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Abstract

While the relationship between management control systems and creativity performance in the organization has been extensively studied in the accounting literature, we still lack an understanding of how different kinds of management control systems influence different stages and different types of creativity performances. My dissertation therefore enriches this literature by disentangling the effects of incentives between different types of creativity as well as different stages of the creative process. In my first essay, I experimentally investigate the effects of framing of incentives on two stages of creativity process: idea generation and idea selection. I find that incentives framed negatively as penalty contracts stimulate people's performance in idea generation task, and lead people to select highly-novel creative ideas in the idea selection task. This finding suggests that organizations could improve creativity performance by changing the framing of the incentive contracts. In my second essay, I particularly focus on creative idea generation by examining whether monetary reward has different effects on creativity performance when the creativity task is responsive creativity compared to when the creativity task is expected creativity. The results suggest that the presence of monetary reward positively affects creativity performance when it is responsive creativity, but negatively affects creativity performance when it is expected creativity. Additionally, social-recognition reward leads to higher performance in expected creativity task but not in responsive creativity task, compared to monetary reward. These findings suggest that organization should provide different types of incentives based on the type of the creativity task. Taken together, these essays expand to our understanding of the cost and benefit of different types of management control systems on creativity performances in different stages and different types of creativity processes.

1 The effect of contract framing on different stages of creativity performance

In this study, I experimentally examine the effects of incentive framing on two stages of creativity process: idea generation and idea selection. For idea generation performance, I find that participants under penalty contract outperform those under bonus contract. Specifically, I predict and find that penalty contract leads to a higher level of cognitive flexibility and more highly novel ideas. I further find that the positive effects of penalty contract only lead to better performance in the initial phase but not the later phase of the idea generation process. For idea selection performance, I predict and find that participants under penalty contract are more likely to select extreme novel ideas rather than balanced ideas that are both moderately novel and useful. This study extends the management controls literature and creativity literature by bringing to the forefront neglected role of framing of incentive contracts and the effects of incentive contracts on creative idea selection performances.

Keywords: Creativity, Framing of incentive contracts, Experiment

1.1 Introduction

Carrots may work better if they can somehow be made to look like sticks (The Economist, 2010).

Organizations often use performance-based incentive contract to motivate employees to achieve higher performance. An incentive contract can be either framed positively as a potential gain or framed negatively as a potential loss. Over the past decade, the effects of framing of incentive contracts on performances have drawn increasing attention to accounting literature (Brink and Rankin, 2013; Christ et al., 2012; Church et al., 2008; Hannan et al. 2005; Liu and Zhang, 2015; Luft 1994). While previous literature mainly focused on examining the relationship between framing of incentive contracts and employee's effort, the effects of incentive framing on creativity performance has been overlooked., As the key determinant of organizational innovation in products and services, creativity is also important to create values to the organization and playing an increasingly important role in the organization's day-to-day activities. Therefore, it is important for organizations and researchers to understand whether the framing of incentive contracts also influence creativity performances. Followed by Hannan and colleagues (2005) call for future research that more comprehensive studies are needed to better understand the conditions in which firms should use the framing of incentive contracts, the first goal of this paper is to examine whether the framing of incentive contracts influence creativity performances.

Creativity is a multi-stage concept that involves two-stage processes: idea generation and idea selection (Amabile, 1983; Rigolizzo and Amabile, 2015). Specifically, the goal of idea generation is to produce ideas as novel as possible, whereas idea selection is the stage that used to determine which idea is optimally novel and useful for implementation in the current business environment (Rigolizzo and Amabile, 2015). Current accounting literature mainly

focuses on investigating the effects of incentive contracts on idea generation performance (Chen et al., 2012; Kachelmeier et al. 2008; Kachelmeier and Williamson, 2010). This is in part due to the underlying assumption that managers can always select the most creative ideas among various ideas. However, this assumption is not valid because existing studies show that selectors are not able to identify the most creative ideas from the pool of idea (Faure, 2004; Putman and Paulus, 2009; Rietzschel, Nijstad, and Stroebe, 2006). Therefore, it is important for organizations and researchers to understand not only how to motivate the idea generation performances, but also how to motivate idea selectors to make better decisions on creative ideas selection. Therefore, the second goal of this paper is to investigate the effects of framing of incentive contracts on both idea generation and idea selection.

I examine how the positive-framed incentive contracts (hereafter, bonus contract) and the negative-framed incentive contracts (hereafter, penalty contract) affect people's performances in the idea generation versus idea selection stage of the creativity process. Building on prospect theory (Kahneman and Tversky, 1981) in psychology, I predict that penalty contract will lead to higher creativity performance in the idea generation stage and leads selectors to choose extreme novel ideas against balanced ideas that are both moderately novel and useful in the idea selection stage.

Prospect theory suggests that people are generally loss averse such that they are more averse to suffering a loss than they are to forgoing the same amount of gain. As a result, people tend to behave more risk-taking when facing the threat that is loss-framing compared to gain-framing (Thaler et al., 1997). Risk-taking is suggested to be an essential element of creativity because it encourages people to push boundaries and explore new territories (Kleiman 2008). Risk-taking behavior is positively related to idea generation performance because it encourages people to challenges the traditional paradigm and breaks the routine. In

fact, the word entrepreneur was initially defined as “bearer of risk” by the eighteenth-century economist Richard Cantillon (The New Yorker, 2014). Similarly, risk-taking behavior will also lead people to select the extreme novel idea that is inherently associated with uncertainty and risk of failure.

To test my predictions, I design two separate laboratory experiments. In the first experiment, I conducted a 3×1 between-subject experiment to investigate the effects of bonus and penalty contract on idea generation performance. Participants are randomly allocated into three sessions: bonus contract, penalty contract, and fixed-payment contract. All participants are provided with a show-up fee of 5 Euros to participate in the experiment. Participants in the bonus contract condition are informed that if their performance is better than the other half of the participants, they will be rewarded by an additional 5 Euros at the end of the experiment. Participants in the penalty contract condition are informed that they will be granted additional 5 Euros at the beginning of the experiment, however, they have to pay back this 5 Euros if they underperform the other half of the participants at the end of the experiment. In the control condition, participants are informed that they will receive 7.5 Euros in total as the participation fee, regardless of their performances. The results of Experiment 1 indicate that participants with penalty contract generate more highly novel ideas than those with bonus contract. In addition, penalty contract leads to participants’ higher cognitive flexibility than bonus contract.

In the second experiment, I conduct a 3×1 between-subject experiment to investigate the effects of bonus and penalty contract on people’s selection between an extreme novel idea (very novel but less useful) and an idea that is both moderately novel and useful. Same to Experiment 1, participants are randomly allocated into three sessions: bonus contract, penalty contract and fixed-payment contract. All participants are provided with a show-up fee of 5

Euros for participating in the experiment. Participants in the bonus contract condition are informed that if they selected more creative ideas than the other half of the participants, they will be rewarded by 5 Euros at the end of the experiment. Participants in the penalty contract condition are informed that they will be granted 5 Euros at the beginning of the experiment, however, this reward will be taken away at the end of the experiment if they selected less creative ideas than the other half of participants. In the fixed-payment condition, participants are informed that they will receive 7.5 Euros in total as the participation fee, irrespective of their performances. The results of Experiment 2 suggest that participants with penalty contract are more likely to select an extreme novel idea rather than an idea that is both moderately novel and useful.

This study contributes to several streams of existing literature. First, this study contributes to the current accounting literature on the framing of contract. As an emerging body of research in accounting, framing of incentive contracts has been shown to have impact on employee's effort (Christ et al., 2012; Church et al., 2008; Hannan et al. 2005; Liu and Zhang, 2015; Luft 1994), risk-taking (Brink and Rankin, 2013; Moreno et al. 2002; Sawers et al. 2011), managerial decision-making (Lipe 1993), and acceptance among audit-client dyads (Cohen and Trompeter 1998). However, how the framing of incentive contracts affect creativity performance remains unclear in the literature. I address this research gap by showing that the framing of contracts also has significant impacts on creativity performance.

Second, this study contributes to the accounting literature on the relationship between incentive contracts and creativity performance in different stages. Previous studies have extensively studied the relationship between incentive on creative performance in both individual, team and organizational level (Chen et al., 2012; Chen et al., 2016; Kachelmeier et al. 2008; Kachelmeier and Williamson, 2010). However, prior literature only investigates the

effects of incentive contracts on creative idea generation but neglect its effect on idea selection. This study contributes to this literature by introducing a more complete picture of the relationship between incentive contracts and creativity performance. The results show that the framing of incentive contracts can also influence people's selection choice of creative ideas.

Apart from theoretical contribution to previous literature, the findings of this study are also in line with the interests of the organization. The results of this study have important practical implications for organizations that value creativity. By simply changing the frames of incentive contract, organizations could effectively motivate employees to achieve favorable outcomes in the creativity processes. In day-to-day organization activities, creative workers are often responsible for generating ideas while managers are in charge of evaluating and selecting ideas. This study suggests organizations could consider using different compensation schemes toward different roles in the creativity processes. For example, when novel ideas are required in a relatively short period of time, penalty contract might be more effective than bonus contract. In terms of idea selection, organizations can choose the framing of the contract based on whether they need more extreme novel ideas or more balanced ideas between novelty and usefulness.

The remainder of this paper is organized as follows. First, I discuss the relevant literature and the development of the hypotheses. Next, I explain how the experiment was designed and conducted. Then, I present the results of the hypotheses tests and some additional analyses. The last section offers a discussion.

1.2 Theoretical background and hypotheses development

1.2.1 Framing of incentive contracts

An incentive contract can be framed as either a bonus or as a penalty. A bonus-framed contract offers an agent a monetary reward if the performance goals are met, whereas penalty-framed contract reduces monetary payouts if performance goals are not met (Christ et al., 2012). For example, a bonus contract provides a base payment of $1000 and a potential bonus of $500 if the goal is achieved, whereas a penalty contract provides a base payment of $1500 and a potential loss of $500 if the goal is not achieved. Although these two types of incentive contracts are economically equivalent, it may lead to employees' different perceptions behaviors. In particular, people are likely to perceive bonus contract as a potential gain, while perceive penalty contract as a potential loss.

Framing of incentive contracts has increasingly drawn attention to accounting literature in the recent decades (Christ et al., 2012; Church et al., 2008; Frederickson and Waller, 2005; Hannan et al. 2005) since Luft (1994). Luft (1994) first studies framing of incentive contract by investigating its effects on employee's effort. Luft (1994) finds that although prefer bonus contract than penalty contract, employees with penalty contract exert higher effort than those with bonus contract. Frederickson and Waller (2005) extend this literature in the context of agent-principal relationship. They find that employers accommodate the workers' loss aversion by increasing workers' expected pay penalty frame compared to the bonus frame. Hannan et al. (2005) found that employees make more effort under negative-framed contract. Such effect was the net effect of both individual's loss aversion (more effort) and individual's reciprocity to the perceived fairness of the contract (less effort). Christ et al. (2012) focus on

the effects of incentive framing on the trust relationship between principal and agent. They find that penalty contract leads to employee's lower trust in manager which in turn leads to lower effort than bonus contract. In sum, the framing of incentive contract is found to have a significant influence on people's perception and behavior. This is due to people's greater disutility from losses than the utility they receive from equivalent gains.

1.2.2 Creativity as a multi-stage construct

Prior accounting literature on creativity mainly assumes that creativity is a single-stage construct. For instance, Kachelmeier et al. (2008) primarily focus on identifying the most effective incentive contract for creative idea generation performance. Kachelmeier and Williamson (2010) investigate how different incentive contracts influence creative idea generation performance when participants are given freedom to choose the incentive contract. Chen et al. (2012) focus on the relationship between incentive contracts and creative idea generation in a group setting instead of an individual setting. However, generating creative ideas is only the first step of the creativity process. Before implementing the creative idea into products or services, the best idea should be first selected from the idea pool (Davila et al., 2009; Perry-Smith and Manucci, 2017). Evolutional theory considers creativity as a dynamic, multi-stage process. For example, Werick's model (1979) of the evolutionary theory of creativity and innovation suggests that the processes of creativity and innovation are made of four stages: variation, selection, retention and diffusion. Variation provides opportunities to generate new ideas; selection is the stage to identify which ideas should be adopted for further development; retention involves the refining and coding of the selected ideas, and diffusion is the stage to reproduce these ideas. Similarly, Perry-Smith and Manucci (2017) conceptualize

four phases of the creativity process: idea generation, idea elaboration, idea championing, and idea implementation. Both of the above conceptual frameworks of creativity process suggest that idea generation is just the initial stage of the creativity journey. In order to complete the whole creativity process, the generated creative ideas should then be evaluated and selected for further development. Although idea generation and idea selection are two stages that are close to each other in the journey of creativity, the processing mechanisms of idea generation and selection are different. When individual generate creative ideas, they are likely to engage in divergent thinking which involves searching for novel associations, combinations, or perspectives (Guilford, 1967). On the contrary, when individuals select creative ideas, they are likely to engage in convergent thinking, which involves applying criteria, standards, and logics based on their prior knowledge and experience (Cropley, 2006). In order to motivate both idea generator and selector to perform well in the creativity processes, organizations may apply different incentives schemes toward idea generator and idea selector.

Addition to the conceptual framework that considers creativity as a multi-stage construct, prior literature also provides empirical evidences by distinguishing idea generation and idea selection as two independent stage of creativity process. Yuan and Zhou (2008) investigate the effect of expected external evaluation on both idea generation and idea selection. They find that expected external evaluation is detrimental to creative idea generation but beneficial to creative idea selection. Perry-Smith and Coff (2011) develop a theory about how the optimal group mood varies for the creative idea generation and idea selection stages of creativity. Perry-Smith and Coff find that while an activated-pleasant mood promotes idea generation, idea selection requires a very different mood. Keum and See (2017) examine the relationship between authority hierarchy and creative idea generation and idea selection. They find that although the hierarchy of authority undermines idea generation, it enhances the

performance of idea selection. In sum, creativity is a multi-stage concept that can be separated into creative idea generation and idea selection. Although idea generation and idea selection are sequential stages in the creativity process, the determinants of these two stages could be different such that one factor benefits one stage of creativity but undermines the performance of the other stage of creativity.

1.2.3 Creativity as a two-dimensional construct

Creativity is defined as the production of novel, useful ideas in any domain (Amabile, 1996). Novelty requires that the ideas to be new, original and innovative, whereas usefulness requires the ideas to be practical, feasible and implementable. A novel but less useful idea is not an appropriate creative idea because it is difficult to be implemented. On the other hand, a useful but less novel idea may not be categorized as creative idea at all because it fails to meet the criteria of being novel in the first place (Diedrich et al., 2015). Eventually, organizations only need are a small number of ideas that are both novel and useful. Novelty of the ideas is produced during the idea generation stage, because the goal of idea generation is to produce ideas that are as many and as novel as possible (Campbell, 1960). Usefulness of the ideas could be achieved through the idea selection stage because the objective of idea selection stage is to eliminate useless ideas (Amabile, 1996; Yuan and Zhou, 2008). Taken together, in order to obtain ideas that are both novel and useful, both idea generation and idea selection are crucial in the creativity process.

Creativity research suggests two distinct roles that are involved in organization innovation process: creators and managers. Creator is responsible for generating ideas that are novel and useful, whereas manager is expected to select which idea should be implemented (Mollick,

2012; Berg, 2016). Some organizations deliberately separate idea generation and idea selection stages: the creative workers in the Research and Development department only responsible for generating novel ideas, and it is managers' responsibility to decide whether to invest these ideas into real products (Benner and Tushman, 2003). The advantage of separating creators and managers is to ensure creators have less constraint to generate novel ideas, then it is managers' responsibility to select the best ideas among all the variations (Aldrich, 1999).

1.2.4 Framing of Incentive Contracts and Idea Generation

1.2.4.1 Framing of contracts and risk taking

Previous literature shows that framing of incentive contracts has impact on people's attitude towards risk. Kahneman and Tversky's prospect theory suggests that individuals are risk-averse in choices involving gains and risk seeking in choices involving losses (Kahneman and Tversky, 1981). In their experiment of "Asian disease problem", Kahneman and Tversky find that participants tend to choose the riskless alternative when given the positively framed version of the task, whereas they tend to choose the risky alternative when given the negatively framed version of the task. Thaler and colleagues (1997) investigate the effect of myopia loss aversion on investor's risk taking. The findings show that investors who display myopic loss aversion will be more willing to accept risks if they evaluate their investments less often. If all payoffs are increased enough to eliminate losses, investors will accept more risk. Sawers and colleagues (2011) investigate how stock option compensation influences the effect of problem framing on manager's risk-taking behaviour. The authors find that managers are more risk-taking in the loss context than in the gain context when the exercise price is equal to the prevailing stock price. Oblak, Ličen and Slapničar (2017) extend

Kahneman and Tversky (1981)'s research from the framing of choices to the framing of contracts. The authors investigate how framing of incentive contracts affects people's decisions on risks and efforts. They find that high risk-effort tasks are more stimulated by a penalty rather than a bonus contract. The mechanism of Oblak et al.'s finding has also been studied in budgeting literature in management accounting research. Prior literature shows that employees are more risk-averse when they are ahead of the budget but show risk-taking behaver when the high budget target is present (Ruchala, 1999). Similar to incentive contracts, a budget level could also be perceived as gaining or losing, and such framing could lead to different risk-taking behavior. For instance, a difficult budget goal is more likely to be perceived as loss-framed contract because a punishment will be occurred if the goal is not achieved. In order to achieve the goal to avoid the punishment, employees will choose to take more risky behavior. On the contrary, when the goal is easy to achieve, it will be perceived as a bonus contract because a reward will be occurred if the goal is achieved. In this case, employees are less likely to take risks under bonus contract because the cost of uncertainty by taking risks will lead to greater lost. Based on these arguments and findings, penalty contract is more likely to induce people's risk-taking behaviour relative to bonus contract.

1.2.4.2 Risk taking and generation of creative ideas

Prior literature show that people are generally risk-aversion and favor certain outcomes. Although risk-taking behavior might not be favored in some routine activities in the organization, prior literature shows that it stimulates the creativity idea generation (Utman, 1997; Zhou and Shalley, 2003). Risk taking is considered as an important determinant for creativity idea generation performance, because creative idea generation requires people to

challenge the traditional patterns by connecting elements from different categories which is associated with risk taking. As it is suggested in Shalley and Gilson (2004)'s review paper: "a key in the motivation of employees toward creativity is to ensure that they feel encouraged to take risks and break out of routine" (p.37). Even if risky ideas involve uncertainty that leads to failure, organizations may learn and improve the unsuccessful ideas through trial-and-error process. On the contrary, a risk averse employee is more likely to follow a routine process rather than taking chances to find a new approach (Shalley and Gilson, 2004). Therefore, a risk-taking attitude is expected to facilitate creative idea generation process, whereas risk-averse attitude is expected to undermine creative idea generation.

Prior research provides evidences that the framing of incentive contracts affect creativity performance. For instance, Friedman (2009) finds that participants with non-gain framing incentive contracts produce more original ideas than those with gain framing incentive contracts. However, the experimental design of this study is problematic because incentive contracts that framed as gain and non-gain are not economically equivalent contract. If the expected monetary outcomes of these two incentive contracts are not identical, it is inappropriate to directly compare these two incentive contracts. Compared to the non-gain framing incentive contract, penalty framing incentive contract is likely to lead to stronger effects on participants' perception of losing money because it emphasizes punishment rather than not being rewarded. To summarize, relative to bonus contract, penalty contract is more likely to encourage people to take risks, which will in turn stimulate the idea generation performance. Based on the above arguments and evidences from previous literature, I propose the following:

Hypothesis 1: During idea generation, Penalty contract leads to participants' greater creativity performance in terms of novelty than Bonus contract.

1.2.5 Risk taking and selection of creative ideas

Framing of incentive contracts is expected to not only influence people's performance in idea generation, but also idea selection performance. Based on the definition of creativity, the criteria of a creative idea include both novelty and usefulness. Novelty is the most expected outcome in the idea generation process, however, it is not necessarily the case in the idea selection stage. Research has suggested that novelty benefits the idea generation but inhibits idea selection. For instance, Ford and Sullivan (2004) argue that novel contributions are beneficial to a project team early in its development when its primary goals are to learn more about a problem, search for useful information, and articulate tentative solutions. When the ideas have already been generated, the team's attention shifts toward executing the proposal and satisfying external stakeholders. In this case, additional attempts to introduce novel ideas are likely to disrupt performance and induce frustration. In the book of *how to kill a unicorn (2014)*, the author, Mark Payne, argues that most of the innovations failed not because they are not innovative. On the contrary, they failed because they are too innovative to be accepted by the marketplace. Payne argues that this is because the decision makers always put the "wow" before the "how". It is suggested that idea selectors of failed innovation tend to choose more novel ideas which is related to "wow" than more usefulness which is related to "how". Based on the definition of creativity, the criteria of a good creative idea should take both novelty and usefulness into consideration. As a competent idea selector, this process involves not only identifying novel ideas, but also screening bizarre ideas that are not useful or feasible.

Prior literature in creative idea selection finds that although it seems that selectors are able to select creative ideas, selectors tend to perform at a suboptimal level (no better than chance) in the idea selection task. Choosing more novel ideas can lead to a risk of failure in

the marketplace. A more novel idea is riskier than a more useful idea due to the higher cost and less predictable practicality. Given that prior literature shows that penalty contract are likely to encourage people to take more risks (Kahneman and Tversky, 1981; Thaler et al., 1997; Sawers et al., 2011; Oblak et al. 2017), penalty contract is expected to induce selectors' risk-taking behavior and thus encourage them to select more novel ideas rather than useful ideas.

Hypothesis 2: During idea selection, Penalty contract leads to participants' lower tendency to choose more useful ideas compared to Bonus contract.

1.3 Experiment design

1.3.1 Experiment 1: Idea generation

1.3.1.1 Participants

I recruited 70 students for 50-minute compensated lab experiment from an Italian university. Participants received an average compensation of 7.5 Euros in the experiment. The average age of participants was 20.6 years and 51.4% was male. All the experiment sessions took place in the laboratory via the computer-based Qualtrics program.

1.3.1.2 Experimental design

Experiment 1 implements a 3×1 between-subjects design. I manipulated the framing of incentive contracts such that participants were randomly assigned to one of the three experimental conditions: bonus contract, penalty contract and fixed payment contract.

For Participants under bonus contract, they were instructed as described below:

In order to encourage you to do the best, you will be paid a salary of €5 for your work in this study. In addition, you will receive a €5 BONUS, depending on the number of valid solutions you generate. More specifically, if you generate an above-average number of valid solutions (relative to all other participants in this study), you will GAIN an extra €5. Otherwise, if you generate a below-average number of valid solutions, then you will not be rewarded and will instead receive only the €5.00 base payments.

For Participants under penalty contract, they were instructed as described below:

In order to encourage you to do your best, you will be paid a salary of €10 for your work in this experiment. However, you will be charged a maximum €5 PENALTY, depending on the number of valid solutions you generate. More specifically, if you generate a below-average number of solutions (i.e., relative to all other participants in this study), you will LOSE €5. Otherwise, if you generate an above-average number of solutions, then you will not be punished and will instead receive the full €10 base payment.

For the fixed payment condition, participants are instructed that "*You will be paid a compensation of €7.5 for your work in this study*".

As a manipulation check, participants answered a question about the incentive scheme immediately after reading the incentive scheme. Participants were not able to move forward to the next page unless they correctly answered the question.

1.3.1.3 Experimental procedure

At the beginning of the experiment, participants read the instruction about their task and reward scheme on computer screen. In the instruction, the definition of creativity was emphasized to the participants as follows: '*creative solution should be both novel (being original, innovative and unusual) and useful (being practical, feasible and implementable).* A question about the definition of creativity was asked immediately after the introduction. Participants who failed to answer the question correctly were not able to move forward to the next page. Participants were then informed that the aim of this study is to investigate how people generate ideas. Each participant spent 20 minutes developing creative solutions to a specific problem on 'How to improve the teaching quality at XXX university'. This task is widely adopted by previous creativity literature (e.g., Bechtoldt et al., 2010; De Dreu et al., 2008; Zhou et al., 2017). Participants were also asked to label each idea with ordinal number. After the idea generation task, each participant completed a post-experimental questionnaire including personal demographic information. Participants in the fixed payment condition received €7.5 participation fee Participants in the bonus contract and penalty contract conditions received €5 participation fee immediately at the end of the session. In addition to the participation fee, participants who were qualified for receiving extra bonus also received performance-based compensation three days after the experiment session.

1.3.1.4 Measure of creativity performance

I adopted "the average novelty score" and "the number of highly-novel ideas" as a measure of novelty of the idea (Kachelmeier et al. 2008). "The average novelty score" is the most common measurement of creative performance in creativity literature. In addition, since the average novelty score does not fully capture the characteristics of high-novel creative ideas, I also adopt "the number of highly-novel ideas" as a supplementary measure of creative

performance. Followed previous literature (Kachelmeier et al., 2008; Kachelmeier and Williamson, 2010), “highly-novel ideas” is defined as ideas with a rating in the top quartile of all ideas.

Four independent raters were recruited and paid to rate total 1,058 ideas generated by 70 participants. Raters are students from the PhD program of Accounting, Economics, Finance and Management, respectively. The raters blindly rated each randomized solution in terms novelty (from lowest 1 to highest 10) and usefulness (from lowest 1 to highest 10), respectively. The final score of the novelty and usefulness of each solution were calculated as the mean of the scores given by four independent raters. The average novelty and usefulness of each participant was calculated by taking average of the novelty score of each idea. The number of highly novel ideas was calculated by taking the average number of each participant’s ideas with novelty score in the top quartile.

1.3.1.5 Results

Hypothesis 1 predicts that penalty contract would enhance idea generation performance in terms of novelty. A one-way ANOVA was conducted to compare the effect of incentive framing on average of novelty and average number of highly-novel idea in bonus, penalty and fixed payment (control) conditions. The results of ANOVA and planned contrasts analysis are presented in Table 1-1. Results indicate that average novelty is not significantly differ across bonus contract (M=5.14, SD=1.18), penalty contract (M=5.71, SD=1.07) and fixed payment (M=5.67, SD=1.15). However, ANOVA reveals a significant effect of incentive framing on highly-novel idea for the three conditions [$F(2,67) = 3.285$, $p < 0.05$]. Planned contrasts test reveals that participants with penalty contract (M= 3.43, SD = 2.50) generate more highly-

novel ideas than participants with bonus contract (M = 1.92, SD = 2.10) do, t (67) = 2.38, $p<0.05$. These effects are graphically presented in Figure 1-1.

---Insert Table 1-1 and Figure 1-2 about here ---

1.3.1.6 Additional analysis

Multiple measurement of creativity performance

In order to obtain a more complete picture of the creativity performance, I also measured creativity from the perspective of cognitive flexibility. Cognitive flexibility is one of the key elements of creativity performance which is defined as the ease with which people can switch to a different approach or consider a different perspective (Nijstad et al., 2010; Torrance, 1966). Cognitive flexibility is measured as the number of distinct semantic categories that a person access (Nijstad et al., 2010). For example, when generating alternative uses for a brick, someone who only mentions ways in which a brick can be used for building is less flexible than someone who also mentions ways to use a brick as a weapon, a musical instrument, decoration, a paperweight, and so on.

In order to measure cognitive flexibility, four raters independently coded every idea into different categories and then discussed and solved disagreements. For example, ideas concerning teaching were classified into a category about teaching method; ideas concerning improve the quality and skills of professor were classified into category of “professor”. A total number of fifteen categories were classified. Each participant’s cognitive flexibility is measured by the number of the categories his/her ideas spanned.

A one-way ANOVA was conducted to compare the effect of incentive framing on cognitive flexibility in bonus, penalty and fixed payment conditions. Figure 1-2 provides a graphical representation of these results. Results show significant effect of incentive framing on cognitive flexibility across three conditions [$F(2,67) = 3.96$, $p < 0.05$]. In addition, planned contrasts reveal that individuals with penalty contract ($M=5.83$, $SD = 2.48$) lead to greater level of cognitive flexibility than individuals with bonus contract ($M = 4.46$, $SD = 1.18$), $t(67) = 2.39$, $p<0.05$.

In addition to the main dependent variable, I also analyze the "average usefulness" and "the number of highly-creative ideas" (both novelty and usefulness score > 7). ANOVA shows that both bonus ($M=7.00$, $SD= 0.25$) and penalty ($M=6.90$, $SD= 0.31$) contract lead to higher level of usefulness than fixed payment condition ($M=5.96$, $SD= 0.38$). Planned contrasts test reveals no significantly difference between bonus and penalty contract ($t=0.847$, $p > 0.05$). In terms of highly-creative ideas, ANOVA shows that both bonus ($M=1.54$, $SD= 1.62$) and penalty ($M=1.70$, $SD= 1.46$) contract lead to more highly creative ideas than fixed payment condition ($M=0.91$, $SD= 0.90$). Planned contrasts test shows that no significantly difference between bonus and penalty contract ($t=0.343$, $p > 0.05$).

Taken together, these results suggest that framing of incentive contracts do have a significant effect on the number of highly-novel idea and people's cognitive flexibility. Specifically, the results suggest that people tend to generate more highly-novel ideas and generate ideas from a broader range of categories when they are given penalty contract compared to bonus contract or fixed payment contracts. Moreover, participants with performance-based contract (both bonus and penalty contract) outperform participants with fixed contract in terms of idea usefulness and the number of highly creative ideas. Therefore,

H1 is partially supported when the creativity performance is measured by the number of highly-novel ideas and cognitive flexibility.

Creativity performance in different phases during idea generation

Hypothesis 1 predicts that penalty contract can enhance people's creativity performance, however, higher level of creativity performance that is induced by penalty contract might not always benefit idea generation performance. Exploring greater level of cognitive flexibility requires more cognitive resources and physical resources. Prior research shows that switching among different categories requires attentional shifting and more frequent updating of working memory with knowledge about new categories. Compared with exploring ideas from switching categories, producing ideas from the same cognitive category is less demanding because it requires ideas that are built on each other in an incremental fashion (Nijstad et al., 2003; Nijstad and Stroebe, 2006). In terms of physical resources, activated negative emotions that are induced by penalty contract lead to increased expenditure of attentional and physical resources, such as glucose and brain glycogen (Klinger, 1975; Schmeichel et al., 2006). Since people with higher level of cognitive flexibility deplete their cognitive resources faster than those with lower level of cognitive flexibility, they may experience performance decline in their later phase of idea generation (Bass et al., 2011). Therefore, the positive effects of penalty contract on idea generation performance might not persist in the whole period of idea generation process due to faster resource depletion.

In order to test this prediction, I spited each participant's solutions into two parts according to the order of the ideas. I then re-calculated the early and later phase of creative performance, respectively. An independent-samples t-test is conducted to compare the effects of incentive framing on different phases of idea generation. The results are presented in Table

1-2. For the initial phase, results suggest that participants under penalty contract generate more novel ideas (M=5.84, SD=1.19) than those under bonus contract (M=4.85, SD= 1.49) do, t (45) =2.53, p<0.05. In terms of number of highly novel ideas, penalty contract (M=1.61, SD=1.34) also leads to better performance than bonus contract (M=0.83, SD=1.27), t (45) = 2.03, p<0.05. For the later phase, results show that participants under penalty contract (M= 5.58, SD=1.15) perform indifferently from those under bonus contract (M=5.45, SD=1.48), t (45) =0.33, P>0.05. Similarly, there is no significant differences for the number of highly novel ideas between penalty contract (M=1.87, SD=1.63) and bonus contract (M=1.08, SD=1.35), t (45) =1.80, p>0.05. Figure 1-3 provides a graphical representation of these results. Taken together, participants under penalty contract outperform those under bonus contract only in the initial phase but not later phase of idea generation.

---Insert Table 1-2, Figure 1-3A and 1-3B about here ---

1.3.1.7 Discussion

Experiment 1 tests the effects of framing of incentive contracts on creative idea generations task. I find that participants with penalty contract are more likely to generate more creative ideas. In particular, although participants with different incentive contracts generate similar number of ideas, participants with penalty contract generate a greater number of highly-novel ideas and generate ideas with broader cognitive flexibility. However, when considering the number of highly-creative ideas that is defined as ideas with both high novelty and usefulness score, results find no significant differences between two treatment conditions. The results indicate that compared to bonus contract, penalty contract only improve the creativity performance in terms of novelty but not usefulness. In addition, when the incentive

contracts are absent, participants tend to generate ideas that are novel but not useful. Specifically, participants with fixed-payment contract generate ideas with lower usefulness score on average, and generate less highly-creative ideas. This result suggests that although some literature finds that fixed-payment can facilitate creativity performance (i.e., Amabile et al., 1986), it has detrimental effects on creative ideas in terms of usefulness. Furthermore, the positive effects of bonus contract are not without cost. The results show that penalty contract only stimulate creativity performance in the initial phase of the task but not in the latter phase of the task. This finding is probably due to participants' depletion of cognitive resource and physical resource in the penalty condition.

1.3.2 Experiment 2: Idea selection

1.3.2.1 Participants

I recruited 76 student volunteers for 50-minute experiment from an Italian university. Participants received an average compensation of 7.5 Euros for participation in the experiment. 58% of the participants in this experiment were male. All the experiment took place in the laboratory via the computer-based Qualtrics program.

1.3.2.2 Experimental Design

Experiment 2 implements a 3×1 between-subjects design, manipulating the framing of incentive contracts. In particular, participants were randomly assigned to one of the three experimental conditions: bonus contract, penalty contract and fixed payment contract.

Participants under bonus incentive contract are instructed as described below:

In order to encourage you to do the best, you will be paid a compensation of €5.00 for your work in this study. In addition, you will WIN a €5.00 AWARD, depending on the creativity level of your selected solutions. More specifically, if you select the above average creative ideas (relative to all other participants in this study), you will WIN an extra €5.00. Otherwise, if you select below-average creative ideas, then you will not be rewarded and will instead receive only the €5.00 base payment.

Participants under penalty incentive contract are instructed as described below:

In order to encourage you to do the best, you will be paid a compensation of €10.00 for your work in this study. However, you need to PAY BACK €5.00 as PENALTY, depending on the creativity level of your selected solutions. More specifically, if you select the below-average creative solutions (relative to all other participants in this study), you will PAY BACK €5.00 to us. Otherwise, if you select above-average creative solutions, then you will not be punished and will instead receive the full €10.00 base payment.

For the control condition, participants are instructed that 'In order to encourage you to do the best, you will be paid a compensation of €7.50 for your work in this study'.

As a manipulation check, participants answered a question regarding to their incentive scheme immediately after reading the incentive scheme. Participants were not able to move forward to the next page unless they correctly answer the question.

1.3.2.3 Experimental Procedure

At the start of the experiment, participants read the instruction about their task and reward scheme on computer screen. In the instruction, the definition of creativity was emphasized to

the participants as follows: '*creative solution should be both novel (being original, innovative and unusual) and useful (being practical, feasible and implementable).* A question about creativity definition was asked immediately after the introduction. Participants who failed to answer the question correctly were not able to move forward to the next page.

Participants were then informed that they are required to select more creative idea from the solutions that are generated from the question "How to improve the teaching quality at XXX University". The creative solutions are given by pairs, each pair of ideas includes two ideas from the same category, one is more novel (very novel but less useful), and another is more useful (less novel but very useful). For example, a more novel idea from the category "incentives" is: "*XXX could reward students who are good at doing teamwork. Team members will vote for their favorite teammate. Students who win most tickets will be given a certificate of 'Best Teamworker', which is a good signal for the potential employers. Students who want to win the certificate will try hard to improve their teamwork skills"*. The more useful idea from the same category is: *"XXX could create a new summer program together with xxx (another university). In this program, xxx students will design and produce a new product such as an electronic car, and XXX student in charge of developing advertisement of the electronic car and selling it. All of the profits will be used to create a scholarship that is named as 'B&P scholarship".* A total amount of six pairs of solutions were given to the participants pair by pair. This design was chosen because it allows us to observe participants' choice between two dimensions of creativity: novelty or usefulness. Because there are no ideas that are both novel and useful, participants have to make the trade-off decision between more novel ideas or more useful ideas.

Before ending the session, participants completed a post-experimental questionnaire. Participants in the bonus and penalty contract received €5 participation fee immediately after

the session and participants in the fixed payment condition received €7.5 participation fee. In addition to the participation fee, participants who were qualified for extra bonus also received performance-based compensation on the next day of the experiment session.

1.3.2.4 Dependent Variable

The dependent variable in the idea selection task is selector's tendency to choose either more novel ideas or more useful ideas. The selection choice is coded as 1 if more than half of the more novel ideas are selected, 0 otherwise.

1.3.2.5 Results

Hypothesis 2 predicts that during idea selection, individuals with penalty contract tend to select more novel ideas than those with bonus contract. Since both independent variable and dependent variable are categorical variables (1 or 0), I conducted chi-square test to test H2. A chi-square test of independence is calculated to determine whether participants' selection of creative ideas corresponded to their framing of contracts. Results show that 37.9 percent of the participants in the bonus condition and 67.9 percent of the participants in the penalty condition selected more novel ideas. The analysis yields a significant effect [$\chi 2$ (1, N = 57) = 5.12, $p < .05$]. This result suggests that compared with participants with bonus contract, those with penalty contract are more likely to select more novel ideas rather than more useful ideas. Therefore, H2 is supported. Regarding the fixed-payment condition, results show that 72.2 percent of the participants in the fixed-payment condition selected more novel ideas.

---Insert Table 1-3 about here ---

1.3.2.6 Discussion

The experiment 2 tests the effect of framing of incentive contracts on the creative idea selection task. As predicted, participants with penalty contract are more likely to select more novel ideas against more useful ideas. In terms of participants in the fixed-payment condition, because there are no incentives in the selection task, participants are more likely to be relax and rely the decision making on their intuitions. Therefore, participants are more likely to select more novel ideas rather than more useful ideas. This result is also consistent with prior literature which suggests that people tend to favor more novel creative ideas when they make decisions based on the intuition rather than analytical thinking (Zhu et al., 2017). In sum, incentive contracts are expected to motivate people from intuitive decision making to logical decision making. However, when the incentive contracts are framed negatively as penalty contract, this positive effect could be offset by people's risk-taking attitude.

1.4 Conclusions

Although previous literature has extensively investigated the effects of incentive framing on organizational performances, little is known whether the framing of incentive contracts also have impact on creativity performances. In addition, previous literature assumes creativity as single-stage construct that is mainly about idea generation, however, creativity is a dynamic process that includes both idea generation and idea selction. The current study contributes to this literature by highlighting that framing of incentive contracts can affect creativity performance in both creative idea generation and creative idea selection. In order to address these research gap, I conduct two laboratory experiment to examine the effects of incentive framing on both idea generation and idea selection performances. The results of this

study 1 suggest that penalty contract could benefit the idea generation stage of creativity that is associate with novelty of the idea. The results of study 2 suggest that penalty contract would lead participants to select more novel ideas against useful ideas. I argue that these findings are due to people's risk-taking attitude that is affected by different-framed contract. In particular, relative to bonus contract, penalty contract leads people to take more risks, which will in turn facilitate creative idea generation performance and make people more willing to select more novel ideas.

My study responses to Hannan et al. (2005)'s call for additional research to further understand the costs and benefits of framing of incentive contract. My study fills the research gap on the relationship between incentive framing and creativity performance. Although the penalty contracts are not prevalent in the real world, there exist similar inventive systems in the creative industry. For example, universities' "tenure-track system" is an incentive system to motivate assistant professors to produce higher quality research. The tenure-track system contains both reward and penalty simultaneously. Specifically, the assistant professor will be promoted to associate professor if he/she meet the criteria of being tenured, whereas he/she will lose the job if the criteria are failed to achieve. Losing the job would be a huge punishment to the assistant professor, therefore, he/she will try to do the best to improve the research quality. The results of my study suggest that if people are with the pressure of losing, they tend to generate more novel ideas and more likely to select ideas that are more novel but less useful.

In addition to these theoretical contributions, the current study also has a number of important practical implications. Since idea generation and idea selection are two different creativity processes that require different ability and techniques, organizations may use different incentive schemes toward idea generator and selector. The findings from experiment

1 suggest that organization could apply penalty contract when there are time constraints, or when novelty is the priority of the creative product. In terms of idea selection, organizations can choose to apply either bonus contract or penalty contract based on their needs. For instance, organizations in the pharmaceutical industry often have approximately ten-year period to develop a new medicine. In such situations, novelty might be considered as the prior criterion during idea selection because the technology improvement will undermine the feasibility concern during a long-time window of product development. Penalty contract might be more suitable for managers in the industries that have long-term product cycle. On the contrary, organizations in the Fast-Moving Consumer Goods industry often have short period to implement ideas into real products. For these organizations, how feasible to translate ideas into products might be the prior criterion during the idea selection process. Bonus contract could work more effectively in industries that have short-term product cycle.

Limitations of the current study provide opportunities for future research. Firstly, the findings are based on laboratory experiment and the task only last for 20 minutes. It is not clear whether the findings will hold in the natural settings. The current experiment study already found that framing of incentive contracts has no significant effects in the later phase of idea generation, future research can explore the effects of penalty contract on creativity performance in the long-term setting. Secondly, previous literature finds that penalty contract has side effects such as perception of unfairness and lack of trust (Christ et al., 2012), it is questionable to apply penalty contract as a regular incentive scheme in the organizations. The negative effects of penalty contract might outweigh the positive effects on creativity performance. Finally, the tasks that are adopted in the experiment are problem-solving task that is closely related to the participants' everyday life. It is not clear whether the findings will

hold when employees meet more unconstrained, new creativity challenges. Future research could explore whether the findings can be generalized to a wider range of creativity tasks.

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Table 1-1

Experiment 1 - Testing H1

Study 1 - ANOVA and planned contrasts analysis for Number of ideas, Cognitive Flexibility, Average Novelty, Average Usefulness, Highly-Creative ideas and Highly-novel ideas.

Variable	Contract Frame			ANOVA F-statistics	t-statistics (Bonus = Penalty)
	Bonus	Penalty	Fixed-payment		
Number of ideas	10.46 (5.823)	10.17 (4.628)	7.43 (3.59)	2.01	0.19
Average Novelty	5.14 (1.18)	5.71 (1.07)	5.67 (1.15)	1.81	1.94*
Average Usefulness	7.00 (0.25)	6.90 (0.31)	5.96 (0.38)	4.99***	0.85
Cognitive Flexibility	4.46 (1.18)	5.83 (2.48)	4.57 (1.65)	3.96**	2.39**
Highly-novel ideas	1.92 (2.104)	3.43 (2.501)	2.13 (1.91)	3.28**	2.26**
Highly-creative ideas	1.54 (1.615)	1.70 (1.460)	0.91 (0.90)	2.13**	0.34

***,**,* Indicate p-value <0.01, <0.05, and <0.10 respectively, two-tailed.

Table 1-2

Experiment 1 - additional analysis

Independent t-statistics of the effect of incentive framing on idea generation performance

Variable		Contract frame		t-statistics (Bonus = Penalty)
		Bonus	Penalty	
Initial phase	Average Novelty	4.85 (1.49)	5.84 (1.19)	2.53**
	Highly novel ideas	0.83 (1.27)	1.61 (1.34)	2.03**
Later phase	Average Novelty	5.45 (1.48)	5.58 (1.15)	0.33
	Highly novel ideas	1.08 (1.35)	1.87 (1.63)	1.80*

This table displays the independent t-statistics for Average Novelty and Highly novel ideas in the Initial phase and Later phase of idea generation, respectively.

***,**,* Indicate p-value <0.01, <0.05, and <0.10 respectively, two-tailed.

Table 1-3

Experiment 2 - Testing H2

Chi-square test of the effect of incentive framing on idea selection choices

Incentive Contract	Selecting extreme novel ideas	Selecting balanced ideas that are both moderately novel and useful	Total
Bonus	11 (37.9%)	18 (62.1%)	29
Penalty	19 (67.9%)	9 (32.1%)	28
Fixed	13 (72.2%)	5 (27.8%)	18

This table shows that significantly more bonus condition than penalty condition participants select more balanced ideas [$\chi 2$ (1, N = 57) = 5.12, p < .05].

Experiment 1- The effect of incentive framing on Novelty

Figure 1-1

Figure 1-1 A

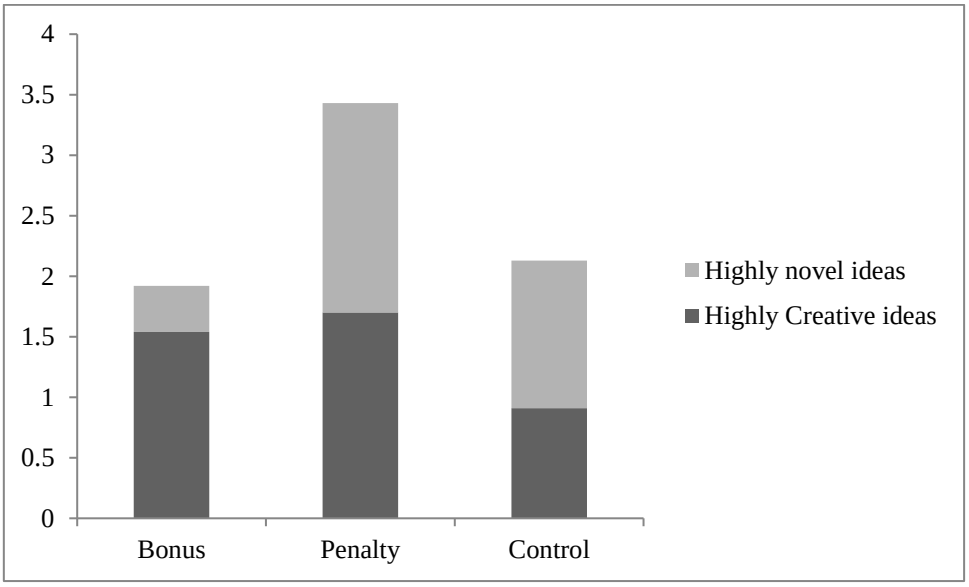
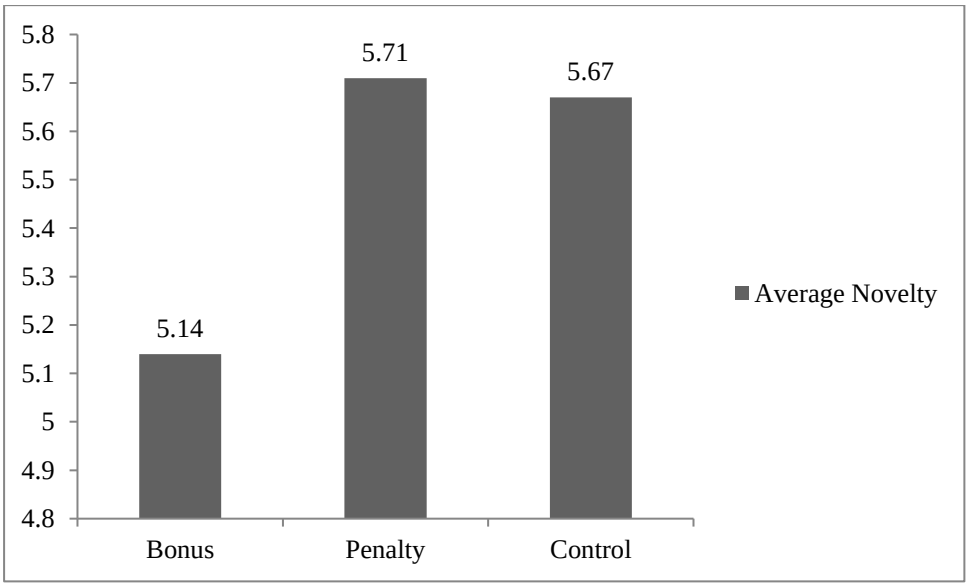


Figure 1-1 B

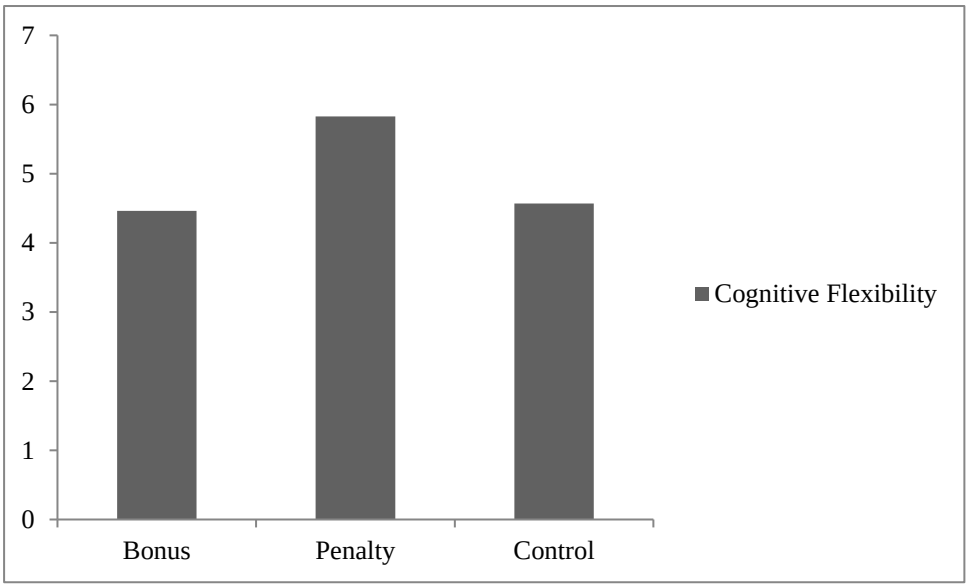


These figures graphical presents the results for Experiment 1. The vertical axis of Figure 1 A indicates the number of highly novel ideas (grey area) or the number of highly

creative ideas (dark area). The vertical axis of Figure 1 B indicates the average score of novelty (range from 1 to 10).

Experiment 1- The effect of incentive framing on Cognitive Flexibility

Figure 1-2



This figure graphical presents the results for Experiment 1. The vertical axis of Figure 2 indicates the number of categories that participants generated.

Experiment 1- The effect of incentive framing on initial and later phase of idea generation

Figure 1-3

Figure 1-3 A - Average Novelty

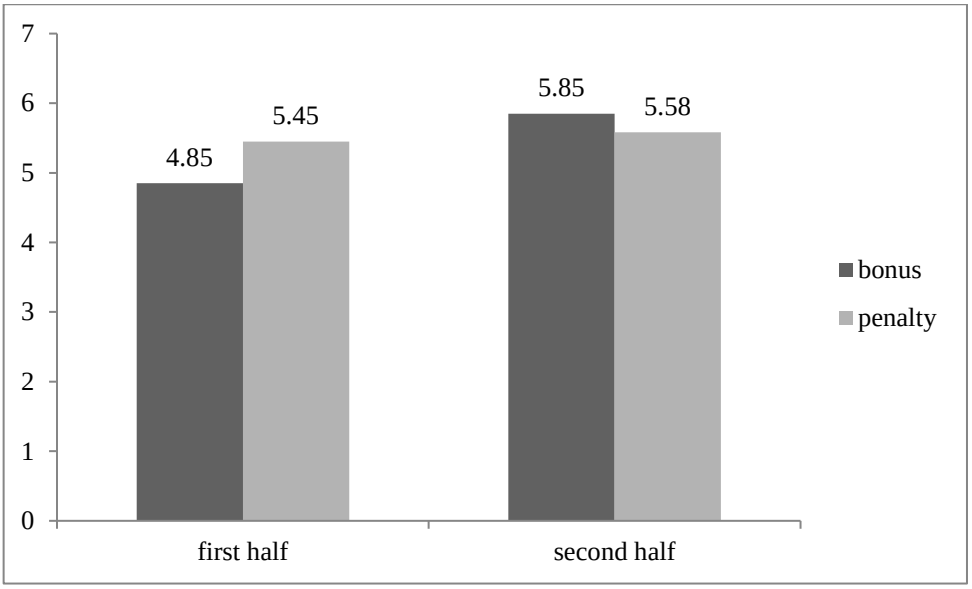
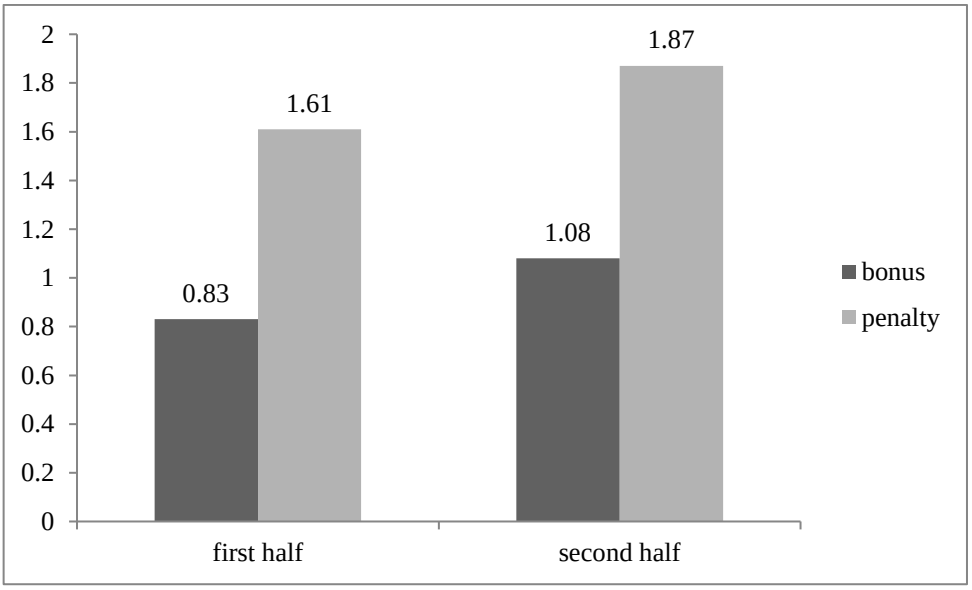


Figure 3 B - Highly novel ideas



These figures graphical presents the results for Experiment 1. The vertical axis of Figure 3 A indicates the average score of novelty. The vertical axis of Figure 3 B indicates number of highly novel ideas. the horizontal axis plots two period of idea generation (initial phase and later phase)

2 When should we reward creativity: A new perspective on creativity types

This study investigates the effects of different types of reward on the performances of two types of creativity. First, we challenge the assumption that creativity is a homogeneous concept by classifying creativity into responsive creativity (for close-ended, presented problems) and expected creativity (for open-ended, self-discovered problems) (Unsworth, 2001). We design novel experimental tasks to examine whether the relationship between reward and creativity depends on the types of creativity. We predict and find that monetary reward (relative to no reward) positively affects creativity performance in the case of responsive creativity task, but negatively affects creativity performance in the case of expected creativity task. Second, we challenge the underlying assumption in the literature that reward always take the form of monetary reward by categorizing it into monetary and social-recognition reward. The experiment results show that compared to monetary reward, social-recognition reward leads to better performance in the expected creativity tasks, but not in the responsive creativity tasks. These results suggest that, when seeking to stimulate different types of creativity performance, it is important for managers to decide not only whether to use a reward, but also how the reward should be provided.

Keywords: Responsive creativity; Expected creativity, Monetary reward; Social-recognition reward

2.1 Introduction

It is common practice for organizations to provide rewards in order to stimulate employees' creativity performances. However, the relationship between reward and creativity performance remains controversial. Over the last three decades, the creativity literature has provided evidence that supports the idea that rewards have both positive and negative effects on creativity performance (Deci and Ryan, 1985; Eisenberger and Selbst, 1994). Although previous studies have attempted to explain such contradictory findings by drawing on external perspectives such as job complexity, styles of performance evaluation and personal thinking (Koestner et al., 1984; Baer et al., 2003), few have sought to explain it from the perspectives of creativity or reward themselves. One reason for this is that prior research tends to assume that creativity is a unitary concept that cannot be differentiated, and that reward is equivalent to monetary reward. However, these assumptions may not be valid if creativity can be categorized into different types, or if the reward can be provided in different forms.

The first goal of this paper is to investigate whether different types of creativity affect the relationship between reward and creativity performance. According to Unsworth's (2001) creativity typology, creativity can be classified into responsive creativity and expected creativity, depending on whether the problem is close-ended or open-ended. Responsive creativity is defined as the required solution to a specific problem. It requires people to provide creative solutions to a specific and predefined problem. Expected creativity is defined as the required solution to a discovered problem. It requires people to self-identify what the problem is from a broad domain before solving it. Although the prior literature has investigated the effects of monetary reward on creativity performance, the differentiation between these two types of creativity has been overlooked (Kachelmeier et al., 2008; Kachelmeier and Williamson, 2010). Given the fundamental differences between responsive

creativity and expected creativity in relation to the problem type, monetary reward could have different effects on the performance of responsive and expected creativity. In this paper, we build on these insights to examine how the reward influences different types of creativity performances.

The second goal of our paper is to investigate whether different types of creativity require different types of reward to stimulate creativity performance. While it has been shown that creativity performance can be motivated by the use of incentives, how these incentives should be delivered remains an open question (Grabner, 2014). The accounting literature has mainly focused on investigating the effects of tangible rewards (e.g., cash or gifts) on creativity performance. However, a reward can be delivered either in tangible form (i.e. a monetary reward) or intangible form (i.e. a social-recognition reward). Monetary reward is defined as an incentive that can make a person wealthier and materially better off, while a social-recognition reward is defined as an incentive that provides social success and makes a person socially known and admired (Kasser and Ryan 1996). Social-recognition rewards are popular and effective form of intangible reward in practice. As Nelson (2005) states, “recognition for a job well done is the top motivator of employee performance” (p. 1). While the literature shows that social-recognition rewards can improve employees’ performances on the routine tasks at the individual, team and firm levels (Lourenco, 2015; Bradler et al., 2016; Li et al., 2016), there is no conclusive evidence of what effect they have on creativity performance. Given the different nature of intangible and tangible rewards, it is empirically unclear whether monetary and social-recognition rewards have the same effects on different types of creativity performance.

Using theory from psychology research, we predict that different types of rewards affect different types of creativity performance by influencing people’s focus (Eisenberger et al.,

1999; Eisenberger and Shanock, 2003; Mehta et al., 2017). More specifically, a narrow focus is important for the performance of responsive creativity because it focuses the employee's attention on solving a well-structured task without exploring irrelevant factors. In contrast, as it deals with open-ended problems, expected creativity requires a broader focus to enable the employee to generate ideas from a wider range of categories (Unsworth, 2001). The literature finds that monetary reward can restrict the employee's focus on achieving the criteria of winning the reward (Harackiewicz et al., 1984). Therefore, a narrow focus on achieving the goal that is induced by monetary rewards is expected to improve the performance of responsive creativity but to undermine the performance of expected creativity (Unsworth and Luksyte, 2015). Unlike monetary rewards, social-recognition rewards cause the employee to adopt a broader perspective, and not just focus on the task itself (Mehta et al., 2017). The reasoning behind this conclusion is that employees will attempt to please multiple groups of people because their creative work will be exposed to judges and their peers if they win social-recognition rewards. Putting themselves in other employees' shoes will force people to consider a broader range of factors when they engage in creativity tasks. Therefore, we predict that social-recognition rewards are advantageous to expected creativity tasks but disadvantageous to responsive creativity tasks.

To test our predictions, we develop a 2 (responsive creativity vs. expected creativity) by 3 (no reward vs. monetary reward vs. social-recognition reward) between-subject laboratory experiment. Participants are randomly assigned to either a responsive creativity task or an expected creativity task. Following prior creativity research, we adopt the 'rebus puzzle' task to measure creativity performance (Macgregor and Cunningham, 2008; Kachelmeier et al., 2008; Kachelmeier and Williamson, 2010; Erat and Gneezy, 2016). More specifically, 'rebus puzzle solving' and 'rebus puzzle designing' are used to measure responsive creativity and

expected creativity respectively. Participants are randomly assigned to three groups in terms of reward: no reward, monetary reward, and social-recognition reward. Participants in the 'no reward' group receive no performance-based reward apart from the €5 participation fee. Participants in the 'monetary reward' group are given an additional €5 if their performance is above the average performance in the session. Participants in the 'social-recognition' group are presented with a 'Certificate of Winner' in front of all the participants if their performance is above the average performance in the session. In addition, a congratulatory email with the winners' names and performances is sent to all the participants after the experiment.

The results of the experiment support our predictions. First, we find that compared to no reward, the monetary reward leads to better performance for the responsive creativity task but to worse performance for the expected creativity task. Second, we find that in comparison with the monetary reward, the social-recognition reward enhances the performance of the expected creativity task but not the performance of the responsive creativity task. Also as predicted, the mediation analysis reveals that the negative effect of monetary reward on expected creativity performance is explained by the participant's narrower focus which is measured by the increased extrinsic motivation and decreased intrinsic motivation.

Our study contributes to the literature and to practice in several ways. First, we contribute to the substantial literature on the relationship between management control systems and creativity (Amabile et al., 1986; Deci et al., 1999). The debate of whether creativity should be rewarded has been running for more than thirty years in the creativity literature. Unlike previous work, which seeks answers to this question from external perspectives, this study provides a new perspective by focusing on creativity itself and distinguishing between responsive creativity and expected creativity (Unsworth, 2001). Specifically, we show that the

question of whether creativity should be rewarded depends on whether the task is responsive creativity or expected creativity.

Secondly, our study contributes to the existing literature on incentives in management accounting research by extending the application of social-recognition rewards into the context of creativity tasks. While the effect of tangible (e.g., cash or gift) rewards on creativity has been extensively studied, the effect of intangible (e.g., social-recognition or praise) reward has not been explored (Kachelmeier et al., 2008; Kachelmeier and Williamson, 2010). We show that social-recognition rewards surprisingly, have positive effects on the performance of both responsive and expected creativity tasks. This finding helps explain why intangible rewards are more popular in industries that require creativity (Cools et al., 2017).

Thirdly, this research develops novel experimental tasks to measure the two types of creativity. Although both 'rebus puzzle solving' and 'rebus puzzle designing' tasks have been used to measure creativity in the literature (Macgregor and Cunningham, 2008; Kachelmeier et al., 2008; Kachelmeier and Williamson, 2010; Erat and Gneezy, 2016), it has been assumed that these two tasks measure the same type of creativity. The use of the solving and designing rebus puzzle task allows us to capture the core characteristics of responsive and expected creativity, because these tasks represent extreme close-ended and extreme open-ended problems respectively. With reference to Unsworth and Luksyte' (2015) review, this is the first quantitative study that directly tests and integrates the performances of responsive and expected creativity.

The findings of our study also have important practical implications for managers who seek more effective incentive systems for creativity performance. While organizations often use no reward, monetary reward or social-recognition reward to incentivize employee's

creativity performance, it is not clear when to use what type of reward to stimulate creativity performance. Our study suggests that managers should take into consideration the nature of the creativity task when deciding what types of reward should be provided to employees. Specifically, when the creativity task is a close-ended problem (i.e. one which requires responsive creativity), monetary reward or social-recognition reward are more effective than no reward. In contrast, when the creativity task is an open-ended problem (requiring expected creativity), no reward and social-recognition rewards lead to higher performance than monetary rewards.

The remainder of this paper is structured as follows. Section 2 discuss the relevant literature and develops the hypotheses. Section 3 explains the experimental design. Section 4 presents the results. Section 5 discuss the results and summarizes the key conclusions.

2.2 Background and hypotheses

2.2.1 Monetary reward and creativity

Prior research on the relationship between reward and creativity performance shows contradictive theories and empirical evidence (Byron and Khazanchi, 2015). The most representative theories in this literature are learned industriousness theory (LIT) (Eisenberger, 1992) and self-determination theory (SDT) (Ryan and Deci, 2000). LIT argues that the informational aspects of rewards can reduce people's inherited cognitive effort aversion, which in turn enhances creativity performance (Eisenberger and Selbst, 1994; Eisenberger and Rhoades, 2001; Eisenberger and Aselage, 2009). For instance, Eisenberger and Rhoades (2001) find that participants who are promised rewards for being creative produce more creative movie titles than participants who are not promised rewards. Eisenberger and Aselage (2009) also find evidence about the mechanism whereby performance-based rewards

can enhance perceptions of self-determination and intrinsic motivation. In contrast to LIT, SDT focuses more on the controlling aspects of rewards, and argues that rewards undermine intrinsic motivation and self-determination, which are important determinants of creativity performance (e.g., Amabile et al., 1986; Amabile, 1996). For instance, in a study of children's responses to rewards, Amabile et al. (1986) find that participants in the non-rewarded group generate more creative stories than children in the rewarded group.

Regarding the contradicting theories and evidence from prior literature, a number of scholars have explained it from different perspectives. For instance, Baer et al. (2003) find that the reward has a positive effect on creativity only if the employee is an adopter but not an innovator in terms of personality. Friedman (2009) finds that rewards lead to lower creativity performance when they make people feel that they have been controlled, whereas Amabile and Hennessey (2010) conclude that rewards can increase creativity performance only if the evaluation confirms people's competence and convey useful information. Although these studies investigate the relationship between reward and creativity, they largely focus on the reward or the employee's personality, and very few studies have approached the issue from the perspective of creativity itself.

2.2.2 Different types of creativity

Most of the literature assumes creativity to be a unitary construct. However, creativity could be classified into different types according to whether the problem is close-ended or open-ended. According to Unsworth's (2001) conceptual framework, creativity can be conceptualized differently on the basis of whether the problem has been formulated before the creator begins the process of trying to resolve it. From this perspective, creativity can be classified into responsive creativity and expected creativity. Responsive creativity is defined

as creativity that is the required solution to a specific problem, whereas expected creativity is defined as the required solution to a discovered problem. Taking academic research as an example, if a study identifies a new stream of literature (e.g., agency theory) or proposes a new conceptual framework (e.g., Unsworth's creativity typology), then this type of research should be classified as expected creativity because the problem does not exist at the beginning of the study. However, if a piece of research aims to apply existing theories (e.g. any empirical research that applies agency theory) or to test a predefined conceptual framework, then it should be defined as responsive creativity. In this case, the well-defined problem requires the research to be done in order to solve the problem in a creative way. Unsworth's creativity typology has recently become a focus of attention in accounting research. For instance, Cools and colleagues (2017) investigate the role of budgets on responsive and expected creativity. Based on comparative case studies, they find firms characterized by responsive creativity use the budget in a more interactive way, whereas firms characterized by expected creativity use it in a more diagnostic way. Although this dichotomy of creativity has been investigated in other areas of management accounting research, it has not been applied to shed light on the debate about the relationship between reward and creativity performance.

2.2.3 Hypotheses development

2.2.3.1 Monetary reward and different types of creativity

In this paper we investigate whether the relationship between reward and creativity performance depends on the type of creativity and the type of reward. In terms of the conceptualization of types of creativity, we use Unsworth's (2001) framework, in which creativity can be classified as responsive creativity or expected creativity depending on whether the problem is close-ended or open-ended. The literature suggests that the breadth of

people's focus is an important determinant of different types of creativity (Unsworth and Luksyte, 2015). We argue that the presence of monetary reward could have different effects on responsive creativity and expected creativity by influencing people's focus.

Unsworth (2001) suggests that a close-ended problem requires task-focused attention which is relatively narrow in focus. A narrow focus will enable individuals to concentrate specifically on more relevant concepts for further scrutiny, discarding other less relevant concepts. According to Oberauer and Hein (2012), a narrow focus drawing on a particular aspect of one's working memory can lead to greater attention and concentration on the task. For responsive creativity, the problems are usually clearly formulated and there is a known method of solving them (Unsworth, 2001). In this case, problem solvers do not require a great deal of autonomy in choosing tasks, and the problem-solving methods are limited (Cools et al., 2017). Therefore, a narrow focus is more likely to accelerate the responsive creativity processes than a broad focus. On the other hand, when the problem space is relatively open-ended, a broad focus can lead people to explore more concepts within the problem space, potentially increasing the likelihood of assembling relevant concepts for creative solutions (Vartanian, 2009). As expected creativity involves more scanning and defining activities than responsive creativity, a broad focus can enable problem-solvers to explore a wider range of alternatives. In conclusion, factors related to a narrow focus will lead to better performance of responsive creativity, and factors related to a broad focus will lead to better performance in expected creativity tasks. This reasoning is also supported by Cheng et al.'s (2007) case study research, which finds that adaptive, narrow thinking is associated with responsive creativity whereas broad thinking is related to expected creativity.

Rewards have been shown to narrow the individual's focus to achieve the goal or the reward that signals competence (Eisenberger et al., 1999; Eisenberger and Shanock, 2003).

For example, Eisenberger and colleagues (1999) show that monetary rewards can narrow participants' focus on achieving the goal and winning the reward. Similarly, Mehta and colleagues (2017) find that participants perform better in a relatively close-ended creativity task when they are rewarded with cash. The authors find that such a focus is positively related to approach motivation, which enhances creativity performance on close-ended problems. On the other hand, expected creativity requires a broad focus, and the presence of monetary reward is likely to have a negative effect on the creativity performance as the individuals are more likely to concentrate on achieving the goal rather than necessarily being open to other ideas (e.g., Amabile et al., 1986). Based on these arguments, we predict that monetary reward (compared to no reward) can lead to a narrow focus which will in turn facilitate higher performance in responsive creativity, whereas no reward (compared to monetary reward) will lead to a broad focus which will in turn enhance performance in expected creativity. Hypotheses 1a and 1b formally state these expectations:

Hypothesis 1a: In responsive creativity tasks, no reward (fixed payment) leads to lower creative performance than monetary reward.

Hypothesis 1b: In expected creativity tasks, no reward (fixed payment) leads to higher creative performance than monetary reward.

2.2.3.2 Different types of reward and creativity

In terms of types of reward, we focus on comparing monetary rewards and social-recognition rewards. Monetary reward is defined as an incentive that can make a person wealthier and materially successful if the criteria for receiving the reward are met (Kasser and Ryan 1996). Most of the literature on the relationship between reward and creativity examines

the effect of monetary or tangible rewards on creativity. However, once an organization chooses to use rewards to incentivize employees' creativity performance, they can choose to deliver the reward either in a tangible form such as monetary reward, or in an intangible form such as social-recognition rewards. A social-recognition reward, on the other hand, is defined as an incentive that makes a person socially known and admired if the criteria for receiving the reward are met (Kasser and Ryan, 1996). Unlike monetary reward, social-recognition rewards are symbolic gestures of appreciation that produce a unique variance in individual outcomes (Stajkovic and Luthans, 1997; Li et al., 2016). Lourenco (2016) investigates the relationship between monetary reward, social-recognition reward and feedback in a field experiment in a retail service company. She finds that both monetary reward and social-recognition reward improve employees' performance. According to motivation theory, the positive effect of social-recognition reward on performance is due to people's need to be esteemed, admired, and acknowledged (Maslow, 1943; Alderfer, 1972).

Lourenco's (2016) study is a new departure in the accounting literature in that it distinguishes between monetary reward and social-recognition reward. However, prior literature does not shed light on the role of these two types of incentives in the context of creativity. We predict that these two types of rewards have different effects on different types of creativity. Specifically, we argue that different types of reward affect the performances of different types of creativity by influencing people's focus. Monetary rewards lead people to set a goal ex-ante to satisfy the judges who decide the winner of the reward. In this case, people's focus is more limited in winning the reward. Social-recognition rewards lead to individuals' social comparisons since people tend to compare their own performances to that of others (Festinger, 1954). In this case, people are also likely to pursue satisfying their peers' preference because they not only want to win the reward itself, but also want to be known

socially and to be admired by their peers. As a result, people facing the possibility of gaining social-recognition rewards are more likely ex ante to have a broader focus on satisfying as many audiences (e.g., managers, colleagues, customers) as possible. Therefore, people pursuing social-recognition rewards are more likely to take a broader perspective when they are involved in a creativity task. A similar argument is proposed by Mehta and colleagues (2017), who argue that monetary rewards can induce a performance focus, while social-recognition rewards induce an environmental focus. This recalls the reasoning of the first two hypotheses, according to which a broader focus is advantageous to expected creativity but disadvantageous to responsive creativity. Accordingly, we expect that monetary rewards (compared to social-recognition rewards) improve responsive creativity performance because they lead to a narrow focus on achieving the reward. On the other hands, social-recognition rewards (compared to monetary rewards) improve expected creativity because they lead people to take a broader perspective. The next two hypotheses formally state these expectations:

Hypothesis 2a: In responsive creativity tasks, monetary rewards lead to higher creative performance than social-recognition rewards.

Hypothesis 2b: In expected creativity tasks, monetary rewards lead to lower creative performance than social-recognition rewards.

Taken together, H1a and H2a predict that monetary rewards lead to higher performance in responsive creativity task than no reward and social-recognition reward respectively. H1b and H2b predict that monetary rewards lead to lower performance in expected creativity task than no reward and social-recognition reward respectively. In other words, we predict that whether

monetary reward is more advantageous to creativity performance is depending on whether the creativity task is responsive or expected creativity.

2.3 Experimental design

2.3.1 Participants

193 students are recruited to participate in an one-hour laboratory experiment conducted over 10 pen-and-paper sessions. 54% of the participants are male. On average, participants receive €6 compensation. All receive €5 participation fee, and half of those who win the reward receive an additional €5.

2.3.2 Experimental task

In order to capture the core characteristics of responsive creativity and expected creativity, we adopt rebus puzzle as the creativity task. A ‘rebus puzzle’ is defined as "a kind of riddle in which words or diagrams are used to represent a familiar term or phrase” (Kachelmeier et al., 2008, p. 350). ‘PAINS’ is an example of a rebus puzzle (to which the solution is 'growing pains', as the font size of the letters in the word 'pains' becomes increasingly large). Specifically, 'rebus puzzle solving' and 'rebus puzzle designing' are chosen as the tasks to measure responsive creativity and expected creativity respectively. Both versions of this rebus puzzle task have been widely used for measuring creativity in the literature (e.g., Kachelmeier et al., 2008; Macgregor and Cunningham, 2008; Salvi et al., 2016; Erat and Gneezy, 2016; Threadgold et al., 2018).

The original version (Griggs, 2000; Macgregor and Cunningham, 2008) of the rebus puzzle (i.e. 'rebus puzzle solving') is used to measure responsive creativity. In this task, participants are asked to come up with as many as possible correct solutions to a number of

rebus puzzles. In psychology, rebus puzzle solving is suggested as an insight problem because it requires subjects to break the implicit assumptions of normal reading, similar to the way in which gaining insight requires restructuring (Macgregor and Cunningham, 2008) [1]. Since this kind of insight problem-solving was introduced by psychologist Mednick (1962) as a measure of creativity performance, it has been commonly used to measure creativity performance in the organization behavior and psychology literature (e.g., Friedman and Forster, 2001; Gino and Wiltermuth, 2014) [2]. The rebus puzzle solving task is an appropriate way of measuring responsive creativity because it is an extreme close-ended problem-solving task in which there is only one correct solution for each rebus puzzle. In addition, this task is pre-defined in such a way that participants can only solve it within a limited domain, which is also consistent with the definition of responsive creativity. To test expected creativity, the Kachelmeier et al. (2008), Kachelmeier and Williamson (2010) and Erat and Gneezy (2016) version of the rebus puzzle ('rebus puzzle designing') is used. In this task, participants are first asked to come up with a phrase, and then to solve the problem by creatively drawing that phrase. This task is an appropriate measurement for expected creativity because it is a two-stage process, involving problem identification by coming up with a phrase that is potentially new, original and clever, and problem solving by drawing something new, original and clever. In contrast to the pre-defined creativity task, it is self-defined and extremely open-ended, which is also consistent with the definition of expected creativity.

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[1] The difficulty of rebus puzzle solving is related to the number of principles used to encrypt a phrase or saying, which depends on the number of implicit assumptions that have to be relaxed to solve a rebus (MacGregor and Cunningham, 2008). Therefore, rebus puzzle solving requires constraints to be relaxed to process text in a standard fashion, and relaxing constraints is considered an important component of solving by insight (Ohlsson, 1992, Salvi et al., 2015).

[2] The insight problem that Mednick developed is called the 'remote associates test' (RAT). RAT includes three common stimulus words that appear to be unrelated. Participants are required to come up with a fourth word that is somehow related to each of the first three words. In this sense, both RAT and rebus puzzle solving are insight problems that have only one correct solution. Cunningham et al. (2009) find that rebus puzzle solving is a significant predictor of RAT scores on creativity performance.

2.3.3 Between-subject manipulations

Our study implements a 2×3 between-subject design, manipulating types of creativity (responsive creativity vs. expected creativity) and types of incentive (no reward vs. monetary reward vs. social-recognition reward). Participants are assigned to one of the three experimental conditions: no reward, monetary rewards, or social-recognition rewards[3]. Participants in all these conditions are informed that they will receive a €5 participation fee at the end of the experiment. Those in the 'no reward' condition are informed that they will receive the €5 participation fee regardless of their performances in the task.

Participants in the monetary reward condition are told, "*if your performance is above-average (relative to all other participants in this session), then you will get €5 reward. The experimenter will then come to you and pay you privately in cash.*" We adopt this relative performance evaluation design from prior literature in which the effects of reward and no reward are compared in the creativity setting (e.g. Erat and Gneezy, 2016; Mehta et al., 2017).

Participants in the social-recognition reward condition are told, "*if your performance is above-average (relative to all other participants in this session), then you will be widely recognized among all of the participants. In particular, you will be recognized later on in the lab, and you will receive a 'Certificate of Winner'.*

Participants in the responsive creativity condition are told, "*your name and your performance will be announced publicly to all participants through a congratulatory email*",

[3]As a manipulation check, participants are asked to answer a multiple-choice question confirming their compensation scheme after reading the instructions, and the experimenter check these answers before continuing.

and those in the expected creativity condition are told, "*your 'Above-Average Creative Puzzles' will be announced publicly to all participants through a congratulatory email*[4]"

2.3.4 Experimental procedure

In each session, participants first read a set of instructions about the experimental task and details of the compensation schemes. All experimental material is provided on printed paper.

For the responsive creativity task, participants are given 60 rebus puzzles to solve in 12 minutes.[5] Participants are informed that their performance will be measured by the number of puzzles they solved correctly, and that they will have 12 minutes to solve as many of the puzzles as they can. For the expected creativity task, participants are required to design their own rebus puzzle on the answer sheet they are given. They are told that their performance will be measured by 'the Number of Above-Average Puzzles' [6] they are able to design, and that they would have 12 minutes to design their own puzzles (including the solutions to the puzzles). Participants are also informed how 'Above-Average Puzzles' is defined: "*Firstly, all puzzles will be rated by two raters based on the creativity level (Original, Innovative, and Clever), on a 1 to 100 scale, where 100 is the highest possible score, and 1 is the lowest possible score. Secondly, each puzzle's creativity score is determined by the average score of*

[4] In case some participants are reluctant to reveal their names and puzzles in the congratulatory email, participants are given an option to choose not to reveal their names and puzzles if they win. No participants are found to select this option.

[5] Since the understanding of the rebus puzzle is closely related to the native language of the subjects, the Italian version of the rebus puzzle is adopted from Salvi et al., (2015).

[6] Because the only possible measure for responsive creativity is 'number of correctly solved puzzles', which contains both a quantity measure (number) and a creativity measure (correctly solved). In order to rule out potential alternative explanations, we use 'the Number of Above-Average Puzzles' to measure expected creativity because this measure includes both quantity (number) and creativity (highly creative) dimensions, and is thus consistent with the measure of responsive creativity.

two raters' scores[7]*. Finally, we rank all of the puzzles generated by all of the participants in the same session based on the creativity score. Those puzzles with creativity scores above the average are defined as 'Above-Average Puzzles'.*

The last part of the instruction is the explanation of the compensation scheme, which varies across the three conditions. After the participants finish the task, the answer sheets are collected by the experimenter, and the participants complete a questionnaire which includes which include measurements of intrinsic and extrinsic motivation (only for participants in the monetary and social-recognition reward conditions). As the participants are doing this, two experimenters count the number of correctly solved puzzles (for the responsive creativity task) and spend up to 20 minutes judging the creativity score (for the expected creativity task) of each puzzle. After all the puzzles have been evaluated, the experimenter collects the surveys, and then give out the appropriate rewards. All the participants are paid the €5 participation fee before they leave the laboratory.

2.3.5 Dependent variables

As the measure of the responsive creativity task, we use 'the number of correctly solved puzzles' because it is a common measurement for this type of task (Macgregor and Cunningham, 2008), and indeed the only measurement used. For the expected creativity task, there are a number of measurements that can capture the creativity performance. This research follows the experimental literature in using 'rebus puzzle designing' as the creativity task (Kachelmeier et al., 2008; Kachelmeier and Williamson, 2010; Erat and Gneezy, 2016).

[7] For example, if one puzzle is given creativity scores of 5 and 7 by two raters, then the final score for this puzzle is calculated as (5+7)/2 = 6.

Specifically, the average creativity score of the puzzles is used as the major dependent variable. The average creativity score is the most widely adopted measurement of open-ended creativity tasks in the creativity literature which provides information about participants' general creativity performance (Amabile 1983). In addition to this, organizations might also be interested in high-quality creativity work, which is difficult to assess from average creativity scores. As a result, the research also adopts 'the number of high creativity ideas' as a supplementary measurement to capture participants' superior creativity performances. As suggested in the literature (Kachelmeier et al., 2008; Kachelmeier and Williamson, 2010), 'high creativity puzzles' is defined as puzzles with a rating in the top quartile of all puzzles. The combination of the average creativity performance and the high creativity performance could provide a more complete picture of participants' creativity performance in expected creativity tasks.

2.3.6 Performance evaluation

In order to evaluate the participants' creativity performances, two independent raters with graduate degrees and work experience are recruited[8]. For the responsive creativity task, raters compare participants' solutions with the correct solutions (Salvi et al., 2016), and then count the number of correct solutions for each participant.

For the expected creativity task, all participants' puzzles are analyzed using a consensual assessment technique developed by Amabile (1983). Specifically, the raters independently rate a total of 811 rebus puzzles on a 100-point scale (1 = not creative at all to 100 = extremely creative) based on creativity criteria (original, innovative and clever). In order to

[8] Ratings allocated during the experiment are rather rough because of the time constraint of 15 - 20 minutes. In order to obtain more accurate and rigorous ratings, independent raters are recruited to evaluate the rebus puzzles after the experiment.

gain a better understanding of the range of creativity in the whole sample, the raters are trained before they start to evaluate the puzzles, and then a clearly defined procedure is followed. Each rater randomly selects and views 10 participants' puzzles to get an idea of the range of creativity before starting to rate. During the rating, the participants' puzzles in different conditions are counterbalanced such that the raters are not aware of the puzzles' original condition. The correlation of the two raters' scores of 0.99 indicates that the creativity evaluations by the two independent raters are consistent. The average of the two raters' creativity scores is then taken as the final score of each rebus puzzle. Using this information, a creativity score (the average creativity rating for all the puzzles generated) is then computed for each participant.

2.4 Results

2.4.1 Descriptive statistics

Table 2-1 and Figures 2-1 and 2-2 show the performances of participants in the three conditions (no reward, monetary reward and social-recognition reward) in the responsive creativity task and the expected creativity task respectively. The analysis of variance (ANOVA) reveals that our manipulations have significant effects on the number of correctly solved puzzles ($F(94,2) = 5.79$, $p = 0.007$) in the responsive creativity task. In the expected creativity task, ANOVA reveals that the three types of incentive have a significant effect on the average creativity score ($F(93,2) = 4.49$, $p = 0.014$) and the number of high-creativity puzzles ($F(93,2) = 4.55$, $p = 0.013$). No significant result is found in the number of above-average puzzles ($F(93,2) = 0.29$, $p = 0.750$).

--- Insert Table 2-1, Table 2-2, Table 2-3, Figure 2-1 and Figure 2-2 here ---

2.4.2 Testing hypothesis 1a and 2a:

Hypotheses 1a and 2a relate to the effects of the different types of incentives on the performance of the responsive creativity tasks. Specifically, Hypothesis 1a predicts that the monetary reward (compared to no reward) leads to a higher creative performance in the responsive creativity tasks, and Hypothesis 2a predicts that the monetary rewards (compared to social-recognition rewards) lead to a higher creative performance in the responsive creativity tasks. The post-hoc comparisons using the Tukey HSD test reveals that, compared to receiving no reward (M = 36.58, SD = 8.1), being incentivized by monetary reward (M = 41.38, SD = 5.3) significantly increases participants' performance of the responsive creativity task (t (94) = 2.60, p = 0.011). Therefore, Hypothesis 1a is supported. With regard to Hypothesis 2a, although post-hoc comparisons show that, the monetary rewards (M = 2.18, SD = 1.90) lead to significantly more incorrectly solved puzzles (t (94) = 2.62, p = 0.011) than the social-recognition rewards (M = 3.41, SD = 2.18), there is no significant differences between monetary rewards (M=41.38, SD=5.33) and social-recognition rewards (M = 42.31, SD = 7.20) in terms of the number of correctly solved puzzles (t (94) = 0.59, p = 0.551). From this analysis, it is concluded that Hypothesis 2a is not supported.

2.4.3 Testing hypotheses 1b and 2b:

Hypotheses 1b and 2b predict the effects of the different types of incentive on the performance of the expected creativity tasks. Specifically, Hypothesis 1b predicts that no reward (compared to monetary reward) leads to a higher creative performance in the expected creativity tasks, and Hypothesis 2b predicts that the social-recognition rewards (compared to monetary rewards) lead to a higher creative performance in expected creativity tasks.

The post-hoc comparisons using the Tukey HSD test reveals that compared to monetary reward (M = 44.43, SD = 14.28), no reward (M = 52.05, SD = 10.53) significantly increases the average creativity score (p = 0.045). This finding is also consistent with Erat and Gneezy's (2015) study, which adopts the same rebus puzzle task as that used in this research for expected creativity. In terms of the 'number of high creativity puzzles', the post-hoc comparisons reveal no significant difference between monetary reward (M = 1.58, SD = 1.62) and no reward (M = 1.32, SD = 0.82). This result is also consistent with Kachelmeier et al.'s (2008) study. Therefore, Hypothesis 1b is supported when the dependent variable is the 'average creativity score', but not when it is the 'number of high creativity puzzles'. To test Hypothesis 2b, the Tukey HSD test reveals that compared to monetary rewards (M = 44.43, SD = 14.28), social-recognition rewards (M = 53.02, SD = 13.56) significantly increase the average creativity score (p = 0.006). In addition, the Tukey HSD test reveals that the social-recognition rewards (M = 2.49, SD = 1.87) significantly increase the number of high creativity puzzles (p = 0.038) compared to the monetary reward (M = 1.58, SD = 1.62). Furthermore, 'the number of above-average puzzles' is used as an additional measurement as it is consistent with the experimental instruction in the monetary reward condition and the social-recognition reward condition in the experiment[9]. The t-test reveals no significant difference in terms of 'the number of above-average puzzles' between the two conditions.

In summary, we find that although no reward leads to higher performance than monetary reward in terms of average creativity score, this difference disappears if the performance is measured by the number of high creativity puzzles. In addition, the social-recognition reward

[9] 'The number of above-average puzzles' is not used as the main dependent variable because the participants in the no reward condition are not informed about this performance measurement. In addition, this measurement has not previously been adopted in the creativity literature. Kachelmeier et al. (2008) use 'the number of mediocre puzzles' as a supplementary measurement, but these are defined as puzzles that are not in the overall top quartile. However, 'the number of above-average puzzles' combined with the 'number of high creativity puzzles' can still provide useful information on creativity performance.

leads to a higher performance than monetary rewards in terms of both the average creativity scores and the number of high creativity puzzles. From the analysis above, we conclude that the question of whether reward benefits improves creativity performance depends on the type of creativity. Overall, different incentive schemes have different effects on both responsive and expected creativity performances. We find that monetary reward, compared to no reward, enhances responsive creativity performance but undermines expected creativity performance. In addition, social-recognition reward, relative to monetary reward, enhances performance in the expected creativity task, but not performance in the responsive creativity tasks[10]. Interestingly, our results show that participants under the social-recognition reward condition perform no worse than participants under either of the other two incentive contracts in either responsive or expected creativity tasks.

2.4.4 Supplemental analysis

Hypothesis 1b and 2b compare the effects of different types of rewards on the performance of expected creativity. We argue that the monetary reward induces a narrower focus than either no reward or social-recognition reward, which in turn undermines the expected creativity performance. To test this mechanism, we conduct a series of mediation analyses.

[10]This result is contradicted by Mehta et al.'s (2017) finding, which suggests that monetary reward rather than social-recognition reward enhances creativity performance. The reasons for these contradicting finding could be due to the experimental tasks used in these two studies. Mehta et al. (2017) use a real-world problem-solving task that is inherently influenced by social norms because a highly creative idea is more likely to challenge conventional practices and violate traditional social norms. As a result, participants' solutions to real-world problem would be restricted by social norms. Rebus puzzle designing, on the other hand, is a highly abstract task that is relatively unrestricted by social norms. Therefore, the negative effect of the social recognition reward on creativity performance is minimized when the task is rebus puzzle designing because this task is not affected by social norms.

For Hypothesis 1b, we test the mediating effect by using participant's intrinsic motivation as a proxy for participants' focus. Intrinsic motivation is a valid proxy for people's focus because the literature shows that it is positively associated with people's searching and exploration behavior, which leads to participants having broader focus (McGraw, 1978; Amabile et al., 1986). Intrinsic motivation is measured by four items in the questionnaire: "I would describe this task as very interesting", "To what extant do you like to do the task again?", "I thought this was a boring task", and "this task did not hold my attention at all". Participants answer these questions on a 1 (strongly disagree) to 7 (strongly agree) scale. We reverse the scores of last two items and take the average of the four scores as the intrinsic motivation score. In order to test the mediation effects, we establish mediation effect if the following three conditions are met (Baron and Kenny 1986; MacKinnon et al. 2002): (1) monetary reward significantly affects creativity performance; (2) monetary reward significantly affects intrinsic motivation, and (3) controlling for intrinsic motivation, the effect of monetary reward on creativity performance become weaker or non-significant. First, a regression analysis is conducted on the average creativity score to examine whether an effect is present. The analysis reveals a significant effect for monetary reward, $F(1, 57) = 4.28$, $p = 0.043$. Second, a regression analysis is conducted on intrinsic motivation to examine whether monetary reward has an effect on the mediator variable. The analysis reveals a significant effect of monetary reward, $F(1, 57) = 7.58$, $p = 0.008$. Participants in the monetary reward show lower level of intrinsic motivation ($M = 4.93$, $SD = 1.37$) than do those in the fixed payment condition ($M = 5.86$, $SD = 0.82$). Third, the first regression analysis is repeated with intrinsic motivation included as an independent variable to examine whether intrinsic motivation mediates the effect of monetary reward on the average creativity score. The analysis reveals that intrinsic motivation has a significant influence on the average creativity

scores, F (1, 57) = 5.52, p = 0.006. The inclusion of extrinsic motivation into the equation reduced the coefficient of monetary reward from significant (t= 2.07, p = 0.043) to non-significant (t = 1.17, p = 0.248), indicating that intrinsic motivation fully mediates the effect of monetary reward on the average creativity score. Collectively, our results suggest that the negative effect of monetary reward on the average creativity score in the expected creativity task is fully mediated by the participants' decreased intrinsic motivation (see Figure 2-3 for a graphical representation). We conclude that monetary reward undermines expected creativity performance because it narrows participants' focus and restricts how far they can search and explore alternatives.

Hypothesis 2b states that the monetary reward leads to a narrower focus than the social-recognition reward, which in turn negatively affects expected creativity performance. We use participants' extrinsic motivation as a proxy for participants' focus as extrinsic motivation makes participants focus more narrowly on the attainment of the extrinsic goal (Amabile et al., 1986). Specifically, strong extrinsic motivation indicates that participants will focus more narrowly on the performance itself. The extrinsic motivation is measured by two items in the questionnaire, namely: "To what extent would you like to win the monetary/social recognition reward?" and "How important is it for you to win the monetary/social recognition reward?" Participants answer these questions on a 1 (strongly disagree) to 7 (strongly agree) scales. We take the average of the two scores as the score of extrinsic motivation. We then conduct the following mediation analysis test. First, a regression analysis is conducted on the average creativity score to examine whether an effect is present. The analysis reveals that monetary reward has a significant effect, F (1, 75) = 7.28, p = 0.009. Second, a regression analysis is conducted on extrinsic motivation to examine whether monetary reward has an effect on the mediator variable. The analysis reveals that monetary reward has a significant effect, F (1, 75)

= 10.73, p = 0.002. Participants in the monetary reward show higher level of extrinsic motivation (M = 5.71, SD = 1.12) than do those in the social-recognition condition (M = 4.20, SD = 1.48). Third, the first regression analysis is repeated with extrinsic motivation included as an independent variable to examine whether extrinsic motivation mediates the effect of monetary reward on the average creativity score. The analysis reveals that extrinsic motivation has a significant influence on the average creativity score, F (1, 75) = 6.23, p = 0.003. The inclusion of extrinsic motivation into the equation reduces the coefficient of monetary reward from significant (t = 2.69, p = 0.009) to non-significant (t = 0.16, p = 0.204), indicating that extrinsic motivation fully mediates the effects of monetary reward on the average creativity score (see Figure 2-3 for a graphical representation). Taken together, these results suggest that the negative effect of monetary reward on the average creativity score in the expected creativity task is explained by the participants' increased extrinsic motivation.

2.5 Conclusions

Although the practice of incentivizing employees' creativity performance with no reward, monetary rewards and social-recognition rewards is widespread, the question of whether and how organizations should reward creativity remains controversial in the creativity literature. This study is based on a laboratory experiment investigating the effects of different types of reward on different types of creativity performances. Specifically, a distinction is made between responsive creativity (close-ended problem-solving) and expected creativity (open-ended problem-solving) on the basis of Unsworth's (2001) creativity typology. In addition, we investigate the effects of different types of reward on different types of creativity by making a distinction between monetary and social-recognition rewards. Our experimental results indicate that monetary rewards (compared to no reward) have a positive effect on responsive creativity, but a negative effect on expected creativity. We also find that social-

recognition rewards have a greater positive effect on expected creativity than monetary rewards. Further mediation analysis indicates that this effect can be attributed to the employees' narrower focus when they are provided with monetary rewards rather than no reward or social-recognition rewards.

In terms of expected creativity tasks, combining average creativity and the 'number of high creativity idea' shows a more comprehensive picture of participants' performance. Compared to no reward, monetary rewards lead to lower average creativity score, but not 'the number of high creativity ideas', which indicates that the difference in the average creativity score is due to the fact that participants offered monetary rewards generate a higher proportion of mediocre creative ideas. Social-recognition rewards lead to better performance than monetary rewards in terms of both average creativity score and 'the number of high creativity puzzles', this difference is due to the fact that participants under social-recognition rewards generate not only a higher proportion of high creativity puzzles but also a lower proportion of mediocre puzzles. Compared to no reward, social-recognition rewards lead to better performance in terms of 'the number of high creativity puzzles' but not the average creativity score, which indicates that the performance difference is due to the fact that participants with social-recognition rewards generate not only a higher proportion of high creativity puzzles but also a higher proportion of mediocre puzzles.

Our study contributes to the debate in the creativity literature on whether organizations should reward creativity. By distinguishing between different types of creativity, we provide a new perspective that explains why rewards sometimes benefit creativity and sometimes undermines it. In addition, our study contributes to the literature on incentives in accounting by distinguishing between tangible and intangible performance-based rewards, while the literature has mainly focused on comparing cash versus non-cash forms of tangible reward in

the effort-based task. Our study expands this literature by classifying rewards for creativity tasks in broader categories (tangible vs. intangible). Our findings show that, when predicting the effect of rewards on creativity performance, it is important to know not only whether the reward should be provided, but also how it is delivered.

This study also provides insights for firms that strive to design reward systems to stimulate creativity performance. Our results suggest that managers can choose different types of reward depending on the type of creativity problems. In particular, when the problem is close-ended and pre-defined, it is more effective to use performance-based rewards such as monetary or social recognition rewards. On the other hand, when the problem is open-ended and unspecified, then no reward and social-recognition rewards are equally superior to monetary rewards. Surprisingly, our results show that social-recognition is a more effective form of reward for both responsive and expected creativity tasks. A survey conducted by Interact/Harris Poll of about 1,000 US employees finds that, 63% complains that their leaders did not recognize employee achievement (Solomon, 2015). Despite being costless and efficient, social-recognition rewards has attracted limited attention in the creativity literature. The results of our study show that social-recognition rewards perform at least as well as the other two forms of reward for both responsive and expected creativity tasks. Therefore, social-recognition reward could be an appropriate reward choice for organizations when it is difficult to judge whether the creativity task involves a close-ended or open-ended problem.

The limitations of our study provide opportunities for future research. First, our laboratory experiment allows us to observe the effects of different reward schemes only within a limited time-span, and so it is not clear what the long-term effects of these reward schemes might be (Kachelmeier et al., 2018). The literature shows that social-recognition rewards not only result in higher employee performance in the short-run, but also increase

other employees' performance in the longer-term (Bradler et al., 2016; Li et al., 2016). An interesting research question for future research is whether the long-term effects and the spillover effects of social-recognition rewards also apply in creativity context. Second, our results in the expected creativity task finds that monetary rewards (relative to no reward) undermine expected creativity performance. One plausible explanation could be the differences in the amount of the monetary reward and the length of time. As Eisenberger and Armeli (1997) suggest, the explicit requirement of novel performance for a large reward (relative to a small reward) enhances generalized creativity without any loss of intrinsic creative interest. Therefore, future research could focus on the moderating role of the amount of monetary reward and task time in the relationship between monetary reward and creativity performance. Third, the effects of rewards on creativity performances are studied in a competition context in our study. However, employees could also be rewarded without competition when they achieve a certain target. Future research could focus on the effects of reward on creativity performance in a target-setting context.

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2.7 Appendix A

Experimental Instructions

- **Responsive Creativity Task**

What we would like you to do?

We would like you to solve the puzzles as many as you can. You will have 12 minutes to complete the task.

How your performance is determined?

There is only one correct solution for each puzzle. Your performance is determined by the number of the correctly solved puzzles.

- **Expected Creativity Task**

What we would like you to do?

We would like you to construct your own puzzles (including solutions of the puzzles). You will have 12 minutes to complete your submission.

What do we expect from you?

While we do not impose any rules on the types of puzzle you submit, we value creativity (i.e., a creative puzzle should be **Original, Innovative**, and **Clever**).

How your performance is determined?

Your performance is determined by "**the Number of Above-Average Puzzles**"

How do we define high creative puzzle?

1. Firstly, all of your puzzles will be rated by three raters based on creativity (**Original, Innovative**, and **Clever**), on a 1 to 10 scale, where 10 is the highest possible score and 1 is the lowest possible score.
2. Secondly, each puzzle's creativity score is determined by the average score of three raters' scores. For example, if one puzzle's creativity score given by three

experts are: 5, 6 and 7, then the final score of this puzzle is calculated as: (5+6+7) / 3= 6.

3. Finally, we will rank all of the puzzles generated by all of the participants in this session based on the creativity score. Those puzzles with **creativity scores above the average** will be regarded as **Above-Average Puzzles**.

2.8 Appendix B

Incentive Schemes

Responsive Creativity Task

- **Condition with no reward**

In order to encourage you to do the best, you will be paid 5 Euros participation fee for your work in this study, irrespective of how you perform in the task.

Performance-based reward

In order to encourage you to do the best, you will have the opportunity to win a REWARD based on your performance. Your performance is determined by the number of puzzles you correctly solved. More specifically, if the number of correctly solved puzzle is ABOVE the average (relative to all other participants in this session), then you will WIN. In particular:

- **Condition with monetary reward**

If you win, you will get €5 Reward. The experimenter will then come to you and pay you privately in cash.

Otherwise, if the number of correctly solved puzzle is LESS than the average (relative to all other participants in this session), you will NOT win any additional reward.

- **Condition with social-recognition reward**

You will be recognized later on in the lab, and you will receive a 'Certificate of WINNER'.

Your name and your performance will be announced publicly to ALL participants through a congratulatory email.

Otherwise, if the number of correctly solved puzzle is LESS than the average (relative to all other participants in this session), then you will NOT win any recognition reward.

Expected Creativity Task

- **Condition with no reward**

In order to encourage you to do the best, you will be paid 5 Euros participation fee for your work in this study, irrespective of how you perform in the task.

Performance-based reward

In order to encourage you to do the best, you will have opportunity to win a REWARD based on your performance (the number of Above-Average puzzles).

More specifically, if you construct more ABOVE-Average (relative to all other participants in this session) puzzles, then you will WIN. In particular:

- **Condition with monetary reward**

If you win, you will get €5 Reward. The experimenter will then come to you and pay you privately in cash.

Otherwise, if the number of correctly solved puzzle is LESS than the average (relative to all other participants in this session), you will NOT win any additional reward.

- **Condition with social-recognition reward**

You will be recognized later on in the lab, and you will receive a 'Certificate of WINNER'

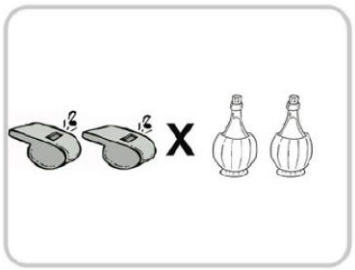
Your name, together with your "Above-average Creative Puzzles" will be announced publicly to ALL participants through a congratulatory email.

Otherwise, if you construct the BELOW-Average (relative to all other participants in this session) number of high creative puzzles, then you will NOT get any recognition reward.

2.9 Appendix C

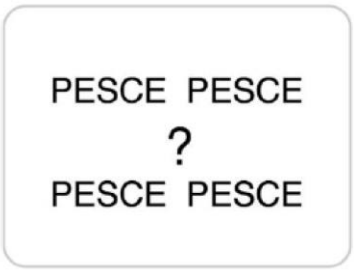
Experiment Task Examples

Actual examples of responsive creativity task:



Solution: prendere fischi per fiaschi

Solution: farne di tutti i colori

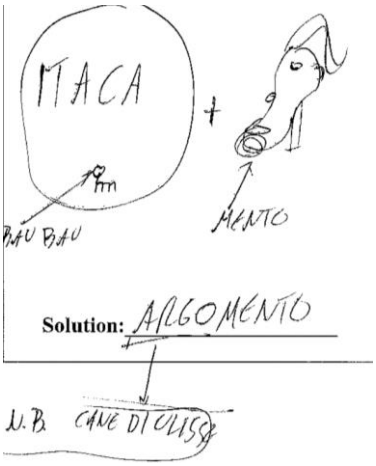


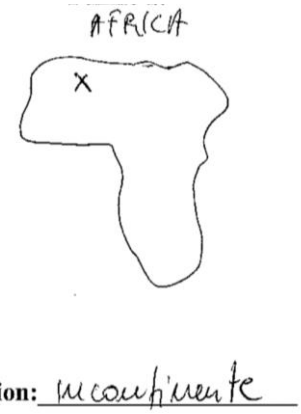
Solution: non sapere che pesci pigliare

Solution: punta della lingua

Actual examples of expected creativity task:

Rebus Puzzles with High Creativity Score:





Rebus Puzzles with Low Creativity Score:

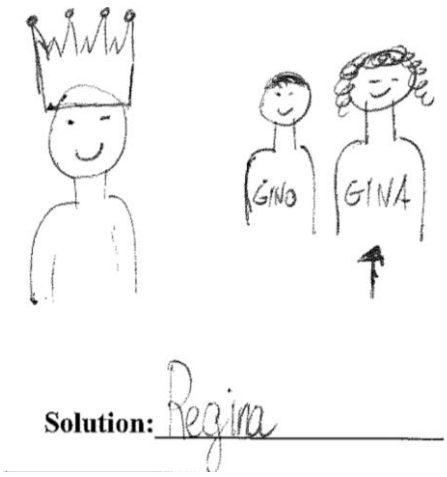
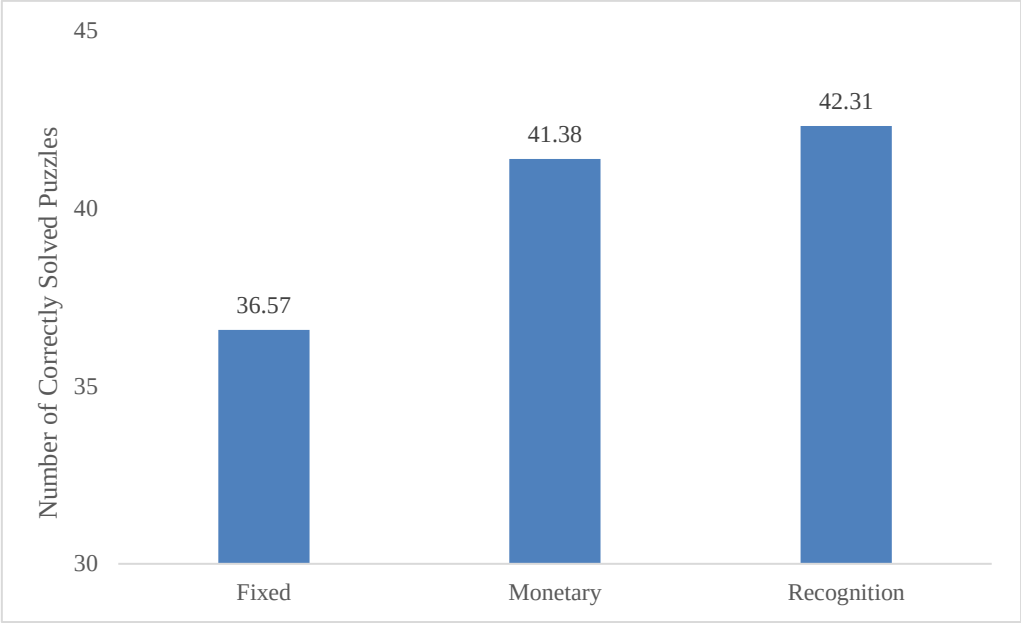


Figure 2-1

Number of Correctly Solved Puzzles in Responsive Creativity Task

(Hypothesis 1a and Hypothesis 2a)

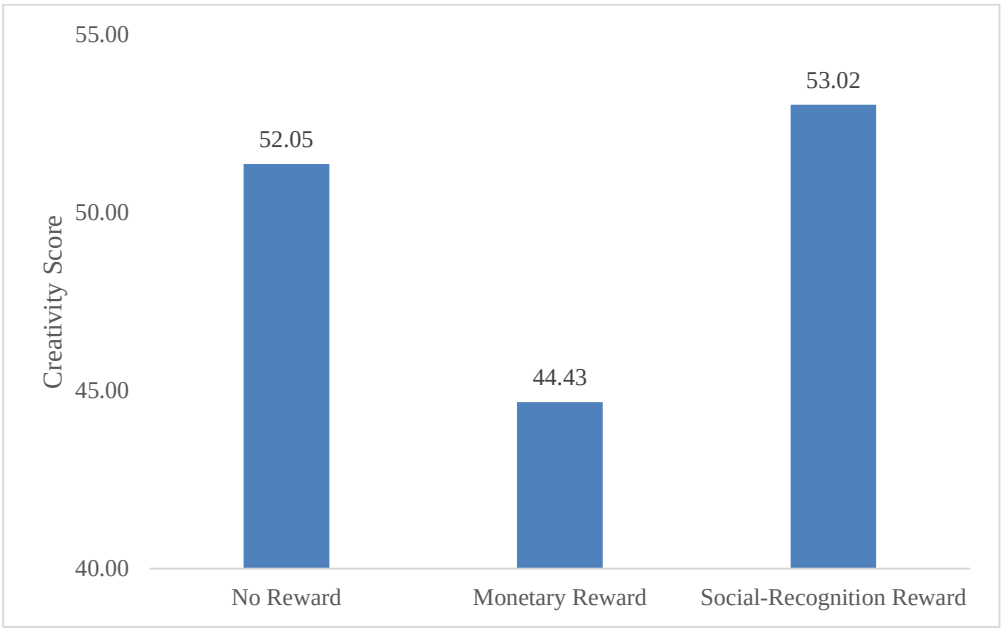


This chart illustrates the number of correctly solved puzzles. It highlights that participants compensated for no reward solve less rebus puzzles than do participants compensated for both monetary reward and social-recognition reward.

Figure 2-2

Panel A: Average Creativity Score in Expected Creativity Task

(Hypothesis 1b and Hypothesis 2b)



Panel B: Total Quantity and Number of High Creativity Puzzles in Expected Creativity Task

(Hypothesis 1b and Hypothesis 2b)

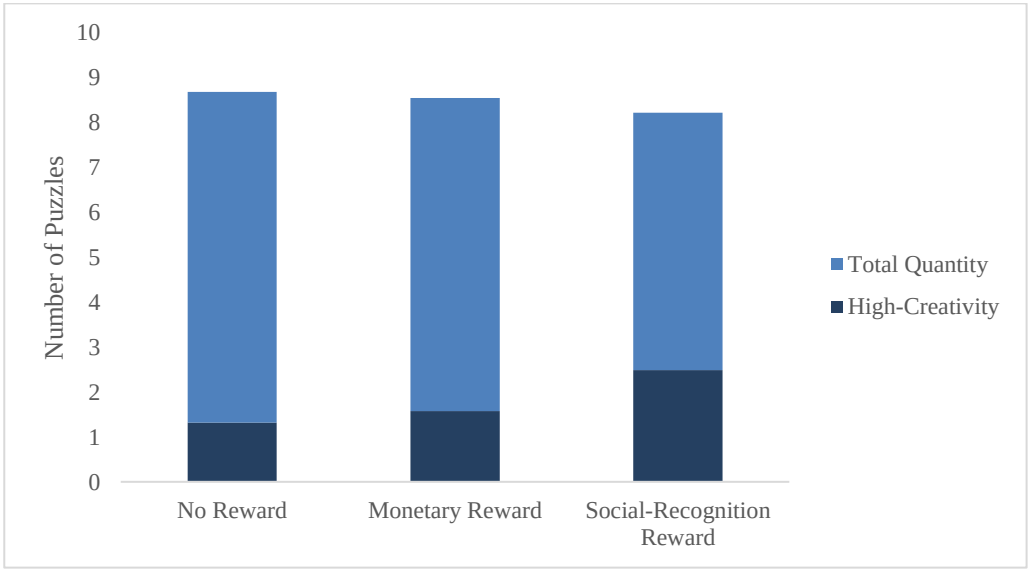


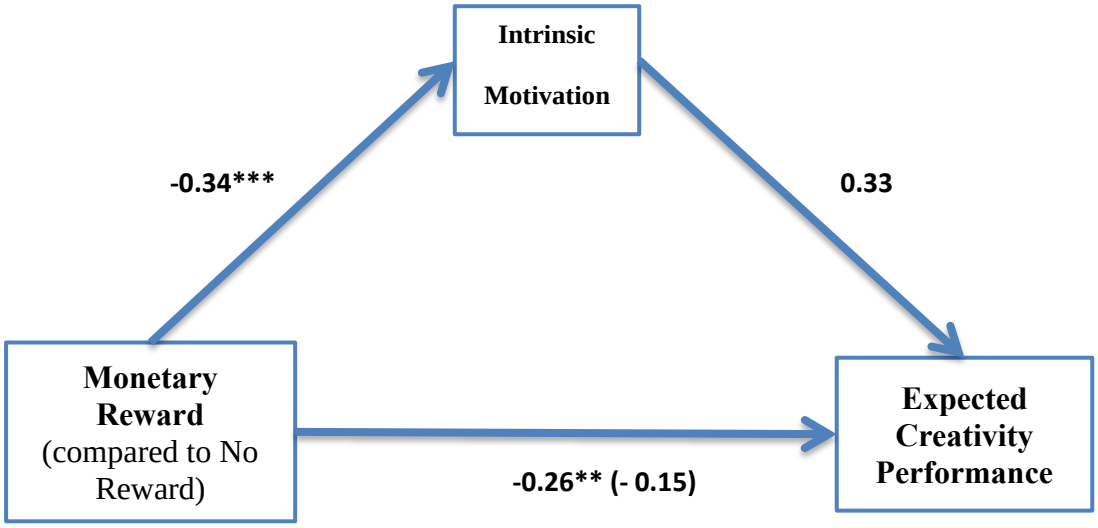
Figure 2-2 (cont.)

Panel A illustrates the average creativity score of the puzzles that each participant produced. It highlights that participants with monetary reward produce less creative rebus puzzles than do participants with either no reward or social-recognition reward.

Panel B illustrates the average number of puzzles each participant produced that receive a creativity rating above and below top quartile in each experimental condition. It highlights that participants provided for no reward, monetary reward and social-recognition reward produce a comparable number of puzzles in total, but participants with social-recognition reward produce significantly more high creativity puzzles than do participants with no reward and monetary reward.

Figure 2-3

Panel A: Mediation Analysis of Intrinsic Motivation



Panel B: Mediation Analysis of Extrinsic Motivation

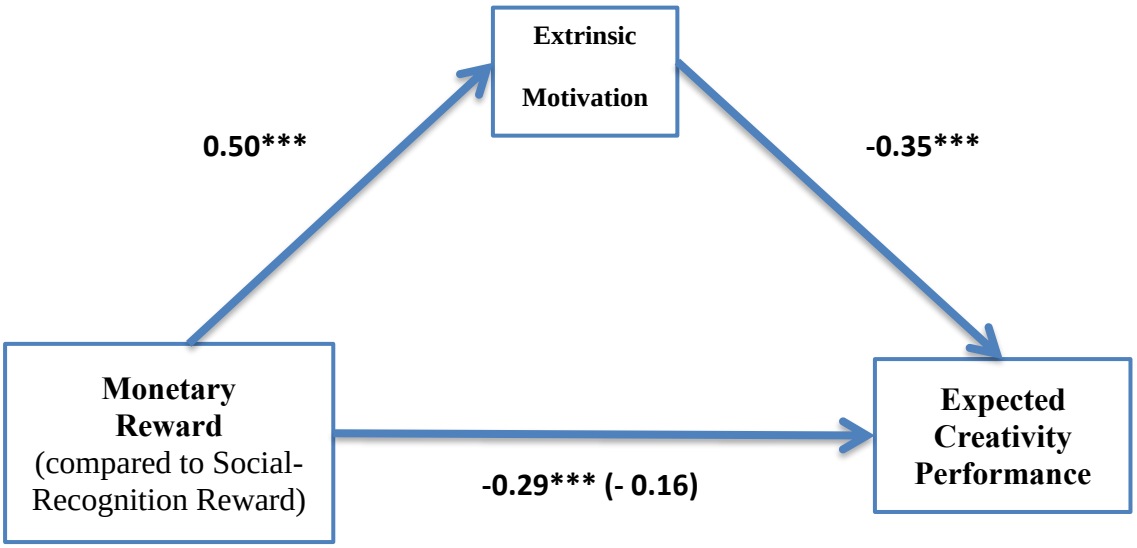


Figure 2-3 (cont.)

Panel A illustrates the indirect effect of monetary reward (relative to no reward) on the performance of expected creativity, via participants' intrinsic motivation. In Step 1 of the mediation mode, a regression analysis is conducted on the average creativity score to examine whether an effect is present. The analysis reveals a significant effect of monetary reward, $F(1, 57) = 4.28$, $p = 0.043$. Step 2 reveals a significant effect of monetary reward on participants' intrinsic motivation, $F(1, 57) = 7.58$, $p = 0.008$. In Step 3, the first regression analysis is repeated with intrinsic motivation included as an independent variable to examine whether intrinsic motivation mediates the effect of monetary reward on the average creativity score. The analysis reveals significant influence of intrinsic motivation on the average creativity score, $F(1, 57) = 5.52$, $p = 0.006$. The inclusion of extrinsic motivation into the equation reduced the coefficient of monetary reward from significant ($t = 2.07$, $p = 0.043$) to non-significant ($t = 1.17$, $p = 0.248$), indicating intrinsic motivation fully mediates the effect of monetary reward on the average creativity score.

Panel B illustrates the indirect effect of monetary reward (relative to social-recognition reward) on the performance of expected creativity, via participants' extrinsic motivation. In Step 1 of the mediation mode, a regression analysis is conducted on the average creativity score to examine whether an effect is present. The analysis reveals significant effect of monetary reward, $F(1, 75) = 7.28$, $p = 0.009$. Step 2 reveals a significant effect of monetary reward, $F(1, 75) = 10.73$, $p = 0.002$. In Step 3, the first regression analysis is repeated with extrinsic motivation included as an independent variable to examine whether extrinsic motivation mediates the effect of monetary reward on the average creativity score. The analysis reveals a significant influence of extrinsic motivation on the average creativity score, $F(1, 75) = 6.23$, $p = 0.003$. The inclusion of extrinsic motivation into the equation reduces the

coefficient of monetary reward from significant (t = 2.69, p = 0.009) to non-significant (t =0.16, p = 0.204), indicating extrinsic motivation fully mediates the effects of monetary reward on the average creativity score.

All reported p-levels are two-tailed: * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 2-1

Descriptive Statistics of Responsive Creative and Expected Creativity Performance

Panel A: Descriptive Statistics of Responsive Creative Performance

	Incentive Scheme		
	No Reward	Monetary Reward	Social-Recognition Reward
Number of correctly solved puzzles	n=21	n=37	n=39
	36.57	41.38	42.31
	(8.1)	(5.3)	(7.2)
Number of incorrectly solved puzzles	4.38	3.41	2.18
	(3.59)	(2.18)	(1.90)

Panel B: Descriptive Statistics of Expected Creative Performance

	Incentive Scheme		
	No Reward	Monetary Reward	Social-Recognition Reward
Number of puzzles	n=19	n=40	n=37
	8.68	8.55	8.22
	(3.79)	(3.50)	(2.83)
Number of Above-average Puzzles	4.11	3.93	4.35
	(2.45)	(2.68)	(2.21)
Number of High Creativity Puzzles	1.32	1.58	2.49
	(0.82)	(1.62)	(1.98)
Average Creativity Score	52.05	44.43	53.02
	(10.53)	(14.28)	(13.56)

Table 2-1 (cont.)

This table shows the means (standard deviations) of our dependent variables across the three experimental conditions. Panel A of the table contains the means (standard deviations) for the performances of responsive creativity task in each of the three conditions. Panel B contains the means (standard deviations) for the performances of expected creativity in each of the three conditions.

Responsive creativity is measured by the *number of correctly solved puzzles*, indicating that the average puzzles that participants solved correctly.

Expected creativity is measured by the *average creativity score* and the *number of high creativity puzzles*, and supplemented by the *number of above-average puzzles*. *Average creativity score* represents the average rating of the puzzles that generated by the participants. *Number of high creativity puzzles* indicates participants' number of puzzles with a rating in the top quartile of all puzzles. *Number of above-average puzzles* represents participants' number of puzzles with a rating above the average of all puzzles.

Table 2-2

ANOVA Estimation of Responsive Creativity Performance

The number of correctly solved puzzles

Factor	DF	Sum of Squares	*F*	p-Value (two-tailed)
Between-Subjects Incentive Scheme	2	475.764	5.195	0.007

This table 2 shows the ANOVA results of our manipulations (no reward, monetary reward, and social-recognition reward) in the responsive creativity task. ANOVA reveals significant effects of our manipulations on the number of correctly solved puzzles (F (94,2) = 5.79, p = 0.007) in responsive creativity task.

Table 2-3
ANOVA Estimation of Expected Creativity Performance

Panel A: Average creativity score

Factor	Df	Sum of Squares	*F*	p-Value (two-tailed)
Between-Subjects Incentive Scheme	2	1585.590	4.467	0.014

Panel B: The number of high creativity puzzles

Factor	Df	Sum of Squares	*F*	p-Value (two-tailed)
Between-Subjects Incentive Scheme	2	23.376	4.546	0.013

Panel C: The number of above-average puzzles

Factor	Df	Sum of Squares	*F*	p-Value (two-tailed)
Between-Subjects Incentive Scheme	2	3.503	0.288	0.750

This table shows the ANOVA results of our manipulations (no reward, monetary reward, and social-recognition reward) in the expected creativity task. ANOVA reveals a significant effect of the three types of incentives on the average creativity score (F (93,2) = 4.49, p = 0.014) and the number of high creativity puzzles (F (93,2) = 4.55, p = 0.013). No significant result is found in the number of above-average puzzles (F (93,2) = 0.29, p = 0.750).