invest in loss prevention ex ante. If, however, the improvement in the low-outcome state is due to the voluntary provision of financial support by another individual, moral hazard cannot be detected and the relationship between the payoff in the low-outcome state and the preventive investment is significantly less negative than in the other treatment.

One of the main implications of our results is that the implementation of financial support is an important design variable which is able to reduce the inefficiency arising from moral hazard in the giver-receiver relationship. Our findings also provide an economic efficiency rationale for sponsorship programs, in which donors and recipients are matched and the latter know about the voluntary nature of their associated donor's financial support. Furthermore, we conjecture that it is easier to find potential donors and that donors make more generous contributions if it can be convincingly argued that moral hazard is not a concern. More generally, our results have implications for policy-makers who aspire to design effective provision of financial support.

The structure of the paper is as follows. In Section 2 we review related literature. In Section 3 we describe the experimental design and its implementation. We present our theoretical predictions in Section 4 and our experimental results in Section 5. In Section 6 we discuss the practical implications and limitations of our study and conclude.

2. Related Literature

Although studied in many fields of economics, moral hazard still appears to be most salient in the insurance literature where it was first discussed. Theoretically, if individual behaviour is not observable, insurance coverage will lead to a distortion in risk-reducing investments resulting in moral hazard, see Winter (2013) for a survey. Empirical evidence abounds. For example, Dionne et al. (2013) analyse French data on car insurance and document moral hazard among inexperienced drivers. Abbring et al. (2008) find evidence of moral hazard in the Dutch car-insurance market using dynamic methods. Cohen and Dehejia (2004) investigate a panel of 50 U.S. states and the District of Columbia and find that the adoption of compulsory automobile insurance leads to an increase in traffic fatalities. Besides car insurance, there is evidence of moral hazard in crop insurance. Smith and Goodwin (1996) report that insured farmers use fewer chemical products to protect their harvest than uninsured farmers. Similarly, Coble et al. (1997) find evidence of moral hazard in crop insurance in years when production is poor, but not in years when growing conditions are favourable. Quiggin et al. (1993) confirm the presence of moral hazard in crop insurance and discuss policy implications for the design of insurance contracts. Further evidence of moral hazard is reported in unemployment insurance where an increase in unemployment benefits increases claims amounts and the duration of unemployment (Krueger and Meyer, 2002; von Wachter et al., 2011), and in disability insurance where an increase in disability insurance benefits tends to lower participation in the labour force (Gruber, 2000; Marie and Vall-Castello, 2012).[2]

These results are by and large confirmed in laboratory experiments. In Berger and Hershey (1994), a fraction of each individual's endowment is added to a common pool from which losses are paid. The authors observe that this sharing mechanism lowers the participants' propensity to invest in self-protection. Biener et al. (2014) find experimental evidence of moral hazard in the context of low-income insurance in the Republic of the Philippines. In Bixter and Luhmann (2014), individuals can choose between a safe and a risky option. They find that, as soon as another participant is forced to participate in the potential losses of the risky option, this induces increased risk taking, which is indicative of moral hazard.

[2] The evidence mentioned so far is on ex ante moral hazard, that is, insurance induced changes of pre-loss behavior. Ex post moral hazard in turn refers to changes in the insured's behavior conditional on a loss (Pauly, 1968), for example, overconsumption of goods and services covered under the insurance policy. Our paper focuses on the former.

This suggests that individuals anticipate the receipt of financial support in case of low outcomes, and factor it into their decision making. Financial support plays a pivotal role in the form of governmental disaster relief programs and private donations after the occurrence of a natural catastrophe (e.g., Barnett, 1999; Brown & Minty, 2006; Zagefka et al., 2011), as financial support provided by a partner or other family member to people who lose their job (e.g., Fafchamps & Lund, 2003; Skoufias & Parker, 2006), or in the form of charity given to people who fall on hard times (e.g., List, 2011). In the existing literature there is a strong focus on the providers of financial support. Recently, researchers have studied the role of intertemporal preferences, procrastination and commitment (Breman, 2011; Knowles and Servátka, 2015), income effects (Erkal et al., 2011; Chowdhury and Jeon, 2014), peer pressure and relative status (Cox et al., 2007; Meer, 2011), intrinsic motives (Deb et al., 2014), the measurement of the value of a contribution (Echazu and Nocetti, 2015), perceived worthiness and race of the recipient (Fong and Luttmer, 2011), and matching (Karlan et al., 2011) for giving behaviour, see also Konow (2010). The economic analysis of giving behaviour is cast within the realm of altruism and social preference theories (Andreoni and Miller, 2002; Charness and Rabin, 2002; Fehr and Schmidt, 2006) such as pure altruism (Becker, 1974), inequality aversion (Fehr and Schmidt, 2006; Bolton and Ockenfels, 2000), impure altruism (Andreoni, 1989, 1990), and conditional altruism (Konow, 2010)

Our paper shows that other-regarding preferences are equally important when considering the recipients of financial support, and more specifically when it comes to moral hazard. Consistent with Fehr and Fischbacher (2002), we argue that other-regarding preferences are instrumental to understand financial incentives adequately. As Rabin (1993) points out people have a propensity to reciprocate, that is, to be nice to those who treat them fairly but to punish those who hurt them (see also Falk and Fischbacher, 2006). Berg et al. (1995) confirm that reciprocity appears to be a basic element of human behaviour, see Dohmen et al. (2009) for a survey. Under such preferences we would expect individuals to react favourably to the provision of financial support by other individuals. This conjecture is not limited to the notion of reciprocity but can be extended to other forms of other-regarding preferences such as altruism. We contribute to the literature by providing further evidence of the presence of other-regarding preferences. Furthermore, we show how and to what extent they can help mitigate the inefficiency arising from moral hazard. As such, other-regarding preferences can become instrumental in the efficient provision of financial support. To the best of our knowledge, we are the first to analyse these effects.

3. Experimental Design

We conducted a laboratory experiment in which participants were randomly allocated to either the role of "subject X" or "subject Y". Subject Y individuals were endowed with EUR 5 and participated in a lottery that paid EUR 10 (high-outcome state) with a probability of $p(e)$ and nothing (low-outcome state) with a probability of $(1 - p(e))$. In the low-outcome state, subject Y individuals received an amount $\lambda \in$ [EUR 0; EUR 10], which varied between participants, as compensation for not winning the EUR 10.[3] This amount can be interpreted as financial support or free insurance coverage, even though the experiment was neutrally framed (i.e., the terms "support" or "insurance" were not mentioned to the participants). Higher amounts of λ correspond to more generous financial support. After subject Y individuals observed this amount, they determined the probability distribution over the two states of the world by specifying an effort level. In the experiment, they did this by choosing an investment in effort, which was deducted from their initial endowment. The relationship between the selected effort level, the associated cost of effort, and the resulting probability distribution is presented in Table 1.

Effort level	1	2	3	4	5	6	7	8	9
Cost of effort (in EUR)	0.00	0.20	0.60	1.20	1.80	2.40	3.20	4.00	5.00
Marginal cost of effort (in EUR)	0.00	0.20	0.40	0.60	0.60	0.60	0.80	0.80	1.00
Probability of the high-outcome state (in percentage points)	10	20	30	40	50	60	70	80	90
Probability of the low-outcome state (in percentage points)	90	80	70	60	50	40	30	20	10

Table 1: Effort level, cost of effort and probability distribution

The cost of effort is increasing in the effort level and so is the probability of the high-outcome state. In line with Fehr and Falk (1999), we used a cost function with increasing marginal cost of effort.

We implemented two treatments in our experiment, which exclusively differed with respect to the provision of financial support. In **treatment 1**, λ was a voluntary transfer made by another individual (subject X). In this treatment subjects were randomly matched into pairs consisting of one subject X and one subject Y. All subject X individuals were endowed with EUR 20 and were told that their matched subject Y individual was endowed with EUR 5 and faced a lottery of winning

[3] At the time of the experiment, EUR 1 corresponded to approximately $1.20 (http://de.exchange-rates.org/).

EUR 10 with a probability $p(e)$ and of winning nothing with a counterprobability of $\big(1 - p(e)\big)$. Subject X had the option to make a transfer $\lambda \in$ [EUR 0; EUR 10] to subject Y conditional on the occurrence of the low-outcome state in the lottery. This transfer decision had to be made before subject Y's effort choice and before the resolution of uncertainty. The transfer was then deducted from subject X's endowment only if the low-outcome state occurred. No transfer could be made for the case that the high-outcome state occurred. It was made clear to each subject X that subject Y would first observe the transfer and afterwards choose an effort level. Table 2 provides an overview over the transfers made by subject X individuals.[4]

Transfer (in EUR) = Financial support	Frequency	Percent	Cumulative
0	15	27.78	27.78
1.00	5	9.26	37.04
1.20	1	1.85	38.89
1.80	1	1.85	40.74
2.00	1	1.85	42.59
2.20	1	1.85	44.44
2.50	2	3.70	48.15
3.00	2	3.70	51.85
3.20	2	3.70	55.56
3.33	1	1.85	57.41
4.00	6	11.11	68.52
5.00	10	18.52	87.04
6.00	1	1.85	88.89
7.00	3	5.56	94.44
7.50	1	1.85	96.30
10.00	2	3.70	100.00
Total	54	100.00	

Table 2: Overview of transfers made by subject X individuals

[4] About a quarter of subject X individuals transferred nothing to their matched subject Y. Most subject X individuals transferred some positive amount that did not exceed half of the maximum transferable amount. Only very few subject X individuals decided to transfer more than half of the maximum transferable amount. The mean transfer is EUR 2.99 and is virtually identical to the median which is EUR 3.00. The standard deviation equals EUR 2.69. Overall, the observed giving behavior is in line with that of participants in dictator-game experiments (e.g., Engel, 2011).

In **treatment 2,** λ was implicitly included in the experimental design. In this treatment all participants were assigned the role of subject Y and there were no pairs. The subjects were told that, if the low-outcome state occurred, they would receive EUR λ.[5] In order to compare the behaviour of subject Y individuals across the two treatments, we assigned this role to the same number of participants in both treatments. In the second treatment, the λ amounts were the same as in the first treatment: 15 subjects received EUR 0, five subjects received EUR 1, one subject received EUR 1.20, and so on. This ensures that financial incentives for effort provision are exactly identical in the two treatments. The only difference is that in treatment 1 financial incentives are implemented with the help of financial support which was provided *voluntarily* by another individual while in treatment 2 they arise by design and do not involve another individual.

Using a between-subjects design, we allocated subject Y individuals randomly to either treatment 1 or treatment 2. They were fully informed about the experimental design of the treatment they were allocated to, so they knew how the financial incentives they faced came about and whether another individual was involved or not. However, subject Y individuals were not informed about the existence of the other treatment.

The experiment was conducted in the Munich Experimental Laboratory for Economic and Social Sciences (MELESSA) in November 2014 and January 2015 with the experimental software *z-tree* (Fischbacher, 2007). The participants were recruited online through the Online Recruitment System for Economic Experiments (ORSEE), which was developed by Greiner (2004). Each subject received a show-up fee of EUR 4 and could additionally earn money in the experiment. The participants' decisions in the experiment and chance determined how much they actually earned. The money was paid by the laboratory.

To ensure identical financial incentives for effort provision in both treatments, we conducted treatment 1 first. In that treatment, after arriving at the experimental laboratory, the participants were randomly allocated to a seat in front of a computer and matched into pairs. In each pair, one participant was subject X and the other one was subject Y. The matched subjects were not introduced to each other and did not know with whom they had been paired. Each transfer that was made by a subject X to her matched subject Y in treatment 1 was randomly assigned to one of the subjects participating in treatment 2. In both treatments, all instructions were shown on the com-

[5] For the exact wording of both treatments, see Appendix A.

puter and all participants could take as much time as they needed to read the instructions and ask as many questions as they wanted. After the participants had read the instructions, they all had to answer individually some questions that verified whether they comprehended the procedure of the experiment, their options, and how the payoffs were determined. The questionnaire aimed to ensure that all subjects understood the experiment. The subjects could only start the experiment once they had answered all questions correctly.

In total, 162 individuals participated in the experiment. Of those, 108 were randomly allocated to treatment 1 and 54 were randomly allocated to treatment 2. All participants in the second treatment were assigned the role of subject Y. In the first treatment, 54 participants were randomly assigned the role of subject Y and 54 participants were randomly assigned the role of subject X. Sixty percent of the participants were female and 40 percent were male. The vast majority of the participants (91 percent) were students at one of Munich's universities. The average age of the subjects who participated in the experiment was 25 years; the minimum age was 18 and the maximum age was 69.

4. Theoretical Predictions

The General Case

To derive testable hypotheses from economic theory we model subject Y's choice of effort in an adapted expected-utility framework where we allow for other-regarding preferences. Experimental evidence suggests that oftentimes agents are not purely self-interested (for a review, see Camerer, 2003). In our setup subject X foregoes wealth in the low-outcome state to help out subject Y. Consistent with positive reciprocity would be that subject Y, after observing that subject X is so kind to offer financial support, would reciprocate by factoring in subject X's well-being into her effort choice. Also, the notion of altruism lends itself to the conjecture that subject X's well-being is relevant to subject Y because, as soon as a positive amount of financial support is provided, subject X's distribution over terminal wealth depends on subject Y's decision. Our model is consistent with any mechanism along which other-regarding preferences might operate, and as such offers a unified perspective.

Assume that subject Y's preferences over own consumption are described by an increasing and non-convex utility function $u(\cdot)$ over income, $u' > 0$ and $u'' \leq 0$. Subject Y chooses effort lev-

el e, which determines the probability of the high-outcome state to be $p(e)$, the probability of the low-outcome state to be $(1-p(e))$, and comes at a monetary cost of $c(e)$.[6] Consistent with the experimental setup we assume $p' > 0$ and $p'' \leq 0$, so that the probability of the high-outcome state increases at a non-increasing rate, and $c' > 0$ and $c'' \geq 0$, so that the cost of effort increases at a non-decreasing rate. Furthermore, subject Y obtains λ from subject X in the low-outcome state. As explained previously, this can activate other-regarding preferences whose intensity we identify with parameter α. Subject X's well-being is measured by an increasing utility function $v(\cdot)$ over income, $v' > 0$. Notice that in our model as well as in the experiment the process by which subject Y forms beliefs about subject X's preferences is irrelevant as long as we accept that subject Y assumes subject X to prefer more money over less. With these specifications subject Y's objective function is given by

$$EU(e) = p(e)u\big(15 - c(e)\big) + \big(1 - p(e)\big)u\big(5 + \lambda - c(e)\big) + \alpha\big[p(e)v(w) + \big(1 - p(e)\big)v(w - \lambda)\big].$$

$\alpha = 0$ corresponds to a purely self-interested subject and $\alpha > 0$ to a subject with other-regarding preferences because she cares about subject X's well-being in choosing her effort level.[7] Optimal effort is determined by the respective first-order condition:

$$EU_e = p'[u_H - u_L] + \alpha p'[v_H - v_L] - c'[pu'_H + (1-p)u'_L] = 0.$$

Subscript e denotes the partial derivative with respect to effort, and subscripts H and L are shorthand for the high- and low-outcome state. The marginal benefit consists of two components; the first term measures the expected-utility impact of increasing the probability of the high-wealth state whereas the second term captures the fact that subject X is better off if the likelihood of the transfer being executed decreases. With other-regarding preferences, this is appreciated by subject Y. The third term is the marginal cost of effort which captures the fact that effort is costly

[6] To facilitate the use of calculus we assume effort to be continuous rather than discrete as in the experimental design. This is to simplify the exposition.

[7] Notice that we assume separability between expected utility over own consumption and over the giver's well-being. This allows for a parametric approach to identify the intensity of other-regarding preferences. Furthermore, our set-up includes the case that subject Y assumes subject X to have other-regarding preferences towards her as long as these are assumed to be separable as well.

and hence reduces consumption in both states of the world. We assume that the second-order condition holds.[8]

First, we observe that

$$EU_{e\alpha} = p'[v_H - v_L] > 0,$$

so that the intensity of other-regarding preference is positively associated with the optimal level of effort. Intuitively, the more subject Y cares about the well-being of subject X, the more effort she will exert to prevent subject X from having to follow through with the promised financial support. Technically, an increase in α induces an increase in the second component of the marginal benefit of effort whereas the first component and the marginal cost remain unchanged. We call this a *level effect* because we expect the chosen effort levels to be higher in the presence of other-regarding preferences than in their absence, ceteris paribus.

The experiment tests the influence of financial incentives on individuals' effort choices. Technically we can obtain this effect by analysing the cross-derivative of expected utility with respect to effort and the size of the financial support. This yields the following expression:

$$EU_{e\lambda} = -p'u'_L + \alpha p'v'_L - c'(1-p)u''_L.$$

The first term is negative indicating that the better the low-outcome state, the less it pays to avoid it (incentive effect). The second term is positive because, with more generous financial support, it pays more to avoid the low-outcome state as subject X's well-being is more negatively affected by having to execute the transfer (other-regarding effect). The third term is positive indicating that more comprehensive financial support makes the individual richer in the low-outcome state which reduces the marginal cost of effort (wealth effect). The overall sign is ambiguous and moral hazard prevails if the incentive effect dominates the other-regarding and the wealth effect. The necessary and sufficient condition for this is that absolute risk aversion in the low-outcome state is below an endogenous threshold that depends on technologies and preferences:[9]

[8] As is well known in the literature on self-protection, the second-order condition does not hold generically. In our set-up a sufficient condition for the second-order condition to hold is $2\frac{p'}{1-p} \leq \frac{c''}{c'} - \frac{p''}{p'}$, which is consistent with the condition developed in Jullien et al. (1999).

[9] A similar condition arises in the comparative statics of optimal effort with respect to the size of a loss, i.e., the difference between incomes in the two states of the world, see Hofmann and Peter (2015).

$$-\frac{u_L''}{u_L'} < \frac{p'}{c'(1-p)}\left(1-\alpha\frac{v_L'}{u_L'}\right).$$

The right hand side is negatively associated with the intensity of other-regarding preferences so that this condition is less likely to be satisfied for higher levels of α. According to the implicit function rule the overall effect of a change in the size of financial support on effort provision is given by $de/d\lambda = -EU_{e\lambda}/EU_{ee}$. If this expression is negative, the individual exerts less effort with more generous financial support (moral hazard).

If the moral hazard effect prevails, it is modulated by the intensity of other-regarding preferences. Intuitively, one would conjecture that other-regarding preferences are negatively associated with moral hazard, so if we increase their intensity, moral hazard is attenuated because subject Y cares more about subject X's well-being. Indeed, when inspecting $EU_{e\lambda}$, it becomes evident that, as we increase α, this cross-derivative also increases so that it becomes less negative. However, this only captures the partial effect of other-regarding preferences on the comparative statics of effort with respect to financial support. In addition, individuals with stronger other-regarding preferences will also select a different level of effort to begin with (level effect). This needs to be reflected in the analysis. Under suitable assumptions on risk preferences and effort technology, intuition is confirmed and an increase in the intensity of other-regarding preferences flattens the effect of financial support on effort provision. This is referred to as a *sensitivity effect* because essentially effort choice becomes less sensitive to changes in the level of financial support when the intensity of other-regarding preferences is increased. We provide the technical details in Appendix B.

The Case of Risk Neutrality

Allowing for risk aversion considerably broadens the applicability of our model but also complicates the technical analysis and requires to develop a set of sufficient conditions to determine the impact of other-regarding preferences on effort provision and on the intensity of the moral hazard effect. This can already be seen by inspecting $EU_{e\lambda}$, where risk aversion adds a positive wealth effect countervailing the negative incentive effect. This difficulty is also consistent with results in the literature on prevention where the role of risk aversion is indeterminate and hinges on assumptions on the prevention and cost technology, see Courbage et al. (2013) for a survey.

In this subsection we show that risk neutrality considerably simplifies the technical analysis.[10] Then, due to continuity, the conjectured relationships between other-regarding preferences, effort provision and the strength of the moral hazard effect carry over to situations where risk aversion is low enough. Assuming both subject X and Y to be risk-neutral yields the following first-order condition:

$$EU_e = (10 - \lambda + \alpha\lambda)p' - c' = 0.$$

The second-order expression is given by

$$EU_{ee} = (10 - \lambda + \alpha\lambda)p'' - c'' = c'\left(\frac{p''}{p'} - \frac{c''}{c'}\right).$$

It is obtained by using the first-order condition and it is negative under the assumptions presented on the effort and cost technology. We obtain the level effect for any $\lambda > 0$ because

$$EU_{e\alpha} = \alpha\lambda p' > 0.$$

With the help of the implicit function rule it holds that

$$\frac{de}{d\lambda} = \frac{(1-\alpha)p'}{EU_{ee}} < 0,$$

resulting in the prediction that more generous financial support results in less effort provision as long as $\alpha < 1$ (moral hazard). Notice that it is natural to assume that individuals place greater weight on their own consumption utility than on that of other individuals. Finally we obtain that

$$\frac{\partial}{\partial\alpha}\frac{de}{d\lambda} = \frac{-p'EU_{ee} - 2\lambda(1-\alpha)p'p'' + \lambda(1-\alpha)(p')^2\frac{EU_{eee}}{EU_{ee}}}{EU_{ee}^2},$$

which is non-negative if $\alpha < 1, p''' \leq 0$ and $c''' \geq 0$. Therefore, the level effect and the sensitivity effect are derived with ease in such a simplified specification.

[10] One example of other-regarding preferences where preferences over own consumption are modeled as risk neutral is the paper Fehr and Schmidt (1999).

5. Experimental Results

Statistical Analysis

In Figure 1 we plot the cost associated with the effort choices made by subject Y individuals against the payoff in the low-outcome state of the lottery.[11] As explained earlier, the variation in the payoffs in the low-outcome state was completely identical in both treatments. As a result, financial incentives for effort provision are the same in both treatments. We first investigate the level effect. In the presence of other-regarding preferences we would expect the average effort level to be higher than in the absence of such preferences. We conjecture that other-regarding preferences are likely to be present in treatment 1, where financial incentives are implemented with the help of financial support provided voluntarily by another experimental subject, and unlikely to play a role in treatment 2, where the payoffs in the low-outcome state are given by design, without reference to another individual.

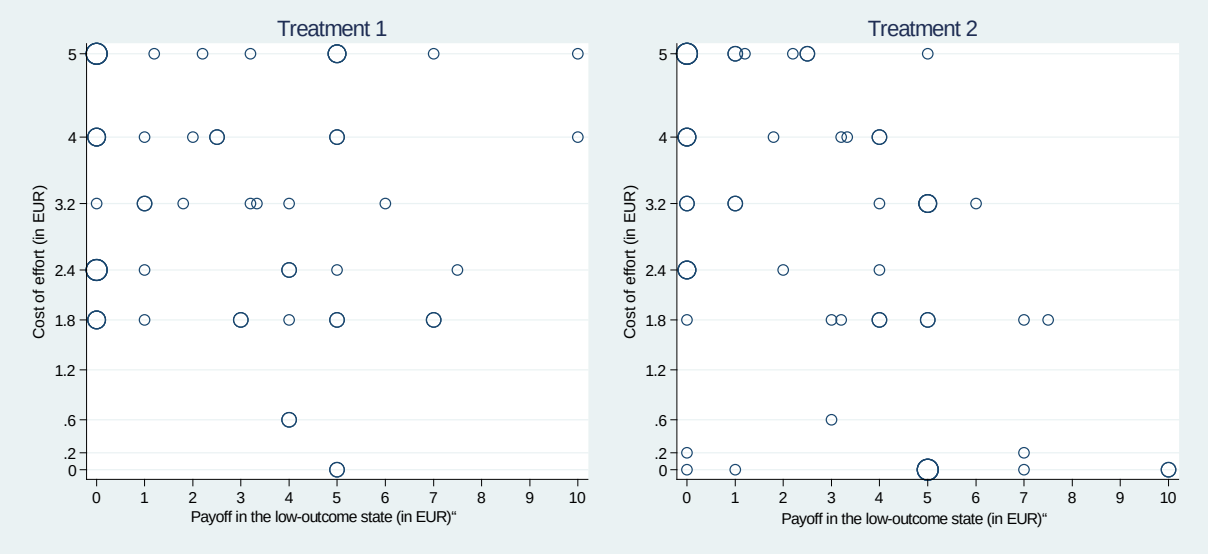

Figure 1: Scatterplots of the cost of effort against the payoff in the low-outcome state for subject Y individuals in both treatments

We start out by comparing individuals whose payoff in the low-outcome state is positive because only then does their effort choice have an impact on the distribution of their matched subject X individual's terminal wealth in treatment 1. This leaves 78 subject Y individuals, 39 in treatment

[11] For the analysis we use the cost of effort because subject Y individuals determined the probability distribution over the states of the world by choosing how much to invest in effort, which was deducted from their initial endowment.

1 and 39 in treatment 2, and we report the mean, standard deviation and median of the cost of effort associated with their decisions in Table 3. Furthermore, the results of a t-test and a Wilcoxon rank-sum test for differences in the cost of effort between treatment 1 and treatment 2 are reported. We do not find a significant difference in the effort provision by subject Y individuals between both treatments.

	Mean	Std. dev.	Median	Tests	t-test	Wilcoxon rank-sum test
Treatment 1	3.026	1.470	3.2	Test statistic	1.426	1.302
Treatment 2	2.497	1.786	2.4	p-value	0.158	0.193

Table 3: Effort provision by subject Y individuals in both treatments

To refine our analysis, we argue that the intensity of other-regarding preferences might depend on the perceived generosity of the giver. Subject Y individuals' other-regarding preferences might be more pronounced when they receive a high level of financial support in treatment 1 than when financial support is low or zero. This reasoning lends itself to differential predictions depending on the size of financial support, which can be regarded as a measure of the giver's generosity. To test for such differences, we split our sample in subjects whose payoff in the low-outcome state is below average and in subjects whose payoff in the low-outcome state is at least the average.[12] The results of this analysis are given in Table 4, where a t-test and a Wilcoxon rank-sum test are applied to test for differences in effort provision between both treatments. For subjects whose payoff in the low-outcome state is below average, there is no significant difference in effort provision between both treatments. However, we do find a significant difference in effort provision for subjects whose payoff in the low-outcome state is at least the average such payoff. For the t-test the difference is significant at the 5% level, while the Wilcoxon rank-sum test just fails to be significant at the 5% level. As a result, there is some evidence for the level effect which appears to be driven by the behaviour of subject Y individuals who experience generous financial support in treatment 1.

[12] The average payoff in the low-outcome state equals EUR 2.99 and is nearly identical to the median which equals EUR 3.00. Therefore, we split the sample between $\lambda < 3$ and $\lambda \geq 3$.

	Mean	Std. dev.	Median	Tests	t-test	Wilcoxon rank-sum test
$\lambda < 3$ (n=26)						
Treatment 1	3.462	1.152	3.6	Test statistic	-0.039	-0.563
Treatment 2	3.477	1.637	4.0	p-value	0.969	0.574
$\lambda \geq 3$ (n=28)						
Treatment 1	2.793	1.575	2.4	Test statistic	2.011	1.915
Treatment 2	1.950	1.561	1.8	p-value	0.049	0.055

Table 4: Effort provision by subject Y individuals in both treatments for the split sample

Let us now turn to the sensitivity effect. As discussed, moral hazard materializes when there is a negative relationship between the payoff in the low-outcome state and the effort exerted by subject Y individuals. In order to measure this relationship, we calculate several measures of association including Pearson's correlation coefficient, Spearman's rank correlation and Kendall's tau. Whereas Pearson's correlation coefficient is restricted to measure a linear relationship between two variables, the latter two measures are able to account for non-linear relationships as well. Our results are reported in Table 5, which is based on individuals again who receive a positive payoff in the low-outcome state. Pearson's correlation coefficient shows no significant relationship between the payoff in the low-outcome state and the cost of effort in treatment 1 at the 5% level, but there is a significant negative correlation in treatment 2 at the 5% level. Results are the same when using Spearman's rank correlation and Kendall's tau instead which corroborates this evidence. Whereas all signs but one indicate that subject Y individuals reduce effort when the payoff in the low-outcome state increases, this relationship is only significant in treatment 2 where the payoff in the low-outcome state is provided by design. As soon as another individual is involved in the implementation of financial incentives, the null of no moral hazard can no longer be rejected.

	Treatment 1				Treatment 2			
	Correlation coefficient	p-value	95%-confidence interval		Correlation coefficient	p-value	95%-confidence interval	
Pearson's correlation	0.008	0.961	-0.309	0.322	-0.563	< 0.001	-0.733	-0.274
Spearman's correlation	-0.042	0.800	-0.353	0.277	-0.547	< 0.001	-0.736	-0.280
Kendall's tau	-0.035	0.740	-0.248	0.178	-0.385	< 0.001	-0.577	-0.192

Table 5: Measures of association between the payoff in the low-outcome state and effort provision by subject Y individuals in both treatments

In a second step we investigate whether the behaviour of subject Y individuals is significantly different between the two treatments with the help of Zou's (2007) method. According to Zou (2007), the confidence interval for the difference between two independent correlations with the correlation coefficients r_1 and r_2 is given by [L, U] with

$$L = r_1 - r_2 - \sqrt{(r_1 - l_1)^2 + (u_2 - r_2)^2},$$

$$U = r_1 - r_2 + \sqrt{(u_1 - r_1)^2 + (r_2 - l_2)^2},$$

where $[l_1, u_1]$ is the confidence interval for the correlation coefficient r_1 and $[l_2, u_2]$ is the confidence interval for the correlation coefficient r_2. We apply Zou's (2007) method to each of the three measures of association and determine the 95% confidence interval for the difference between the two treatments. Results are given in Table 6. All confidence intervals exclude the value zero so that we can reject the null hypothesis that financial incentives have the same effect on effort provision in both treatments. Subject Y individuals react significantly differently to financial incentives when they involve voluntary provision of financial support by another individual than when they arise by experimental design.

Difference for	95%-confidence interval	
Pearson's correlation	0.142	0.928
Spearman's correlation	0.095	0.876
Kendall's tau	0.062	0.637

Table 6: Confidence intervals for the difference in measures of association between both treatments

As already argued, the intensity of other-regarding preferences might depend on the perceived generosity of the provider of financial support. We exploit this differential intensity of other-regarding preferences by splitting our sample in subjects whose payoff in the low-outcome state is below average and in subjects whose payoff in the low-outcome state is at least the average. The results are summarized in Table 7. For those subjects whose payoff in the low-outcome state is below average, all measures of association are insignificant in either treatment. However, for those subject Y individuals whose payoff in the low-outcome state is at least the average, we find a significant negative relationship between the payoff in the low-outcome state and the cost of effort in treatment 2 but not in treatment 1 for all measures of association. In order to test whether the difference in these coefficients between treatment 1 and treatment 2 is statistically significant,

we apply Zou's (2007) method again and find a significant difference for all three correlation coefficients if payoffs in the low-outcome state are high but not if they are low. Hence, while subject Y individuals do not appear to react differently to financial incentives in both treatments for small payoffs in the low-outcome state, we find such a significant difference when the payoff in the low-outcome state is large. This provides further evidence for our main result that moral hazard is present in situations of individual effort choice but less so as soon as financial incentives involve the voluntary provision of financial support by another individual. Furthermore, the results from splitting the sample in half show that the effects obtained earlier are driven by the behaviour of individuals who receive high levels of financial support. This is consistent with our hypothesis that the intensity of other-regarding preferences is stronger the more generous the giver.

	Treatment 1				Treatment 2				Difference	
	Correlation coefficient	p-value	95%-confidence interval		Correlation coefficient	p-value	95%-confidence interval		95%-confidence interval	
$\lambda < 3$ (n=26)										
Pearson's correlation	0.228	0.263	-0.192	0.553	0.292	0.148	-0.130	0.596	-0.583	0.469
Spearman's correlation	0.201	0.325	-0.202	0.546	0.317	0.115	-0.080	0.627	-0.625	0.410
Kendall's tau	0.132	0.280	-0.115	0.379	0.188	0.124	-0.055	0.430	-0.402	0.291
$\lambda \geq 3$ (n=28)										
Pearson's correlation	0.271	0.163	-0.133	0.572	-0.459	0.014	-0.693	-0.070	0.169	1.111
Spearman's correlation	0.219	0.262	-0.167	0.548	-0.426	0.024	-0.690	-0.063	0.115	1.067
Kendall's tau	0.135	0.249	-0.100	0.370	-0.270	0.020	-0.494	-0.046	0.080	0.730

Table 7: Measures of association, confidence intervals for both treatments and confidence intervals for the difference between both treatments

Finally, we conduct a multivariate analysis by estimating a tobit regression model. The tobit model is suitable because the cost of effort is bounded from above and below by definition. As explanatory variables we include the treatment, the lottery payoff in the low-outcome state ($Payoff_{low}$) to identify the financial incentive faced by the individuals, and an interaction term between the treatment and the financial incentive variable. We also include the subjects' gender and age as controls. The results of the tobit model are given in Table 8. The coefficient for treatment 2 is significantly positive, whereas the interaction term between treatment 2 and the financial incentive is significantly negative. This backs our previous results. Overall, average effort provision does not differ significantly between the two treatments. This is consistent with our finding that there is some support for the level effect, which is rather weak. However, only in treatment 2 participants reacted to variations in the payoff in the low-outcome state when making their effort

choices. This corroborates our finding of a clear sensitivity effect. Although insignificant, the signs of the control variables are consistent with existing findings on the intensity of other-regarding preferences (see List, 2003). As a robustness check, we also estimate an OLS regression and an ordered probit model. The results remain stable over all model specifications, see Appendix C.

	Tobit Model
VARIABLES	Cost of effort
Treatment 2	2.360**
	(1.047)
$Payoff_{low}$	0.039
	(0.148)
Treatment 2 * $Payoff_{low}$	-0.751***
	(0.230)
Female	0.420
	(0.486)
Age	0.028
	(0.025)
Constant	2.081**
	(1.002)
Observations	78

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Tobit model for the effort provision by subject Y individuals

Discussion

Our results show that there is a significant difference in the reactions of subject Y individuals to the provision of financial incentives in the two treatments. As payoffs in the low-outcome state become more favourable, individuals reduce their effort level significantly when financial incentives are provided by design. This behaviour is consistent with moral hazard. However, as soon as financial incentives involve the voluntary provision of financial support by another individual, moral hazard can no longer be detected. Furthermore, differences between the two treatments are significant. When splitting the sample in half, we find that our results are driven by the behaviour of individuals who experience financial support that is relatively generous as compared to the rest

of the sample. We argue that such differences can originate from the fact that the strength of other-regarding preferences is higher in giver-receiver relationships with a generous giver.

In treatment 1, subject X individuals decided how much financial support they want to provide to their matched subject Y, and therefore how generously they wanted to treat subject Y. Subject Y individuals could see how generous their matched subject X had decided to be before selecting an effort level. We surmise that subject Y individuals who felt treated generously by their matched subject X were reluctant to choose low effort levels because this would increase the likelihood of subject X suffering from their generosity. In treatment 2 in turn financial incentives were provided by design and it is harder to make the case for other-regarding preferences. In such a situation subject Y individuals maximized expected utility by choosing a low effort level as soon as the difference between the payoffs in the low- and the high-outcome state became smaller.

Our results differ from those in Bixter and Luhmann (2014) where subjects received financial support because other experimental subjects were forced to participate in the losses. They find evidence of moral hazard, which suggests that the voluntary nature of financial support in our setup plays a crucial role. These different findings are indicative of the fact that our results are driven more by positive reciprocity than by pure altruism. In Bixter and Luhmann (2014) and in our paper individuals know that their behaviour affects others and that increased risk taking or reduced precautions raise the likelihood of others experiencing a loss in wealth. If individuals were purely altruistic, both setups should lead to the same conclusion about moral hazard. In our paper, however, the givers provide financial support voluntarily, which can activate positive reciprocity in the recipients. This is not the case when the participation in losses is involuntary because then the provision of financial support is not a deliberate decision of its provider.

Another way of evaluating the effect of the different behaviours in our set-up is to compare material efficiency in both treatments. One possible approach is to investigate pre-support expected wealth of subject Y individuals (EW) and to use it in order to compare the distribution of effort levels in both treatments. This criterion arises naturally in treatment 1 by determining aggregate wealth of each giver-receiver pair:

$$\begin{aligned} & p(e)([20-\lambda]+[5+\lambda-c(e)])+\big(1-p(e)\big)(20+[15-c(e)]) \\ &= 20+\underbrace{5p(e)+15\big(1-p(e)\big)-c(e)}_{\text{subject Y's pre-support expected wealth}}. \end{aligned}$$

In Table 9, we report the mean and standard deviation of EW for both treatments for the subsample of individuals who face a positive payoff in the low-outcome state as well as for the split sample. We also conduct a t-test and a Wilcoxon rank-sum test for differences in the means as well as a Variance ratio test and Levene's robust test for equality of variance for differences in the variances. The t-tests are significant at the 5% level for the sample of individuals facing a positive payoff in the low-outcome state as well as for individuals whose payoff in the low-outcome state is at least the average such payoff whereas the Wilcoxon-rank sum test is only significant in the latter case at the 10% level. These results indicate that there is some evidence for expected wealth to be significantly higher in treatment 1 than in treatment 2. The variance ratio test and Levene's robust test for equality of variances are significant at the 5% level for all cases except the variance ratio test in the subsample of individuals whose payoff in the low-outcome state is at least the average. There, it just fails to be significant at the 5% level. Overall, there is strong evidence that expected wealth is significantly less volatile in treatment 1 than in treatment 2. These results provide evidence that the reduction of moral hazard through other-regarding preferences in treatment 1 lends itself to higher and significantly less volatile expected wealth. We conclude that activating other-regarding preferences in the giver-receiver relationship in treatment 1 is beneficial in material efficiency terms.

	Mean	Std. dev.		Tests	t-test	Wilcoxon rank-sum test	Variance ratio test	Levene's robust test for equality of variances
Treatment 1	8.513	0.727		Test statistic	2.035	1.370	0.392	11.175
Treatment 2	8.067	1.160		p-value	0.046	0.171	0.005	0.001
$\lambda < 3$ (n=26)								
Treatment 1	8.769	0.292		Test statistic	1.144	-0.139	0.111	5.523
Treatment 2	8.562	0.878		p-value	0.262	0.890	< 0.001	0.023
$\lambda \geq 3$ (n=28)								
Treatment 1	8.386	0.813		Test statistic	2.025	1.751	0.470	8.831
Treatment 2	7.836	1.185		p-value	0.049	0.080	0.055	0.004

Table 9: Material efficiency in both treatments

6. Conclusion

We conducted a laboratory experiment to analyse how individuals react to financial incentives. We compare a treatment where financial incentives are provided by design to a treatment where they involve the voluntary provision of financial support by another individual. We conjecture that moral hazard is present. Furthermore, we present a model of other-regarding preferences

whose intensity attenuates the moral hazard effect. Our experimental results support both conjectures. When adverse outcomes are improved, individuals reduce prevention consistent with moral hazard. We find evidence that this moral hazard effect is indeed mitigated by the presence of other-regarding preferences. As soon as another individual is involved, the null of no moral hazard can no longer be rejected. The voluntary provision of financial support induces individuals to reciprocate in terms of their effort choice, and this other-regarding effect is strong enough to make moral hazard undetectable. Furthermore, differences in how individuals adjust effort levels to financial incentives are significant between both treatments. When splitting the sample in half, we find that these differences are driven by the behaviour of recipients who experience generous financial support.

Our results have a variety of practical implications. They provide an economic efficiency rationale for matching donors to recipients. Moral hazard may be a concern for individuals who agree to issue a guarantee or stand surety in favour of another individual. The latter might interpret the guarantee as "free" insurance coverage, inducing adverse effects on his incentive to exercise costly effort. Our results suggest that moral hazard will not be a severe issue in such situations.

More generally, charitable giving, social insurance and governmental support face a trade-off in their design. The principle of charity is based on the idea that people with altruistic preferences are willing to transfer money to other people who suffered a major loss or have fallen on hard times. Stronger institutionalization will typically have benefits in terms of lower transaction cost. However, it intensifies the moral hazard problem. Recipients will see the donors behind the money they are receiving less clearly. In a sense, it is "easier" to free-ride the system than to free-ride on individual donors. This might prevent potential donors from making contributions altogether. On the other hand, voluntary and weakly institutionalized financial support will frequently be less efficient in terms of transaction costs. However, our results provide evidence that it mitigates the moral hazard issues induced by financial support. This suggests that informal and voluntary financial support may be a solution for situations where otherwise financial support would not be viable due to moral hazard.

When discussing the real-world implications of our results, it is necessary to bear in mind that this study has some of the common limitations of laboratory experiments in economics. First,

people may react differently within a laboratory than they would in real life. With regard to this point, Benz and Meier (2008) find that pro-social behaviour in the lab and in the field are significantly correlated. Based on this result, we believe that our results have sufficient external validity to be applicable in the field. Second, the vast majority (91 percent) of the subjects who participated in our experiment were students. Levitt and List (2007) show that the behaviour of students is not significantly different from that of other groups of subjects with respect to social preferences. If anything, students appear to be a little more selfish than a representative sample of the general population (Dohmen et al., 2009; Bellemare, Kröger, & van Soest, 2008). Third, although the experiment was incentivized and participants earned considerably more than a student would typically earn in 30 minutes by doing another job, the participants might have nevertheless behaved differently if the stakes had been higher. Some researchers who examined whether an increase in stakes changes social behaviour found that such changes are small (e.g., Cameron, 1999; Fehr, Fischbacher, & Tougareva, 2002). Finally, in the treatment involving the voluntary provision of financial support by another individual, participants were randomly matched into pairs and did not know with whom they were matched, so everyone was anonymous. In contrast, in many real-life situations donors and recipients may know each other. In our setting, we found no evidence of moral hazard when recipients received a voluntary transfer from an anonymous individual. We would expect this result to be even more pronounced if the donors and the recipients knew each other, as there is plenty of literature showing that the lower the social distance between individuals, the stronger their social behavior (e.g., Bohnet & Frey, 1999; Charness & Gneezy, 2008; Chen & Li, 2009). However, how anonymity affects moral hazard in the context of charity and insurance would be an interesting path for future studies to explore**.**

Appendix

Appendix A - Decision Situation in the Experiment (Translated from German)

Treatment 1:

Participant X has specified a transfer of EUR 4.00 in the case that state B occurs.[13]

Therefore, your payment situation can be depicted as follows:

Participant Y

State A
EUR 15 minus your chosen investment

State B
EUR 9 minus your chosen investment

Please choose an investment now. Each investment results in specific costs for your account and determines the probabilities of State A and State B. The relationship between the investment and the respective probabilities of State A and State B can once again be found in the table below.

Investment [e]	0 Euros	0.20 Euros	0.60 Euros	1.20 Euros	1.80 Euros	2.40 Euros	3.20 Euros	4.00 Euros	5.00 Euros
Probability of State A [p(e)]	10%	20%	30%	40%	50%	60%	70%	80%	90%
Probability of State B [(1-p(e))]	90%	80%	70%	60%	50%	40%	30%	20%	10%

Reminder:

If State A occurs, you receive EUR 15 minus your chosen investment. If State B occurs, you receive EUR 9 minus your chosen investment

Please choose an investment now. Note that values of Euros and Cents in this program are separated by dots, not commas, as usual in German.

Investment _____ Euro

[13] The high- and low-outcome state were referred to as state A and state B in the experiment.

Treatment 2:

Your payment situation can be depicted as follows:

State A
EUR 15 minus your chosen investment

State B
EUR 9 minus your chosen investment

Investment [e]	0 Euros	0.20 Euros	0.60 Euros	1.20 Euros	1.80 Euros	2.40 Euros	3.20 Euros	4.00 Euros	5.00 Euros
Probability of State A [p(e)]	10%	20%	30%	40%	50%	60%	70%	80%	90%
Probability of State B [(1-p(e))]	90%	80%	70%	60%	50%	40%	30%	20%	10%

Please choose one of the nine possible investments. **Please type in the investment as given in the table. Note that values of Euros and Cents in this program are separated by dots, not commas, as usual in German.**

Your choice is relevant for your payment!

Investment _____ Euro

Appendix B – Derivation of the Sensitivity Effect

We show how changes in the intensity of other-regarding preferences influences the moral hazard effect. Recall that by the implicit function rule we obtain that $de/d\lambda = -EU_{e\lambda}/EU_{ee}$ with

$$EU_{e\lambda} = -p'u_L' + \alpha p'v_L' - c'(1-p)u_L''$$

and

$$EU_{ee} = p''[u_H - u_L] - 2p'c'[u_H' - u_L'] + \alpha p''[v_H - v_L] - c''[pu_H' + (1-p)u_L'] + (c')^2[pu_H'' + (1-p)u_L''].$$

Individuals who have stronger other-regarding preferences will place a greater weight on subject X's well-being in their effort choice. This has two implications for the moral hazard effect. *First*, with more pronounced other-regarding preferences a different effort level will be selected (level effect). *Second*, the fact that more generous financial support reduces subject X's well-being more receives greater attention when adjusting the effort level to a change in the level of financial support. The first effect is expressed as $de/d\alpha = -EU_{\alpha e}/EU_{ee}$, which is positive due to

$$EU_{\alpha e} = p'[v_H - v_L] > 0.$$

The second effect is related to the sign of

$$EU_{\alpha e\lambda} = \alpha p'v_L' > 0.$$

For the net effect we have to use the quotient rule to understand how $de/d\lambda$ reacts to changes in the intensity of other-regarding preferences. This yields the following expression:

$$\frac{\partial}{\partial \alpha}\frac{de}{d\lambda} = -\frac{EU_{ee}\left(EU_{\alpha e\lambda} + EU_{ee\lambda}\frac{de}{d\alpha}\right) - EU_{e\lambda}\left(EU_{\alpha ee} + EU_{eee}\frac{de}{d\alpha}\right)}{EU_{ee}^2}.$$

Three further cross-derivatives need to be inspected. Notice that

$$EU_{ee\lambda} = -p''u_L' + 2p'c'u_L'' + \alpha p''v_L' - c''(1-p)u_L'' + (c')^2(1-p)u_L'''.$$

The first and fourth term are non-negative, the second and third non-positive, and the fifth one is indeterminate. Assuming that preferences are not imprudent ($u''' \geq 0$) we can sign the fifth as non-negative. Note that by $EU_{e\lambda} < 0$ we conclude that

$$-p''u_L' + 2p'c'u_L'' + \alpha p''v_L' - c''(1-p)u_L''$$
$$\geq u_L'\Big(\big(-2p'c' - p''c'(1-p) + c''(1-p)\big)r_u(L) - p''(1-p')\Big),$$

where $r_u(L)$ denotes absolute risk aversion of utility function u in the low-outcome state. From this we can see that sufficient conditions for $EU_{ee\lambda}$ being non-negative are that $p' < 1$ and that $2p'/(1-p) < -p'' + c''/c'$, which is slightly stronger than the sufficient condition for the second-order condition, see Footnote 8. Furthermore, we obtain that

$$EU_{\alpha ee} = p''[v_H - v_L] \leq 0.$$

The last term to be determined is

$$EU_{ee} = p'''[u_H - u_L] - 3p''c'[u_H' - u_L'] - 3p'c''[u_H' - u_L'] + 3p'(c')^2[u_H'' - u_L'']$$
$$+ \ \alpha p'''[v_H - v_L] - c'''[pu_H' + (1-p)u_L'] + 3c'c''[pu_H'' + (1-p)u_L'']$$
$$- (c")^3[pu_H''' + (1-p)u_L'''].$$

Again this is a priori ambiguous but we can present sufficient conditions to sign this expression. If the agent is not imprudent ($u''' \geq 0$) and the effort technology satisfies $c''' \geq 0$, $p''' \leq 0$ and $-p''/p' \leq c''/c'$, we obtain a non-positive sign overall. Notice that the additional assumptions on the effort technology are compatible with the ones made earlier. As a result we can conclude that $\partial/\partial\alpha \ de/d\,\lambda$ is positive overall indicating that the net effect of an increase in the intensity of other-regarding preferences is that the moral hazard effect flattens out.

Appendix C – Regression Results

OLS Model	
VARIABLES	Cost of effort
Treatment 2	1.447**
	(0.654)
$Payoff_{low}$	0.020
	(0.102)
Treatment 2 * $Payoff_{low}$	-0.471***
	(0.132)
Female	0.404
	(0.347)
Age	0.014
	(0.025)
Constant	2.353***
	(0.754)
Observations	78

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: OLS model for the effort provision by subject Y individuals

Ordered Probit Model	
VARIABLES	Cost of effort
Treatment 2	1.208**
	(0.536)
$Payoff_{low}$	0.019
	(0.075)
Treatment 2 * $Payoff_{low}$	-0.383***
	(0.119)
Female	0.254
	(0.250)
Age	0.013
	(0.013)
Cut1 (Constant)	-0.956*
	(0.540)
Cut2 (Constant)	-0.881
	(0.537)
Cut3 (Constant)	-0.686
	(0.530)
Cut4 (Constant)	0.045
	(0.514)
Cut5 (Constant)	0.309
	(0.512)
Cut6 (Constant)	0.829
	(0.518)
Cut7 (Constant)	1.369**
	(0.535)
Observations	78

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Ordered probit model for the effort provision by subject Y individuals

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