The Risk-Distributional Preferences and Risk-Aversion Paradox: A Gift-Exchange Experiment*

Miguel Luzuriaga** and Oliver Kunze***

Abstract: In a principal-agent setting, offering maximum levels of incentives, i.e., the compensation is completely variable, is far from optimal because this reduces the principal’s profits, and because the risk-aversion nature from the agent matters. In this paper, we hypothesize that an incentivized agents’ risk-taking about the composition of their own wage structure can offset the typical risk-aversion, and thus lead to an increase in performance. Using a reframed version of the gift-exchange game by Fehr et al. (1998) workers decide, before their effort choice, how much of their wage is variable and fixed. The variable component is limited to max. 30% of the initial wage offer (the rest remains fixed) and it increases/decreases with effort and also with a random factor. We find that risk-averse workers exposed ¾ of their variable component to risk, and outperformed a control group (fixed wage scheme) by half in effort levels. This increase in effort is positively correlated to their risk-distributional preferences. Theoretical explanations (supported by data) are discussed.

Keywords: Risk-Taking Incentives, Risk-Distributional Preferences, Compensation, Experiments

JEL Codes: C91, D81, D86, J33, J41

*We would like to thank Florian Schlatterer and participants at the HNU Workshop 2016. Financial support from the Neu-Ulm University of Applied Sciences and TBS (Technology Network Bavaria-Swabia) is greatly appreciated. We also thank Wolf-Peter Maier for his assistance in implementing the experiment.
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1. Introduction

The design of incentive systems reminds us of an important challenge for economic development. Modern economic theory on incentives suggests that the workers’ decision over their own productivity play an important role in a wage-effort setting (see, for example, Hart and Holmstrom, 1987; Milgrom and Roberts, 1992; Lazear, 1998; Bebchuk, Fried, and Walker, 2002). A typical example occurs when firms offer to their employees stock-purchase plans expecting from them higher productivity. Employees in turn decide whether to accept the plan or not. If accepted, they must put down money from their own pockets to buy stocks, hold them for a while, and bear the associated risks. In fact, survey data shows that workers who purchase shares, work harder, for longer hours, and have lower quit and absence rates than workers who do not (Byson and Freeman, 2018). However, empirical evidence under control conditions is limited. Then we ask, is there a positive correlation between incentivized risk-taking and work-effort? In this study, we speculate that not only the standard fixed wage plays a role in the effort choice, but also on how much risk a worker is willing to bear in his compensation package.

According to agency-theory, when effort is verifiable, incentives have no effect because the principal can dictate the effort level that maximizes profits. In real life situations, however, observable effort is rare. Also rare is a situation where the agent is risk-neutral, and thus has no preferences over the consequences from random forces affecting profitability. Assuming that the agent’s utility strictly depends on the wage offered, then the agent is, to some extent, risk-averse. In the same way, the principal’s profit is determined by the effort exerted from the agent and so by random factors. Now, if the agent receives the maximum level of incentives, i.e., the compensation is completely variable, then the agent would exhibit the highest possible effort to maximize profits. But offering the maximum of incentives is far from being optimal because this reduces significantly the net principal’s profits, and also, because the risk-aversion nature from the agent matters. This seems to be a dilemma only for the principals. Yet, in this paper, we speculate that the agents’ decision over the composition of their own wage structure might play an important role in their performance.

From the above arguments, principals must design effective incentive schemes for their agents. But how much of the compensation package should be fixed and how much variable? Should the principal delegate this decision to the agent, who in fact has an important stake on it? Could own risk-distributional preferences offset the typical risk-aversion?
A typical concern while testing incentive systems (from the field) is the lack of control over the variables of interest. Responses to incentive systems (and their associated risks) become difficult to interpret due to their interaction with factors that are unobservable. More specifically, the pure effect of a decision over the wage structure on work effort is unknown. Therefore, we present a controlled laboratory experiment using a reframed version of the well-known Fehr et al. (1998) bilateral gift-exchange in which we compare workers’ effort, when they are able to decide how much of their payment is variable, and when the typical fixed rate is the only option. The variable component is limited to max. 30% of the initial wage offer (the rest remains fixed) and it increases/decreases with effort and also with a random factor. What at first sight might seem counterintuitively, we find that risk-averse workers exposed about ¾ of their variable component to risk, and on average, increased their work effort by half (relative to those with a fixed pay). Other things equal, the increase on effort is strongly associated with the workers’ preferences for receiving a variable pay, as well as on their propensity to actually take risks (by choosing a higher proportion of their variable component). An important economic consequence is that the employers’ revenues under the variable wage were twice higher than under a fixed pay. Theoretical explanations are presented in section 4.

The reminder of the paper proceed as follows. In the next section, we present a literature review, while section 3 introduces the experimental design. Section 4 contains our behavioral predictions and in section 5, we summarize our results. In the last part, we conclude.

2. Related Literature

While several theoretical papers have studied risk-taking incentives from principal-agent models (see Dittmann et al., 2017 for a comprehensive overview), empirical research is less known. For instance, Lambert (1986) and Core and Qian (2002) use discrete volatility choices where the agent exert effort to obtain information about investment projects. Feltham and Wu (2001) and Lambert and Larcker (2004) investigate whether the agent's effort affects the mean and the variance of the firm value. In addition, similar models have been proposed to solve special cases using continuous effort and volatility choice (i.e., Hirshleifer and Suh, 1992; Flor et al., 2014; Hellwig, 2009; Sung, 1995; Ou-Yang, 2003; Manso, 2011; and Dittmann et al., 2017).

We then complement this theoretical literature, and contribute to the empirical research, by providing experimental evidence under control conditions and using real economic incentives. This
becomes particularly important since the majority of the empirical research exhibits endogeneity problems i.e., the firm’s risks and incentives are simultaneously determined in the compensation plan. For instance, in Dittmann et al. (2017), the agent simultaneously makes two choices: exerts a costly effort to affect the firm's expected value, and costless effort to affect the firm's stock return volatility\(^1\). To solve this issue, our setting allows the agent’s effort to affect the expected firm value but not the associated risks, which in our framework, are determined by a random factor. With this in mind, we aim to capture two dimensions of principal-agent situations, the decision on the costly effort to affect the firm’s value, and an exogenous shock from random forces. Moreover, we introduce an incentive to take risk over the composition of the wage offered and which increases with effort.

3. Experimental Design and Procedure

We ran one baseline (B) and a treatment experiment (T): in B we employ a rephrased version of the Fehr et al. (1998) bilateral gift exchange game with the typical fixed wage, and T with a variable wage. In B, subjects were randomly paired as employers and employees. Each employer was matched anonymously with an employee, and both located in the same room. The game consists of two stages. In the first stage, the employers are endowed with 120 Guilders (experimental currency) each. Then each employer choses a wage (between 20 and 120) for his employee. In the second stage, employees can either accept or reject the offer. A rejection ends the game and both employer and employee earn nothing. If the employee accepts, he receives the wage offer, and must then choose on a scale from 1 to 10 an effort level (which represents a factor between 0.1 and 1.0) with an associated cost that increases with effort. At this point the game is over and no subsequent periods are played. Thus, wage and effort determines the employer’s (F) and employee’s (E) payoff functions:

\[
\Pi_F = (v - w) e \\
\Pi_E = w - c(e) - C_o
\]

where \(v\) represents the employer’s endowment of 120 Guilders, \(w\) denotes the wage, \(e\) is the employee’s effort choice, \(c(e)\) denotes increasing effort costs, while \(C_o\) represents fixed costs for

\(^1\) Following Innes (1990), they assume that the agent can costlessly reduce output. That is, the wage is non-decreasing.
the employee equal to 20 Guilders (detailed definition of variable in the appendix). The feasible
effort levels and the corresponding costs of effort are represented in the following table:

<table>
<thead>
<tr>
<th>effort</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>c(e)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>p(e)</td>
<td>0.6</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.4</td>
<td>1.6</td>
<td>1.8</td>
<td>2.0</td>
<td>2.2</td>
<td>2.4</td>
</tr>
</tbody>
</table>

The employer’s payoff has two equally possible values, either high (H) or low (L) and the resulted
payoff is determined by a random factor ($\xi$) which represents a market success factor. $\xi$ has two
possible values either 0.5 or 1.5. Each value has 50% chance of occurring, and a random device
decides one of the two$^2$.

More specifically, each of the feasible effort choices involves a 50% chance of generating the
employer’s low payoff, and a 50% chance of the high payoff:

$$\Pi_{FH} = (v - w)e \cdot 1.5$$
$$\Pi_{FL} = (v - w)e \cdot 0.5$$

$T$ is identical to $B$, except that the employee can decide the type of payment scheme (fixed or
variable) and does this just after receiving the offer $w$. Under the variable scheme, the employee
decides the variable amount ($\alpha$) which can be from 0 up to 30% of the initial offer $w$. The decision
on the type of scheme does not affect the income of the employer. Then, the variable component
($w_v$) is determined by the employee’s effort level (effort factor $p_e$), and also by the random factor
($\xi$). If the employee choses a variable scheme ($\alpha>0$) thus:

$$w_v = \alpha w \cdot p_e \cdot \xi$$

The employee also decides $p_e$ (from 0.6 up to 2.4) by choosing the effort level (see Table 1). This
factor act as an incentive to both, increase the proportion of the variable component and also the
effort.

$^2$ In a typical principal-agent situation, the correlation between the work effort and the firm’s profit is not perfect. This
is because of the intervention of market random forces. We aim to mimic this by introducing the random factor $\xi$. 
To the contrary, the fixed component $w_f$ is determined as follows:

$$w_f = (1 - \alpha)\ w$$

Therefore, the net payment $\Pi_E$ is determined by:

$$\Pi_E = (w_f + w_v) - c(e) - C_o$$

Note that if the employee decides to receive a fixed pay ($\alpha = 0$), then he receives a fixed amount as it occurs in our benchmark B.

A sample of 200 students from the Neu-Ulm University of Applied Sciences, Germany, participated in the experiment. They were distributed in 14 sessions, 102 subjects in B and 98 in T. Each session lasted about 45 minutes and participants were paid privately and in cash after the session was over. The experimental currency was converted into Euros at a rate of 5 Guilders = 1 Euro. Participants earned on average 12 Euro including a set of incentivized elicitation questions and 5 Euro compensation for their attendance to the experiment. This amount is relatively higher than the average payment that a student would earn in one work hour. Subjects were in their early twenties ($Mdn = 23$ years, $SD = 4.79$), had mainly a business-economics background, and 53% were female. Participants received detailed instructions through the PC screen and also a summary on paper. To ensure full understanding of the instructions and payoff functions, subjects solved several hypothetical exercises prior to the actual experiment. In these exercises, participants calculated both the employer and employee payoffs, and the answers were reviewed before proceeding. When an answer was incorrect, a pop-up message with the correct answer appeared in the screen. Subjects had also the opportunity to raise their hand for further assistance. The experiment was conducted in the German language and programmed with the software z-Tree (Fischbacher, 2007).

4. Predictions of Behavior.

Assuming profit-maximizers workers who have in T the possibility to multiply their payoffs by the factors $p_e$ and $\zeta$, we should expect, for a given wage, the higher $\alpha$ and higher effort levels compared with B. Also, from backward induction, employers anticipate this and offer higher amounts in T than in B. Thus we present:
Hypothesis 1

$e_T > e_B$

Hypothesis 2

$w_T > w_B$

Supporting the above hypotheses, reciprocal models and a vast empirical evidence demonstrate that people tend to respond kind actions by reciprocating, even when it is costly (see Fehr et al., 1993; Berg, et al., 1995, and the large body of evidence thereafter. Fehr and Falk, 2008, provide an early overview). The Akerlof’s (1982) model, for instance, describe a positive offer from the employer as an invitation to the worker to “exchange gifts” where wage and effort represent the gifts respectively. In T, the possibility to both, determine the wage composition, and to multiply profits by the effort and market success factors can be interpreted by workers as an “additional gift” which would induce a higher work effort compared with Baseline.

Furthermore, we will here mainly concentrate on the agent’s behavior and show that an agency model that incorporates the agent’s distributional preferences over a fixed and variable component of a compensation can predict higher effort.

Consider the linear agency model where the principal offers a fixed wage in exchange for a costly work effort. Note that this model reflects the exchange transaction in Baseline and that the worker’s utility can be represented as follows.

$$U = w - c(e) \tag{1}$$

Now, in a more realistic representation of a principal-agent exchange, agents are assumed to be risk-averse (with respect to fluctuations in their incomes resulting from random factors). If the agent’s expected utility is expressed in terms of income from $w$ and the realization of a particular state of nature (random variable $\xi$) then we have that utility in T can be expressed:

$$EU = E(w) - \xi^2 K - c(e) \tag{2}$$

where $E(w)$ is the expected value of the compensation and the terms $- \xi^2 K$ and $- c(e)$ reflect respectively an utility loss from the exposure to risk, and from the cost of effort. In this setup, $\xi$ represents the swings in the agent’s pay (as the market success factor moves up and down) while $K$ denotes the risk-aversion parameter that is constant and non-negative.
Let us now simply incorporate in (3) the agent’s distributional preferences over their own compensation structure. Here, the term \( \alpha (w p e \xi) \) measures the preferences with respect to the variable component, while the fixed element is denoted by \((1-\alpha) w\). Note that in the former, the payment depends on the allocation choice \( \alpha \) from the initial wage offer \( w \), effort factor \( p_e \), and random forces \( \xi \). For the third term \((1-\alpha) \xi^2 K\), we let the aversion to risk to be diminished by distributional preferences (since the agent signals lower risk-aversion by setting \( \alpha \neq 0 \)). In other words, the larger is \( \alpha \), the lesser is the negative impact from \( \xi^2 K \) on \( EU \) and therefore the higher the agent’s expected utility in (3) compared to (2). Moreover, when agents decide an \( \alpha = 0 \), meaning that they prefer a fixed payment, the scheme in (3) equals the typical fixed scheme in (2).

\[
EU = \alpha(w p_e \xi) + (1-\alpha)w - (1-\alpha)\xi^2 K - c(e) 
\]  

(3)

By taking the partial derivative of \( EU \) with respect to \( \alpha \) we arrive at:

\[
\delta EU/\delta \alpha = w (p_e \xi -1) + \xi^2 K 
\]  

(4)

Cet par, as risk-aversion increases, \( EU \) becomes very responsive to an increase in \( \alpha \). Similarly, as risk-aversion approaches to zero little change on \( U \) to a change on \( \alpha \) is expected. Assuming risk-averse subjects, we should see (counterintuitively) workers choosing high levels of \( \alpha \). Similarly, given that utility-maximizer agents with risk distributional preferences \((\alpha \neq 0)\) expect a higher utility the higher the \( \alpha \) is, we should also see, high \( \alpha \) choices.

Next, based on the well-known positive relationship wage-effort, we should see that the higher the \( \alpha \), the higher the effort choices. Finally, from a cross-treatment comparison, we should then expect higher effort levels in the treatment compared to the baseline.

Yet we propose an alternative hypothesis. Prospect Theory have strongly demonstrated that individuals are more affected by losses than for gains of the same magnitude. In the treatment, workers who set \( \alpha > 0 \) will experience a loss if the realized outcome is a low payoff. Anticipating feelings of disappointment if their work effort does not result in a positive outcome, workers will minimize the loss by setting \( \alpha = 0 \) thus avoiding any variability in their payoffs. This leads us to the following alternative hypothesis 3:

\[ e_T = e_B \]
and from backwards induction:

\[ WT = WB \]

Similar predictions from loss-aversion are those from risk-aversion. Risk-averse workers will also avoid risk exposure by deciding a fixed wage.

5. Results

In this section, we summarize the main results. The descriptive statistics in Table 2 show that while the average wage offers in T decreased with respect to B, the work effort increased and the costs of effort doubled.

Table 2.

<table>
<thead>
<tr>
<th>Summary Statistics by Treatment and Statistical Tests</th>
<th>Baseline</th>
<th>Treatment*</th>
<th>Mann-Whitney U-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(M)</td>
<td>SD</td>
<td>Mdn</td>
</tr>
<tr>
<td>Wage offer ((w))</td>
<td>62.1</td>
<td>17.1</td>
<td>60</td>
</tr>
<tr>
<td>Effort</td>
<td>3.3</td>
<td>1.84</td>
<td>4</td>
</tr>
<tr>
<td>Cost of effort</td>
<td>3.15</td>
<td>3.04</td>
<td>4</td>
</tr>
</tbody>
</table>

* In () statistics when \(\alpha > 0\)

In line with our main Hypothesis 1, we see that employees in T significantly increased their effort \((Mdn = 6)\) compared to those in B \((Mdn = 4)\), \(Z = -4.35, p = < .001\). Thus we present our first result:

**Result 1:** Employees’ effort is significantly higher when they can decide a variable pay and reveal their risk-preferences than when the payment is fixed.

However, our experimental data rejects Hypothesis 2: we see that the wage offers are marginally lower in T \((Mdn = 60)\) than in Baseline \((Mdn = 55)\), \(Z = 1.65, p = .097\).

**Result 2:** Employers’ initial offers are higher under the fixed than under the variable scheme.

This result might suggest two polarized interpretations. As we inferred, employers in T anticipate an increase in effort from their workers and hence higher payoffs with respect to B. This makes them behave as profit-maximizers and at best, they offer on average the same amounts compared to B. Another interpretation derives from our hypothesis 3: employers anticipate risk/loss-aversion
from their employees expecting them to choose on average a $\alpha = 0$, hence they offer wages similar to those in B.

Table 3.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th></th>
<th>Treatment*</th>
<th></th>
<th>Mann-Whitney U-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$Mdn$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Payoff F&lt;sup&gt;a&lt;/sup&gt;</td>
<td>18.0</td>
<td>14.5</td>
<td>13</td>
<td>36.1</td>
<td>29.9</td>
</tr>
<tr>
<td>Payoff E&lt;sup&gt;b&lt;/sup&gt;</td>
<td>38.9</td>
<td>16.5</td>
<td>36</td>
<td>36.7</td>
<td>21.2</td>
</tr>
<tr>
<td>Payoff pair&lt;sup&gt;c&lt;/sup&gt;</td>
<td>57.0</td>
<td>17.5</td>
<td>57</td>
<td>72.9</td>
<td>38.6</td>
</tr>
<tr>
<td>Effort/wage&lt;sup&gt;d&lt;/sup&gt;</td>
<td>.053</td>
<td>.029</td>
<td>.054</td>
<td>.110</td>
<td>.070</td>
</tr>
<tr>
<td>Cost/wage&lt;sup&gt;e&lt;/sup&gt;</td>
<td>.050</td>
<td>.047</td>
<td>.053</td>
<td>.157</td>
<td>.136</td>
</tr>
</tbody>
</table>

Notes. <sup>a</sup> F = Employer. <sup>b</sup> E = Employee. <sup>c</sup> Pair = Sum of F’s and E’s Payoffs. <sup>d</sup>Proportion of effort with respect to the initial wage $w$. <sup>e</sup>Proportion of costs of effort with respect to the initial wage $w$. * Statistics in () when $\alpha > 0$

Furthermore, Table 3 shows that due to a marginal reduction in the initial wage offers and an increase in the work effort, the employers’ payoff in T ($Mdn = 30$) is twice as high as in B ($Mdn = 13$), $Z = -3.70$, $p = <.001$. This treatment effect on payoffs does not hold for the employees’, which on average received about the same money in B and T ($Mdn = 36$ vs. $35$), $Z = .832$, $p = .405$. This is not because employees did not want to exert effort under a self-selected variable pay, but because the costs doubled with respect to B ($Mdn = .120; .053$), $Z = -4.56$, $p = <.001$.

**Result 3:** Firms’ payoffs are higher under the variable pay structure, while the employees’ payoffs remain the same under the variable or fixed pay contract.

Moreover, regardless of a significant increase in work effort and wage savings, the payoffs per pair in T were not statistically significantly higher compared to B ($Mdn = 57$ vs. $57$), $Z = -1.24$, $p = .213$.

Considering that significantly higher effort levels in T did not result in higher workers or pairs’ payoffs, we might speculate that the employees’ preferences for own profit-maximization and for efficiency are not sufficient. Moreover, since workers were able to estimate their own payoff before
making their effort choice, it is intriguing that in T they were willing to bear significantly higher costs, about double compared to B. This might call for a behavioral explanation as we infer in our main hypothesis. Apart from merely economic reasons, the workers’ risk-distributional preferences over their compensation package seem to play an important role in their work efforts choices. In the following section, we provide evidence suggesting that this might be the case.

5.1 Behavioral Analysis within the Treatment.

In T, just after workers made their effort choice and before getting to know the outcomes of the experiment, they answered a set of follow up questions. First, we ask them what was the most attractive aspect of their compensation: a) “it is fixed”, b) “it is variable and increases with my quantity of work and by 1.5 if the random device decides so”. 75% of the subjects answered that it was attractive because of its variable condition. In addition, we ask what is the best wage structure: a) fixed or b) variable. Consistent with the previous question, 71% preferred a variable scheme. Most importantly, correlation results from these questions and effort choices indicate a highly significant and positive relationship: coef. \(= 4.83, p = .002\) and coef. \(= 1.54, p = .004\)

Furthermore, we elicited the risk and loss aversion using the well-established decision problems by Kahneman and Tverksy, (1984, 1992). For the former, participants decided between these two options: a) "Receive 240 euros for sure" or b) "Play a gamble with 25% of receiving 1000 euros, and 75% of receiving nothing". For the later, subjects stated the amount \(x\) that they would want to win to be indifferent between these two options: a) “Receive 0 euros for sure” or b) “Flip a coin where you have 50% probability of receiving \(x\), and 50% probability of losing 25 euros?” These elicitation methods were incentivized and presented just after the subjects’ job market decisions and before the experimental results were revealed.

Next, we present the summary statistics within T. As we inferred in the prediction’s section, \(\alpha\) levels are high, despite the majority of workers revealed to be risk (76%) and loss-averse (78%). From Table 4 we see that on average workers decided that about 2/3 \((Mdn = .666)\) from their possible variable component \(.30*W\) would be exposed to the random factor \((\zeta)\). Therefore, on average subjects insured a fixed amount of 80% of their initial wage offer \((Mdn = .80)\).
From the agency model presented in section 4, we examine whether workers who increase/decrease their $\alpha$ are more prone to increase/decrease effort. Our data confirms our predictions.

The following Table 5 presents a subsample analysis of workers within T. They are classified by those who chose a higher/lower $\alpha$ than the median ($Mdn = .666$). First we see that those who selected a low $\alpha$ ($\alpha_L$), exerted an average effort of $Mdn = 4$, while those who chose a high $\alpha$ ($\alpha_H$) doubled the effort levels ($Mdn = 8; Z = -4.31, p = <.001$).

Because of a highly significant increase in effort choices, the employers’ payoffs were also significantly higher when workers chose a $\alpha_H$ than when otherwise ($Mdn = 35), Z = -2.86, p = <.004$. In addition, the payoffs by pair were significantly higher when a $\alpha_H$ was chosen ($Mdn = 72 vs. 53.5; Z = -2.85, p = <.004$. However, although workers who set a $\alpha_H$ doubled their efforts with respect to their counterparts, they did not obtain a statistically significant higher payoff ($Mdn = 39 vs. 32.5; Z = -1.58, p = <.112$).

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In order to validate our results and further investigate the self-selected pay system we present a set of Tobit regression models (Table 6).

First, the coefficient for Treatment in regression (1) confirms that subjects exert higher effort in T than in B. This is also true after controlling for initial wage offers (2) and gender (3). The coefficient for Wage also confirms the positive relationship wage-effort found in previous studies, even when
the workers’ payment can be variable \((Treatment*Wage)\). Moreover, from Female we see that work effort does not vary by gender. In addition, the interaction terms in (4) and (5) show that the treatment effect does not depend on gender or on the initial wage. There is also a treatment effect on wage offers. However, it is only significant at \(p < .10\) level. Table 7 shows that this effect holds after controlling for gender (2), and from (3) we see that it is not different for males and females.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>-6.30*</td>
<td>-6.32*</td>
<td>-5.18</td>
</tr>
<tr>
<td></td>
<td>(3.32)</td>
<td>(3.31)</td>
<td>(5.03)</td>
</tr>
<tr>
<td>Female</td>
<td>.392</td>
<td>1.39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.35)</td>
<td>(4.90)</td>
<td></td>
</tr>
<tr>
<td>Treatment*Female</td>
<td></td>
<td></td>
<td>-2.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(6.67)</td>
</tr>
<tr>
<td>Intercept</td>
<td>62.16***</td>
<td>61.95***</td>
<td>61.42***</td>
</tr>
<tr>
<td></td>
<td>(2.43)</td>
<td>(3.17)</td>
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<tr>
<td>(R^2)</td>
<td>.004</td>
<td>.004</td>
<td>.004</td>
</tr>
<tr>
<td>F-statistic</td>
<td>.061</td>
<td>.161</td>
<td>.284</td>
</tr>
</tbody>
</table>

Notes. Tobit regression models ( ) with robust std errors in parentheses.  
\(n = 100\) for all models.  
Treatment and Female = 1.  
***\(p < .01\). **\(p < .05\). *\(p < .1\).  

Now, in Table 8 we introduce behavioral covariates as determinants of effort levels in \(T\). The coefficients for Pay Preference confirm our main hypothesis by revealing a strong and positive correlation between the employees’ preference for receiving a variable payment and their exerted work effort. Importantly, this relationship holds after accounting for the employees’ gender, risk, and loss aversion. Notice also that in (3) and (4) the coefficients for risk and loss-aversion are positive (but not significantly different from zero). By gathering the data from both Baseline and Treatment, the interaction terms Treatment*Risk-Aversion and Treatment*Loss-Aversion are statistically significant with \(p=.005\) and \(p=.014\) respectively. In line with our predictions, it is actually risk and loss-averse subjects (compared with risk and loss-seekers) who drive the treatment effect. Based on this, we could argue that to some extent, the own risk-distributional preferences might offset the aversion for risk and losses.
To conclude, in section 4 we predicted that a higher chosen $\alpha$ would lead to a higher effort. The coefficients for $\alpha$ in Table 9 suggest that this is the case. From (1) and (2) we see that the correlation is positive and highly significant, and from the interaction term in (3), we see that this relationship is not conditional on gender.

Table 8.

*Determinants of the effort/wage ratio*

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay Preference</td>
<td>.060***</td>
<td>.062***</td>
<td>.061***</td>
<td>.059***</td>
</tr>
<tr>
<td></td>
<td>(.019)</td>
<td>(.018)</td>
<td>(.018)</td>
<td>(.019)</td>
</tr>
<tr>
<td>Female</td>
<td>-.008</td>
<td>-.004</td>
<td>-.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.018)</td>
<td>(.018)</td>
<td>(.018)</td>
<td></td>
</tr>
<tr>
<td>Risk Aversion</td>
<td></td>
<td>.028</td>
<td>.023</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.018)</td>
<td>(.019)</td>
<td></td>
</tr>
<tr>
<td>Loss Aversion</td>
<td></td>
<td></td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(.019)</td>
<td>(.000)</td>
</tr>
<tr>
<td>Intercept</td>
<td>.065***</td>
<td>.068***</td>
<td>.045**</td>
<td>.043**</td>
</tr>
<tr>
<td></td>
<td>(.016)</td>
<td>(.018)</td>
<td>(.021)</td>
<td>(.021)</td>
</tr>
<tr>
<td>R²</td>
<td>-.064</td>
<td>-.065</td>
<td>-.080</td>
<td>-.091</td>
</tr>
<tr>
<td>F-statistic</td>
<td>.003</td>
<td>.005</td>
<td>.005</td>
<td>.008</td>
</tr>
</tbody>
</table>

Notes. Tobit regression models ( ) with robust std errors in parentheses. n = 49 for all models. Preferred Pay Structure (variable), Female, and Risk Aversion = 1. Loss aversion = continuous covariate (loss neutrality = 25, $M = 164.04$, $Mdn = 60$)

***$p < .01$, **$p < .05$, *. $p < .1$.
Typically, firms face a trade-off between offering maximum incentives and an optimal distribution of risks that affect the workers’ compensation. High incentives lead to higher risks, and because employees are usually risk-averse, and hence expect a lower expected utility, firms must compensate for the random forces. However, the higher the compensation (fixed salary), the lower the firm’s utility. In this paper, we hypothesize that the distribution of such risks on the hands of the own workers can outweigh the typical risk-aversion and therefore has a positive effect on their performance.

We experimentally test this issue by using a reframed version of the gift-exchange game by Fehr et al. (1998). We let workers to decide how much of their wage is variable and we compare their work effort against the traditional fixed salary scheme. The variable component is limited to max. 30% of the initial wage offer and it increases/decreases with effort and also with a random factor. We find that a) risk-averse workers exposed ¼ of their variable component to risk and b) they outperformed their counterparts by half in work effort levels. Cet par, this increase in effort is related to the workers’ risk-distributional preferences over a given compensation package.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha$</td>
<td>0.107***</td>
<td>0.107***</td>
<td>0.096***</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.016)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Female</td>
<td>0.000</td>
<td>-0.020</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.017)</td>
<td></td>
</tr>
<tr>
<td>$\alpha \times$ Female</td>
<td>0.035</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.047***</td>
<td>0.047***</td>
<td>0.054***</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.009)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>R²</td>
<td>-0.183</td>
<td>-0.183</td>
<td>-0.188</td>
</tr>
<tr>
<td>F-statistic</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

Notes. Tobit regression models ( ) with robust std errors in parentheses. 
n = 49 for all models. 
Female = 1

***p < .01. **p < .05. *p < .1 .

6. Summary and Discussion

Typically, firms face a trade-off between offering maximum incentives and an optimal distribution of risks that affect the workers’ compensation. High incentives lead to higher risks, and because employees are usually risk-averse, and hence expect a lower expected utility, firms must compensate for the random forces. However, the higher the compensation (fixed salary), the lower the firm’s utility. In this paper, we hypothesize that the distribution of such risks on the hands of the own workers can outweigh the typical risk-aversion and therefore has a positive effect on their performance.

We experimentally test this issue by using a reframed version of the gift-exchange game by Fehr et al. (1998). We let workers to decide how much of their wage is variable and we compare their work effort against the traditional fixed salary scheme. The variable component is limited to max. 30% of the initial wage offer and it increases/decreases with effort and also with a random factor. We find that a) risk-averse workers exposed ¼ of their variable component to risk and b) they outperformed their counterparts by half in work effort levels. Cet par, this increase in effort is related to the workers’ risk-distributional preferences over a given compensation package.
Moreover, we show that the higher the employees’ exposure to risk the higher their work effort. These results are at odds with the typical risk-aversion behavior. Here we provide some theoretical evidence (supported by data) suggesting that risk-distributional preferences might offset risk-aversion and thus lead to a higher work-effort.

From real-world situations, we actually observe that incentivized risk-taking is important because it diminishes the risk-aversion from managerial decision-making. Often, risk-averse CEOs avoid risky projects thus reducing the probabilities for the firm to obtain higher returns. (see for example Low, 2009; Knopf et al., 2002; Coles et al., 2006; Acharya et al., 2011; Dittmann et al., 2017). A compensation structure where agents are able to absorb part of the risks, and therefore become residual claimants, arise as a possible solution. Under the franchising business model, franchisees benefit from paying a fixed amount to the franchiser and by keeping the residual profits, but bearing the influence from random factors. Becoming residual claimants and exposing their own capital to risks seems to be enough motive to exert higher work efforts. At the same time, franchisers benefit from profit sharing, risks diversification, and costs reduction from i.e., performance monitoring.

Yet a contrasting example is the stock purchase plans (ESPP). Listed firms create a gift-exchange situation in which they offer discounted stock rates expecting from their employees a higher performance. To accept such exchange, workers should be enough motivated to be more productive to rise the share price and, in addition, overcome the typical free-riding problem. Evidence demonstrate that these type of employee-ownership plans might be not that appealing since an important proportion of workers do not accept the offer (Engelhardt and Madrian, 2004; Pendleton et al. 2009; Babenko and Sen, 2011; Bryson and Freeman, 2018). Indeed, these contrasting stories leave several questions open for future research.
Appendix

Definition of variables.

Guilders = experimental currency

Players: Employer’s (F) and employee’s (E)

\( v \) = F’s experimental endowment of 120 Guilders

Wage (\( w \)) = initial wage offer from F to E, \( 20 \leq w \leq 120 \) Guilders

Effort (\( e \)) = work effort chosen by E, \( 1 \leq e \leq 10 \)

\( c(e) \) = costs of effort, \( [0, 1, 2, 4, 6, 8, 10, 12, 15, 18] \) Guilders

\( C_o \) = fixed costs for E = 20 Guilders

\( p(e) \) = effort factor, \( [0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4] \)

\( \Pi_F \) = employer’s payoff in Guilders

\( \Pi_E \) = employee’s payoff in Guilders

\( \alpha \) = proportion of the wage offer \( w \) that becomes variable, \( 0 \leq \alpha \leq 0.3 \cdot w \)

\( w_v \) = compensation component that varies on \( e \) and on a random factor (\( \xi \))

\( \xi \) = random factor, \( [0.5, 1.5] \)
References


