Incentive Schemes and Peer Effects on Risk Behaviour: An experiment

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Abstract *This paper studies if incentivising performance with competition and cooperation-based incentive schemes, rather than individual compensation, affects peer effects on subsequent risk behaviour. We run a laboratory experiment in which we introduce three different compensation schemes - piece-rate, equal-split-sharing-rule, and tournament - associated to a real effort task. Risk behaviour is measured by using the Bomb Risk Elicitation Task. We find that competition more than halves peer influence on risk behaviour compared with piece-rate compensation but treatment effects are not statistically significant. Competition also significantly reduces an individual's feeling of attachment to the peer and self-reported peer influence. Finally, we find that relative performance in the incentivised task matters for peer effects on subsequent risk behaviour: the worst performing subjects within the group are influenced by their peer, while the best performing subjects are not.*

Keywords: Risk Behaviour, Incentive Schemes, Peer Effects, Competition, Equal-split-sharing-rule

JEL Classification: D03, D81, D83

1. Introduction

Risk is inherent to a wide range of economic decisions, such as the choice of track in secondary school, field of study at the university, job decisions, health-related behaviours, marriage, parenthood, migration, and of course financial assets' allocation (Saks and Shore, 2005; Belzil and Leonardi, 2007; Schmidt, 2008; Caner and Okten, 2010; Jaeger et al., 2010; Light and Ahn, 2010; Spivey, 2010; De Paola and Gioia, 2012). Recent research has shown that individual risk attitudes are not immutable personality traits, but are shaped at least partly by the environment, such as family structure or classroom's gender composition (Dohmen et al, 2012; Booth and Nolen, 2012), by emotional states (Bassi et al., 2013; Conte et al., 2013; Campos-Vazquez and Cuilty; 2014), by life experiences, such as poverty, job loss or violence (Haushofer and Fehr, 2014; Hetschko and Preuss, 2015; Callen et al., 2014) and, more directly relevant for this paper, an individual's risk attitudes appear to be shaped by peers (Cooper and Rege, 2011; Lahno and Serra-Garcia, 2015).

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Peer effects are particularly valuable from a policy perspective because they amplify the benefits of any policy intervention thanks to a social multiplier effect (Mansky, 1993). We do however know little about what determines the existence and strength of peer effects. Peers are by definition part of the same social setting, but the nature of their social interactions may differ. At school or at work, peers may be competing to be the best or to be promoted. However, they may also have incentives to cooperate to share specific knowledge or carry out complex projects. Competitive and cooperative incentive schemes are widely used by educational institutions, organizations and private companies to increase individual performance. In this paper, we investigate the extent to which the nature of incentive schemes to which individuals are exposed affects the existence and strength of peer effects. In a nutshell, we ask: Are you more likely to be influenced by your peer if you compete with him/her or if you have to cooperate? Since peer interactions outlast the competitive/cooperative task, we are not interested in peer effects on the immediate productivity but we study peer effects on subsequent risk behaviour and, in turn, on subsequent decisions influenced by risk attitudes, which could affect future productivity.

We hypothesize that the introduction of a competition/cooperation-based incentive scheme is similar to a manipulation of group identity[1] so it may influence peer effects on risk behaviour: compared with working individually but surrounded by random co-workers, subjects may be less likely to perceive a competitor as a member of their group because when peers are competitors, they work to reach a personal goal and only one peer will be able to meet such goal. Instead, being teammates may (depending on teammates' behaviour) increase peer's salience and enhance the feeling of belonging to the peer group. In fact, with cooperation-based incentive schemes, like an equal-split-sharing-rule, peers work to reach a common goal and this enhances their group membership; however, since a peer's performance/contribution to the group output positively affects the individual, peer relationships may also be weakened by a peer's contribution not meeting individual expectations, for example because of under provision of effort due to free-riding. Previous work has shown that group identity amplifies peer effects: Gioia (2016) shows that higher levels of group identity significantly increase peer effects on risk behaviour, that is individuals with a stronger feeling of group membership, a greater sense of belonging to the social group, are significantly more influenced by the risk behaviour of their peers when taking decisions involving risk.

Our hypothesis is inspired by recent empirical research in organizational psychology and management that shows that incentive schemes affect co-worker relations and this, in turn, has an impact on job satisfaction, commitment to an organization and turnover (Ducharme and Martin, 2000;

[1] Group identity is defined by psychologists as "the portion of an individual's self-concept derived from the sense of belonging to the social group" (Hogg and Vaughan, 2002).

Morrison, 2004; Morgeson and Humphrey, 2006; Quigley et al., 2007; Chiaburu and Harrison, 2008; Barnes et al., 2011; Taylor and Westover, 2011; Skaalvik and Skaalvik, 2011; Onemu, 2014). Our research is also motivated by recent evidence in the peer effects literature that suggests that not all peers matter and some matter more than others (Vaquera and Kao, 2008; Lomi et al., 2011; Lin and Weinberg, 2014; Borjas and Doran, 2015). We add to this literature by considering the long-lasting nature of peer relationships and thus focussing on teammates and competitors' influence on the risk behaviour – and the decisions involving risk – following the incentivized work, not just on peer effects on immediate performance.

We answer our research question by conducting a laboratory experiment with three treatment conditions corresponding to three different compensation schemes - piece-rate (PR), equal-split-sharing-rule (ESSR), and tournament (TO) – of an effort task, named Coin Task, consisting in recognizing for five minutes the value and the country of a random sequence Euro coins displayed on the computer screen. Risk preferences are measured both before and after the incentivised task by using the Bomb Risk Elicitation Task (Crosetto and Filippin, 2013), a simple elicitation method in which participants have to choose how many boxes to collect out of 100, 99 of which contain £0.10 while one contains a bomb that destroys all earnings. At the end of the experiment, subjects complete a short questionnaire including a question on attachment to the peer and a question on perceived peer influence.

We find that participants in the PR treatment are influenced by their randomly assigned peer when making their risky choice after the effort task: for each additional box collected in the first performance by their randomly assigned peer, they increase their choice in the second performance of the BRET by about 0.20 boxes, an effect significant at the 5 percent level. Peer effects are very similar in size for participants in the ESSR treatment (+0.17 boxes for a unitary increase in teammate's previous choice, significant at the 5 percent level) while they are more than halved when performance is incentivized by using competition (+0.06 boxes, not statistically significant). Thus, our findings confirm the evidence of peer effects on risk behaviour that emerges from the economic literature and seem to point to a role of incentive schemes on peer influence, in particular for tournaments that produce an economically (despite not statistically) significant attenuation of peer influence.

In a setting of complete information where individuals can observe both their peers' behaviour before the incentivized task and the outcome of such task – as it commonly happens –, incentives may shape subsequent peer influence in an heterogeneous way because, after the incentivized task, peers are no longer under equal conditions (for example after a competition there are winners and losers) and the extent to which individuals are influenced by their peers may depend on such conditions. In fact, the literature on feedback, that typically focuses on its effects on performance, considers different behaviours depending on the ranking (i.e. underdogs *vs* frontrunners) (Eriksson, Poulsen and Villeval, 2009; Kuhnen and Tymula, 2012). Likewise, the literature on emotions associates different emotions to positive and negative feedback (Kräkel, 2008; Belschak and Hartog, 2009). We investigate whether peer effects differ depending on the relative performance in the incentivised effort task and we find that peer influence on risk behaviour is mostly driven by participants with the lowest score (+0.38 significant at the 1 percent level in PR), while peer effects are significantly smaller and no longer statistically significant for subjects obtaining the highest score (+0.10, p-value=0.438 in PR). This evidence comes mainly from peer groups that are very heterogeneous in terms of performance in the effort task. Differences in peer influence across treatments are never statistically significant. However, they are close to zero for the highest scoring subjects but become bigger for the lowest scoring subjects: the influence of a better performing teammate is about one third higher than that of a better random person while the influence of a winner is lower by about a half compared with the latter.

Since our hypothesis of an effect of incentives on peer influence was based on the idea that the implementation of incentive schemes may change the feeling of group membership, we use answers to the final questionnaire's question on attachment to the peer to check that. We find that after competition participants feel significantly less attached to their peer than after the implementation of both a piece-rate compensation scheme (-1.15 on a 0 to 10 scale) and a cooperation-based incentive scheme (-1.72). Moreover, tournaments significantly attenuate the probability of self-report peer influence compared with the other two compensation schemes (-17 percentage points *vs* PR and – 27 percentage points *vs* ESSR).

Our findings have implications for the design and evaluation of the optimal compensation scheme. For instance, suppose that we have to structure the environment in compulsory education. Since we care about individual performance, as we think it reflects the accumulation of skills or knowledge that improve human capital and will have some value in the labour market, we might want to choose the incentive scheme that produces the highest increase in performance and evaluate it only on the bases of the performance boost achieved. However, suppose that we also publicly finance higher education. If individuals face some risk of successfully finishing higher education, we might worry about people being less risk averse in making their decisions. So, the incentives implemented in compulsory education become important as they may affect peer relationship and influence and, in turn, individual decisions and the payoffs to society from financing higher education. Likewise, in research and development, individuals care about the results of current projects, but risk attitudes will shape the types of future projects that are attempted.

The paper is structured in five parts. Section 2 briefly presents the related literature. In section 3 we describe our experimental design. Section 4 presents our empirical analysis. Section 5 concludes.

2. Related Literature

Studying the impact of different compensation schemes on peer effects on risk behaviour makes three contributions to the existing economics literature. First, it offers new evidence on peer effects on risk behaviour. As a consequence, it sheds more light on the extent to which the characteristics of the environment can shape risk attitudes, often considered an innate behavioural trait. Last, but not least, it improves the understanding of the consequences of implementing incentive schemes, that, especially in a long-run perspective with repeated and continuous interaction, may go beyond a change in immediate performance.

In our previous work (Gioia, 2016), we found that group identity strengthens peer effects on risk behaviour. We use the same risk elicitation task and the same design to provide feedback on peers' ex-ante risk behaviour but, instead of manipulating group identity between the ex-ante and ex-post risk elicitation, we manipulate the incentive structure of a real effort task.[2]

Our hypothesis that collaborators and competitors represent different peers and, therefore, the implementation of such incentive schemes may trigger a different attachment to the peer group and a different magnitude of peer effects, deepen the understanding of recent evidence in the peer effects literature that suggests that not all peers matter and some matter more than others. For example, Borjas and Doran (2015) use very nice data on the emigration of Soviet mathematicians after the collapse of the Soviet Union to study how the change in peer group composition (i.e. losing a competitor - researcher working on the same topics -, a co-worker – researcher employed by the same department -, or a collaborator - co-author -) changes the productivity of remaining mathematicians. They find that the productivity of mathematicians losing competitors increases while researchers losing co-workers and collaborators, especially high-quality ones, lose the positive knowledge spillover coming from these peers. Similarly, Chan, Li and Pierce (2014) examine data of a department store where multiple brands establish their own counters to compete on a common retail floor and each firm may use either team based (TC) or individual based (IC) compensation for its salespeople. The authors find that TC incentives improve the performance of the team because they

[2] In addition, we have pairs instead of groups of three because we want to study also the role of the outcome of the incentivized task and having pairs allows us to compare subjects obtaining different outcomes across treatments. In fact, within pairs there is a winner and a loser in competition and a best and worst performing subject in piece-rate and teamwork (ties are not a major issue because subjects receive feedback on performance and in such a case the winner is randomly chosen). With groups of three instead there are a winner and two losers in competition, but in the other two treatments there is a three level rank and the middle level rank is not necessarily considered as the bottom ranked individual.

stimulate positive peer effects; instead, IC incentives stimulate competition within salespeople of the same firm. Also, heterogeneity in salesperson ability improves team performance at TC counters, while at IC counters worker heterogeneity reduces overall sales. We go one step further by looking at peer influence not only on productivity but on subsequent risk behaviour and, in turn, on subsequent decisions involving risk which could affect future productivity.

We therefore contribute to the recent literature showing that risk behaviour is not an immutable personality trait but is influenced by characteristics of the environment, emotional states and peers behaviour. Dohmen et al. (2012) show evidence of a role of family size and birth order on the intergenerational transmission of risk attitudes, with firstborn children and children with fewer siblings being more strongly influenced by parents. Booth and Nolen (2012), in a field study, show instead that women's risk preferences react to the classroom's gender composition. Haushofer and Fehr (2014) point out a positive relationship between the psychological consequences of poverty, such as stress and negative affective states, and risk-averse decision-making. A positive relationship with risk aversion has been highlighted also for job loss, exposure to violence and emotional states like sadness (Callen et al., 2014; Campos-Vazquez and Cuilty, 2014; Hetschko and Preuss, 2015). Finally, several papers (see, among the others, Gardner and Steinberg, 2005; Cooper and Rege, 2011; Ahern, Duchin and Shumway, 2013; Bougheas, Nieboer and Sefton, 2013; Balsa, Gandelman and Gonzàles, 2015; Lahno and Serra-Garcia, 2015; Gioia, 2016) show evidence of the role played by peers in an individual's risk behaviour.

To the best of our knowledge, we are the first to suggest the implementation of incentive schemes as a possible mechanism shaping an individual's risk behaviour through a change in peer influence.[3] Most of the literature on incentive schemes has focused on their impact on individual performance.[4] However, the consequences of implementing incentives are not limited to productivity alone as it has also been shown that they affect co-worker relations and this, in turn, has an impact on job satisfaction, commitment to an organization and turnover. (Ducharme and Martin, 2000; Morrison, 2004; Morgeson and Humphrey, 2006; Chiaburu and Harrison, 2008; Barnes et al., 2011; Taylor and Westover, 2011; Skaalvik and Skaalvik, 2011; Onemu, 2014). For example, Anderson et al. (2007) highlight deformation of relationships and a decline in free and open sharing of information and knowledge among the negative consequences of competition among scientists. Quigley et al. (2007) study knowledge sharing and performance and suggest a positive role for incentives that

[3] Following to our work, Filippin and Gioia (2017) run a lab experiment with the same effort task and risk elicitation task to investigate the pure effect of competition on subsequent risk behaviour in absence of peer influence.
[4] See among the others Gneezy, Niederle and Rustichini, 2003; Gneezy and Rustichini, 2004; Ivanova-Stenzel and Kübler, 2005; Niederle and Vesterlund, 2007; Antonovics, Arcidiacono and Walsh, 2009; Paserman, 2010; Niederle and Vesterlund, 2011; Dohmen and Falk, 2011; Lavy, 2012; Bandiera et al., 2013; Datta Gupta, Poulsen and Villeval, 2013

emphasize group performance and are strongly reinforced through more positive norms for knowledge sharing.

We contribute to this literature by investigating how the change in co-worker relations after an incentivized task affects peer influence on subsequent decisions. There is some literature studying the role played by peers in cooperative/competitive settings, but it mainly focuses on the (heterogeneous) effect of peers on individual performance in the task to be accomplished under a cooperative/competitive compensation scheme (Gneezy, Niederle and Rustichini, 2003; Ivanova-Stenzel and Kübler, 2005; Antonovics, Arcidiacono and Walsh, 2009; Lavy, 2012; Datta Gupta, Poulsen and Villeval, 2013). As we said above, we go beyond the widely studied relation "incentive schemes – performance" because in real life peer relationships outlast an incentivized work so the effects of the incentives may spread to other decisions and behaviours and this may have important consequences for the individual and also for the society.

3. Experimental design

3.1. Tasks

In order to exogenously sort subjects into treatments exposed to different incentives, we manipulate the compensation scheme of a real effort task, that we name the *Coin Task*, consisting in recognizing the value and the country of randomly selected Euro coins. A similar task has been used by Belot and Schröder (2013, 2016) to study counterproductive behaviour and monitoring.

When performing the Coin task, participants see on the left hand side of their computer screen a table with different Euro coins and for each coin the indication of the value and of the country (see Figure 1). A Euro coin randomly drawn from the table appears on the right hand side of the screen. They have to select the value and country of the Euro coin from two lists, one with all the countries having Euro as domestic currency and the other with all the values that Euro coins may take. After confirming their choice, a new table and a new coin to identify appear on the computer screen.

Figure 1: Participant's computer screen in the Coin Task

Participants have five minutes to recognize as many coins as they can. Their score in the Coin task is the number of coins successfully recognized within this five-minute time period. There is no penalty for wrong answers. Before they start, participants are allowed to practice the task for one minute. The number of coins correctly identified during this practice period does not affect earnings.

The use of real effort tasks to manipulate incentives is common in the literature studying competition, cooperation and their impact on performance. We choose to influence the competitive/cooperative nature of the environment with this new task because it is simple and the outcome is easy to measure. More importantly, compared with the widely used task of adding sets of two-digit numbers (Niederle and Vesterlund, 2007), the identification of coins does not carry any gender stereotype. Also, answering correctly does not require any knowledge and ability as subjects may in principle get all answers correct, provided they exert a sufficient level of effort. This does not of course mean that ability or knowledge do not help, as people who are very good may be faster at the task and have lower costs of effort, but no specific knowledge is required to answer correctly. Finally, it does not involve learning and it can be performed with real money and outside the lab for field studies, as in Belot and Schröder (2013, 2016).

Individual level of risk aversion is measured using the Bomb Risk Elicitation Task – BRET (Crosetto and Filippin, 2013).[5] When playing the BRET, subjects see on their PC screen a square formed by 10x10 cells representing the 100 boxes that they can collect (see Figure 2a). They have to choose how many boxes to collect and write their chosen number.[6] They can therefore choose their preferred lottery among 100 lotteries whose outcomes and probabilities are fully described only by one parameter, i.e. the number of collected boxes.

Earnings increase linearly with the number of boxes collected but participants are warned that their earnings are provisional. In fact, they know that one box contains a bomb without knowing in which box the bomb is located. The position of the bomb is randomly determined for each participant at the end of each performance of the task but it is not revealed.

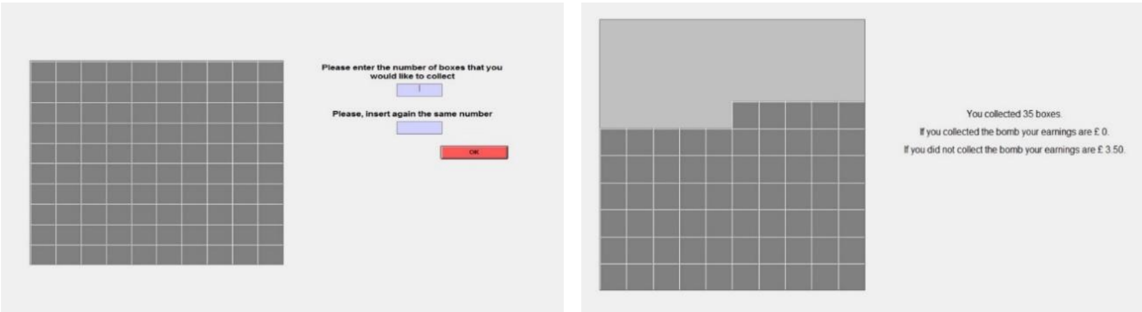
Boxes are collected in numerical order starting from number 1 in the top left hand corner and continuing until the number of boxes chosen by the subject is reached. While reading the instructions, we displayed a dynamic visual representation of the game on participants' computer screen to show the order of collection.

[5] In both economics and psychology there are a variety of experimental methods for eliciting and assessing risk behaviour. See Charness, Gneezy and Imas, 2013, for a review of advantages and disadvantages of the most common risk elicitation methods.

[6] We asked participants to write the same number twice and to confirm their choice in order to avoid measurement errors due to an incorrect number being input.

Figure 2: Participant's computer screen

(a) when performing the BRET (b) after having chosen to collect 35 boxes



If a participant collects the bomb, s/he earns zero. If s/he collects a number of boxes lower than the number of the box containing the bomb (i.e. s/he does not collect the bomb) s/he obtains £0.10 for each collected box. After confirming their decision, participants see on their screen the square of boxes showing the collected boxes in light grey and a message with the potential earnings in both situations (if the bomb is collected or not). Figure 2b shows the computer screen for a participant who chose to collect 35 boxes.[7]

Participants are allowed to play a practice round before the beginning of the experiment. This practice round gives them an opportunity to make sure they understand the rules, the types of decisions they will make and how these will affect their earnings. The trial period, however, does not end with the draw of the bomb's position so as to avoid providing subjects with a reference point regarding the bomb's position.

We chose to elicit risk attitudes using the BRET because of a number of appealing features. It is very easy to understand, thanks to the visual representation of the game which illustrates in an intuitive and transparent way probabilities and outcomes[8], and its duration is very short. Moreover, compared with other well-known tasks in the literature, the BRET allows precise measurement of both risk aversion and risk seeking, is defined entirely in the gain domain and does not provide any endogenous reference point, thus avoiding the presence of loss aversion as a potential confounding factor.[9]

[7] As explained in Gioia (2016), we decided in favour of a static version of the BRET to avoid individual level of impatience affecting participants' decision and thus our indicator of risk behaviour. At the same time, we make sure that participants' decision was not driven by confusion or imperfect comprehension of outcomes and probabilities by introducing also a dynamic visual representation of the collection process when explaining the rules of the task and a visual representation of the boxes collected and not collected after each decision.

[8] Simple methods are most useful in studies as ours that try to capture treatment effects and differences in individual risk preferences (Charness, Gneezy and Imas, 2013). Moreover, the absence of complexity of the task should reduce the extent to which social learning drives peer effects on individual risk behaviour.

[9] Moreover, compared with other risk elicitation methods, such as the Balloon Analogue Risk Task (Lejuez et al., 2002), in the BRET there is no truncation of the data.

3.2. Treatments

Our design entails three treatment conditions corresponding to three different compensation schemes: PR (Piece Rate), ESSR (Equal-Split-Sharing-Rule) and TO (Tournament).

Table 1 describes the main features of our treatments. We have 54 participants, so 27 groups, in the PR and TO treatments and 52 participants, so 26 groups, in the ESSR treatment.

Table 1: Treatments of the experiment

	Pay Scheme	**Number of Sessions**	**Number of Subjects**	**Number of Groups**
Piece Rate (PR)	£0.20 per UIO	3	54	27
Equal-Split-Sharing-Rule (ESSR)	1/2*(£0.20 per UGO)	3	52	26
Tournament (TO)	£0.40 per UIO or £0	3	54	27

Note: *UIO* denotes unit of individual output; *UGO* denotes unit of group output; *Output* denotes the number of correctly identified coins.

In the PR treatment participants receive £0.20 per coin they identify correctly.

In the ESSR treatment the subject's earnings depend both on his own performance and on the performance of a randomly selected participant. The two form a team that shares equally the money earned. The output of the team is given by the sum of the number of correct answers of the two members and each teammate earns £0.10 for each correct answer of the team.

In the TO treatment, the subject's earnings depend on his performance relative to the performance of a participant randomly selected to be his competitor. Within each group, the subject with the highest score receives £0.40 for each correct answer and his competitor receives £0. In case of ties between group members, the winner is randomly selected and the other subject receives nothing. The tournament pay scheme is designed so that for a given performance a subject with a 50 percent chance of winning the tournament receives the same expected payoff from the tournament as from the piece rate.

To make the cooperative/competitive nature of peer interaction more salient, both in the instructions and in the on screen information we refer to the peer as "teammate" and "competitor" in the TE and TO treatments, respectively, while s/he is called "other person" in the PR treatment.

We test our hypothesis in a setting of complete information where subjects working under any treatment condition can observe their own output as well as the output of other subjects, even if irrelevant for their own payoff. In order to make the design less artificial for PR treatment as regards having an additional "useless" information, thus attenuating any potential experimenter demand effect, before reading the instructions of the Coin task and explaining in detail how the earnings of the task are computed, all subjects are informed that, at the end of the task, they are going to see their earnings, their score as well as the score of a randomly drawn participant in the session. They are told that, although the score of the other person may or may not affect their earnings, they will see it in any case. Thus, at the end of the task, subjects in the PR treatment (that serves as a control group) are informed on their earnings, on the number of coins they have personally identified correctly as well as on the score of a randomly selected participant. ESSR and TO subjects are informed on their earnings, on their score and on the score of their teammate and competitor, respectively.

3.3. Experimental procedure

We conducted the experiment in October 2015 at the Behavioural Laboratory at the University of Edinburgh (BLUE), using z-Tree (Fischbacher, 2007).[10] 160 students were recruited using the ORSEE software (Greiner, 2015). A total of 9 sessions were organized, each lasting about 45 minutes, and each student participated in a single session only.

The experiment is divided into two parts (Part I and Part II) as shown in Table 2.

Table 2: Structure of the experiment

	Risk Behaviour	**Coin Task**	**Risk behaviour with information on previous choice**
Part I	Yes	-	-
Part II	-	Yes	Yes

In part I we elicit risk behaviour.

In part II, subjects are randomly matched in pairs. Then, they perform the Euro coin recognition task with the assigned incentive scheme and receive feedback on individual earnings and the score of both members of the group. Finally, they perform again the risk behaviour elicitation task as in part I, but this time having information on the choices made by group members in the previous performance of the same task. Instructions make clear to subjects that their payoffs depend solely on their own choice, not on the choice of their partner. The information on the choice made previously by group members is reported both on the waiting screen before the main screen of the BRET and in the top right corner of the main screen of the BRET.

Upon entering the laboratory, participants were assigned randomly to a computer. Then, we read aloud the instructions for the experiment, which were also displayed on the participants' computer screen. We gave detailed instructions at the beginning of each part and, when needed, before each relevant step in the experiment. Every time, after reading the instructions, we gave individuals some time to ask clarifying questions.

[10] The experiment is part of a bigger experiment that includes also two tasks on social preferences performed in part III. Here we describe only the parts of the experiment relevant for the analysis.

At the end of the experiment, participants completed a short questionnaire. Then, the task selected for payment and their earnings were shown on the computer screen. By paying only for one task, we reduce the chance that decisions in a given task may be used to hedge against outcomes in other tasks. Subjects received a show-up fee of £3. We paid out total earnings (including the show-up fee) in cash at the end of the experiment. We called participants individually, based on the number of their computer; they went into another room, signed a receipt and received their earnings in a sealed envelop.

4. Empirical analysis

4.1. Descriptive statistics

Table 3 reports descriptive statistics of our main variables both at the aggregate level and by treatment group. Variables are divided into three groups: outcomes of the Coin task, risk behaviour measured by choices in the BRET and individual predetermined characteristics. In the first four columns the means of the variables are reported. In the last two columns, we report the F-stat and the p-value of a test for the equality of variable means across all groups.

We first present the variables relating to the Coin Task. During the five minutes of the effort task, participants try to identify on average about 28 coins. The average number of attempts is virtually invariant across treatments, but it ranges from 9 to 45 in the PR and from 15 to 45 and 18 to 40 in the ESSR and TO, respectively. Similarly, on average PR participants identify correctly about 25 coins (value ranging from 1 to 43) while ESSR and TO have on average 25.8 correctly identified coins (values ranging from 13 to 38 and 16 to 38, respectively). The identification of about 2 coins is incorrect.[11] The variable *Highest Scoring Within Pair* indicates the winners of the competition in TO, the best performing partner in PR and the partner that has contributed more to the payoff of the team in ESSR. Overall, about 51 percent of the participants can be classified as best performing because of one tie in the ESSR treatment. This variable is used to investigate who drives peer effects and if they vary depending on the performance rank. None of the variables representing outcomes of the effort task is significantly different across treatments.

[11] The variable *Euro Zone* shows that almost 90 percent of our sample comes from a Country that has not Euro as the country currency. Differences in the distribution of people familiar with Euro coins are not significant across treatments.

Table 3: Descriptive statistics

	Means					
	ALL	**PR**	**ESSR**	**TO**	**F-stat**	**p-value**
Coin Task						
Total Coins	27.725	27.6667	27.7115	27.7963	.0073	.9928
Correct	25.55	25.0926	25.7885	25.7778	.2271	.7971
Wrong	2.175	2.5741	1.9231	2.0185	.4074	.6661
Highest Scoring Within Pair	.5062	.5	.5192	.5	.0255	.9748
BRET						
Choice	43.1	44.3704	43.2308	41.7037	.2917	.7474
Choice After	44.075	46.5185	46.1346	39.6482	3.6129	.0292
Most Risky	0.4688	0.5	0.4615	0.4444	0.1725	0.8418
Pred. Charact.						
Female	.65	.6852	.5577	.7037	1.4623	.2348
Age	22.6813	22.4630	22.5385	23.0370	.0934	.9108
Asian	.2438	.2778	.2308	.2222	.2572	.7735
European	.6938	.6852	.6731	.7222	.1619	.8507
Euro Zone	.1063	.1296	.0962	.0926	.2326	.7927
Economics	.3188	.2593	.2692	.4259	2.1803	.1164
HSS	.5188	.5926	.4808	.4815	.8833	.4155
MVM	.0313	.0370	.0577	0	1.5014	.2260
Distinction	.3688	.3889	.3846	.3333	.2171	.8051
Mother Uni Degree	.5875	.5926	.5577	.6111	.1576	.8543
Father Uni Degree	.6313	.6296	.5769	.6852	.6604	.5181
Brothers	.8	.7037	.9423	.7593	.9777	.3785
Sisters	.8125	.6481	.8462	.9444	1.5082	.2245
Self-Reported Risk	5.3813	5.0556	5.4615	5.6296	.8191	.4427
Smoker	.1688	.1296	.1538	.2222	.8792	.4171
Drinker	.8938	.8704	.8846	.9259	.4665	.6280
Observations	160	54	52	54		

Notes: In the last two columns, we report the *F*-stat and *p*-value of a test for the equality of variable means across all groups. HSS is the Humanities and Social Sciences degree. MVM is the Medicine and Veterinary Medicine degree.

As regards the risk elicitation task, the variable *Choice* represents the number of boxes that each student decides to collect in the first performance of the BRET and, therefore, his/her ex-ante risk behaviour. In part I, when all participants perform the BRET for the first time, the average number of collected boxes in the whole sample is 43.1. The majority of participants (58.75%) display risk averse behaviour (i.e. choose a number of boxes below 50); 16.25 per cent of the sample is risk neutral and the remaining 25% choose to collect more than 50 boxes, thus displaying risk seeking behaviour.[12] When looking at the average choice separately by treatments, we see that TO has the lowest average number of collected boxes (41.7); PR the highest (44.4) and ESSR lies somewhere in

[12] See Crosetto and Filippin (2013) for details on how to formalize subjects' decisions in the BRET.

the middle. Importantly, there are no significant differences across treatment groups[13] in terms of participants' risk behaviour in part I. However, *Choice* is still an important control variable in our estimates as ex-ante and ex-post risk behaviour are positively and significantly correlated (corr=0.6817, p=0.000).

Choice After is our dependent variable. It represents subjects' choice when they perform the BRET in part II, after the Coin task, and, therefore, their ex-post risk behaviour. In such performance of the BRET subjects collect on average about 44 boxes overall so subjects' behaviour is slightly less risk averse. About 59.38% is risk averse in part II, 16.88% is risk neutral and 23.74% is risk seeking. Risk behaviour after the Coin task differs significantly across treatments, with participants in PR and ESSR increasing their choice to about 46 boxes on average and TO decreasing its choice on average to 39 boxes. In PR subjects' ex-post risk behaviour converges to risk neutrality as about 5.6 percent of the sample switches from either risk aversion (3.7 percent) or risk propensity (1.9 percent) to risk neutrality. In ESSR about 5.8 percent of the sample, who ex-ante was risk averse, become either risk neutral or risk seeking. Instead, in TO both ex-ante risk seeking and ex-ante risk neutral subjects become ex-post risk averse (11.1 percent).

Most Risky is a dummy variable taking the value of 1 for subjects who have the highest ex-ante risk propensity within the peer group (on average 47%) and is used to control for the possibility that peer effects vary depending on the relative ex-ante riskiness rank within the peer group.

Finally, we use the last set of variables (together with the variable *Choice*) to check if our randomization was successful in creating comparable treatment groups. We find no systematic differences across treatments in any of the individual predetermined characteristics, including those that could be correlated with risk taking behaviour outside the lab, such as smoking or drinking and, as we said before, also in ex-ante risk behaviour.[14]

4.2. Incentive schemes and peer effects on risk behaviour

Many organizations and educational institutions often use competition for career advancements, sought-after jobs or high grades, and teamwork with compensation equally shared among group members as incentives to provide to their employees/students to increase performance. The evaluation

[13] Two-sample t-tests for the equality of variable means within each pair of treatments show that we cannot reject the null hypothesis of similar mean ex-ante risk behaviour within each pair of treatments.

[14] The most worrying of the not statistically significant, but potentially important, differences across the groups is in the percentage of subjects enrolled in the field of *Economics*, that is much higher in the TO treatment. In fact, on one hand different personality "types" may select into different majors; on the other hand, economics training may change how subjects behave under different incentives and in laboratory experiments. When we run our main estimates including only subjects not enrolled in an economics field, we find a bigger effect size for the TO treatment (i.e. bigger reduction in peer effects on risk behaviour compared with piece-rate) but less precision due to the lower sample size.

of the effects of these incentive schemes is usually limited to the resultant level of workers/students' productivity. However, besides their effect on performance, incentive schemes could also change the nature of peers relationship (Ducharme and Martin, 2000; Morrison, 2004; Morgeson and Humphrey, 2006; Quigley et al., 2007; Chiaburu and Harrison, 2008; Westover and Taylor, 2011; Skaalvik and Skaalvik, 2011; Onemu, 2014) and this, in turn, may have an impact on the existence and magnitude of peer effects.

We hypothesize that competition may hamper peer attachment because competitors work to reach a personal goal and only one peer will be able to meet such goal; on the contrary, an equal-split-sharing-rule evokes cooperation, working to reach a common goal, and this may enhance peers relationship as well as weaken it if a peer's performance/contribution does not meet individual expectations due to free-riding.[15] Thus, compared with a situation where earnings depend only on individual performance, we expect peer effects to be smaller in magnitude or absent in competition because of the rivalry between peers. A less clear-cut prediction may be made for peer effects after an equal-split-sharing-rule incentive scheme due to the opposite effects of positive impact on peers and disappointment for a peer's poor performance. If none of the effects is predominant, than the average effect will not be significantly different from peer effects after piece-rate compensation.[16]

In this section, we investigate if incentive schemes have an impact on peer effects on subsequent risk behaviour by estimating the following model:

$$ChoiceAfter_i = \beta_0 + \beta_1 PeerChoice_i + \beta_2 Choice_i + \beta_3 ESSR_i + \beta_4 TO_i + \beta_5 PeerChoice_i * ESSR_i + \beta_6 PeerChoice_i * TO_i + \beta_7 X_i + \varepsilon_i$$

where $ChoiceAfter_i$ is the ex-post risk behaviour of subject i; $PeerChoice_i$ represents the number of boxes collected by the peer in the first performance of the BRET and its effect is our measure of peer influence; $Choice_i$ is subject i ex-ante risk behaviour; $ESSR_i$ and TO_i are two dummy variables for the treatment status (PR is the reference category); $PeerChoice_i*ESSR_i$ and $PeerChoice_i*TO_i$ are the interaction variables between the treatment status and the measure of peer influence used to analyse heterogeneity in peer effects across treatments; X_i is the vector of our control variables, that is, a dummy variable to control for gender (*Woman*), a dummy variable to control for the riskiness rank

[15] Moreover, if we consider the effort task and the BRET task as a portfolio of lotteries, we could think about the former as a lottery for which individuals have less control over both outcomes and probabilities than they have in the BRET. In fact, while in the BRET for every possible choice subjects know how much they may earn and with which probability, in the effort task first they do not know how their effort maps into performance, second, when performance is incentivized using an equal-split-sharing-rule or a tournament, they are exposed to further uncertainty coming from the assigned peer's ability and performance. So, after playing the first lottery, they may be more desirous of controlling for risk when they can and thus they may be less influenced by their peers.

[16] Distinguishing the contribution of each of these mechanisms to peer effects is beyond the aims of this paper.

within the pair (*Most Risky*)[17] and a dummy variable describing the outcome of the Coin Task (*Highest Scoring Within Pair*); ε_i is an error term.

Our prediction is that, in the absence of peer effects on risk behaviour we should not be able to reject the null hypothesis that the coefficient $\hat{\beta}_1$ is equal to zero (in the reference category, piece-rate, subjects receive information on the risk behaviour of a randomly assigned participant as in the *Random Treatment* in Gioia (2016)). Moreover, if incentive schemes do not have any impact on peer effects on risk behaviour, then there should be no reason to expect the coefficients $\hat{\beta}_5$ and $\hat{\beta}_6$ to be significantly different from zero and, in particular, if competition does not hamper peer effects there should be no reason to expect the coefficient $\hat{\beta}_6$ to be also negative.

We define peer effects as a change in subject's choices due to non-monetary reasons triggered by the knowledge of peers' previous choice and the comparison with the peers and we measure peer effects on risk behaviour by computing the change in the subject's ex-post risk behaviour produced by the ex-ante risk behaviour of the randomly assigned peer. This method is common in most of the literature on peer effects where the existence of peer influence is measured by regressing some individual outcome of person *i* in group *j* on the mean value of the - pre-determined - outcome for all the other people in group *j* (Zimmerman, 2003; Mas and Moretti, 2009; Lavy, Silva, and Weinhardt, 2012; Balsa, Gandelman and González, 2015).

Table 4 reports OLS estimates of our model. In column (1) we only control for the individual and peer's ex-ante risk behaviour. We find that overall subjects are significantly influenced by their peer's choice: given their own initial choice, for each additional box collected by the peer, they collect on average 0.15 boxes more. This means that the average peer will change the individual ex-post choice by about 6.5 boxes (0.15*43.1). The magnitude of this effect is slightly less than one third of the effect of the own previous choice.

In column (2), to check if peer effects are significantly different across treatments, we include the treatment dummies and the two interaction dummies between treatment status and peer choice. Data show again evidence of peer effects on risk behaviour: participants in the PR treatment significantly increase their choice in the second performance of the BRET by about 0.20 boxes for each additional box collected in the first performance by their randomly assigned peer. Peer effects are very similar in size for participants in the ESSR treatment while they are more than halved when performance is incentivized by using competition (*Peer Effects in TO*=0.06). The interaction terms

[17] Gioia (2016) shows that relative riskiness within the group matters and peer effects are especially strong for individuals whose peers are riskier than they are, who take on average riskier decisions, even when controlling for regression to the mean.

are imprecisely estimated so the difference in peer effects between PR and TO, despite economically relevant, is not statistically significant.

Table 4: Incentive Schemes and Peer Effects on Risk Behaviour

	CHOICE AFTER				
			Weighted		**Weighted**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Peer Choice	0.1501***	0.1979**	0.2327***	0.2397**	0.2808***
	(0.0513)	(0.0865)	(0.0611)	(0.0922)	(0.0714)
Choice	0.5523***	0.5508***	0.5487***	0.5199***	0.5214***
	(0.0690)	(0.0674)	(0.0658)	(0.0821)	(0.0779)
*Peer Choice*ESSR*		-0.0313	-0.0872	-0.0405	-0.0943
		(0.1172)	(0.0964)	(0.1183)	(0.0952)
Peer Choice TO*		-0.1358	-0.1480*	-0.1202	-0.1434*
		(0.1255)	(0.0762)	(0.1298)	(0.0857)
Equal-Split-Sharing-Rule		1.8235	4.3309	1.8798	4.7406
		(5.9559)	(5.1727)	(5.8843)	(4.8365)
Tournament		0.7885	1.3876	0.3638	1.9840
		(6.3559)	(4.4818)	(6.5270)	(4.8208)
Woman				-3.6733*	-4.1653**
				(1.8778)	(1.8546)
Highest Scoring Within Pair				-1.4957	-1.9300
				(1.6918)	(1.5808)
Most Risky				2.2905	2.3670
				(2.2349)	(2.1414)
Constant	13.8046***	13.2975***	11.8026***	14.9347***	13.2005***
	(3.4732)	(5.0431)	(4.2157)	(5.1338)	(4.3563)
Peer Effects in ESSR		0.1666**	0.1455*	0.1992**	0.1865**
		(0.0798)	(0.0752)	(0.0881)	(0.0773)
Peer Effects in TO		0.0621	0.0847*	0.1195	0.1374**
		(0.0927)	(0.0480)	(0.1020)	(0.0626)
Observations	160	160	160	160	160
Adj. R-squared	0.490	0.510	0.545	0.518	0.571

Standard errors (corrected for heteroscedasticity) are reported in parentheses. The symbols ***, **, * indicate that the coefficients are statistically significant at the 1, 5 and 10 percent level, respectively. *Peer Effects in ESSR* and *Peer Effects in TO* are computed as the linear combination of the coefficient of *Peer Choice* and the coefficient of the interaction of *Peer Choice* with *ESSR* and *TO*, respectively.

A possible source of such imprecision may be heteroscedasticity (White's general test p=0,074; White's special test p=0.0085). Thus, in addition to use Huber-White estimate of variance, we tried to identify the form for heteroscedasticity and we estimated OLS on a weighted regression where each observation is weighted by 1 over its error variance such that observations that contain relatively more information (small error variance) are weighted more than less informative observations (large error variance). The standard deviation function estimated by regressing the absolute value of the residuals against the predictors *Peer Choice*, treatment dummies and the interaction terms (so that one over the square of the fitted values of this regression is used as weights)[18] produces a weighted model that achieves higher precision and predicts point estimates close to the OLS estimates in column (2). The estimate of such weighted model is reported in column (3) and shows that, if the proposed model of heteroscedasticity is a reasonable approximation of the true unknown model, then, once heteroscedasticity is controlled for, there is evidence of a statistically significant reduction in peer effects on risk behaviour after a competition.

Overall, our findings confirm the evidence of peer effects on risk behaviour that emerges from the economic literature and seem to point to a role of incentive schemes on peer influence, in particular for tournaments that, possibly because of rivalry, produce an economically (despite not statistically) significant attenuation of peer influence.

Results remain stable in columns (4) and (5), where we add among regressors our control variables for gender, outcome of the Coin Task and relative riskiness rank within the pair. Again, we find that peer effects are statistically significant and that, when we run the same procedure described above to take into account heteroscedasticity including our controls, performing the effort task in competition significantly attenuates the influence of the peer.

As far as control variables are concerned, the choice in the first performance of the BRET is always an important determinant of subsequent risk behaviour while the outcome of the effort task (*Highest Scoring Within Pair*) and the relative riskiness rank[19] do not play any significant role. Of particular interest is instead the coefficient of the variable *Woman* that shows that women are significantly more risk averse ex-post than men. While ex-ante there are no gender differences in risk behaviour[20], the higher risk aversion ex-post in women is driven by the PR treatment (men's *ChoiceAfter* in PR=51.76; women's *ChoiceAfter* in PR=44.11; Mann-Whitney p=0.0949). There are no statistically significant gender differences in the other two treatments but it is interesting to note that while in ESSR women are more risk averse than men, the opposite is true in TO. Also, if we look at ex-post risk behaviour within gender and across treatments, we find that men in TO are significantly more risk averse than men in PR. This is due to men becoming both significantly more risk averse after competition and significantly more risk seeking after a piece rate compensation. Finally, there are no gender differences in the impact of peer effects both overall and within treatments.

[18] We propose this standard deviation function estimate because the plots of the residuals against such predictors exhibit a megaphone shape.

[19] We have also checked whether peer effects are different depending on the relative riskiness rank within the pair. We find that overall peer influence seems more important for subjects with the highest ex-ante risk aversion within the pair but the difference with ex-ante most risk-seeking subjects is not statistically significant. Also, we do not observe any statistically significant difference across treatments in the effect of relative riskiness rank on peer influence.

[20] In the first performance of the BRET, both men and women decide to collect on average about 43 boxes.

4.3. Outcome of the Effort Task and Subsequent Risk Behaviour

In this section, we consider the fact that the outcome of the incentivized task is typically observed by all subjects and that peers' relationship typically outlasts the incentivized task, therefore subsequent peer influence may be affected by the observed outcome.

Similarly to what happens for relative payoffs concerns, where subjects may feel envy if they have lower monetary payoff and compassion if the inequality in income is to their advantage (Fehr and Schmidt, 1999); individuals may use information on their relative performance in the effort task as an indicator of ability, promptness or even luck and may experience different feeling towards themselves or towards their peer that may, in turn, translate into different levels of peer influence. So, peer effects after the incentivised task may vary according to the outcome of the task. This effect may be present already in the piece-rate compensation scheme if individuals care about their relative performance even compared with random co-workers and it may be different for competition/cooperation-based incentive schemes if individuals add to relative performance concerns the winning/losing or contributing/free-riding effects.

In particular, we suggest that the willingness to conform to peers may be stronger for the lowest scoring subjects because they are more likely to perceive their peers as better than they are so they may expect them to make a better decision in subsequent choices as well (i.e. the BRET). Also, this social learning effect may be stronger the bigger the difference in performance, that is the better the peer compared to the subject itself. Being teammates, instead of random co-workers, may amplify the difference in peer effects between low and high ranked individuals if, besides ability, having contributed more to the group output without free-riding increases the influence on the lowest scoring peer. On the contrary, being competitors may shrink such a difference if losers are less willing to imitate winners because they feel disappointment or anger towards them.

In Table 5 columns (1) and (2) we estimate the same specification as in Table 4 column (4) for the subsample of the highest and lowest scoring subjects within the pair, respectively. We find that worse performing peers do not play a statistically significant influence on the highest scoring subjects in any treatments. However, while the point estimate is small for both PR and TO, we cannot reject the possibility of a modest effect for ESSR (0.15), despite being statistically insignificant.

Instead, peer effects are strong and significant for the lowest performing subjects. For this subsample, we find again that competition almost halves the size of peer effects compared with piece-rate while an increase in peer influence of similar economic relevance is observed after the cooperation-based incentive. However, we do not have enough statistical power to make confident conclusions, so we cannot exclude that teammates are influenced by the more cooperative team member and losers by their winning counterparts in the same way as the lowest scoring subjects are influenced by a better performing random person.

Table 5: Outcomes of the Effort Task and Peer Effects on Subsequent Risk Behaviour

	CHOICE AFTER					
	Highest Scoring Within Pair	**Lowest Scoring Within Pair**	**All**	**I Q**	**II-III Q**	**IV Q**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Peer Choice	0.1009	0.3734***	0.3812***	0.3195*	0.3601***	0.4446**
	(0.1466)	(0.1066)	(0.1052)	(0.1718)	(0.1123)	(0.1973)
*Peer Choice*ESSR*	0.0517	0.1484	0.1415			
	(0.1745)	(0.1543)	(0.1593)			
Peer Choice TO*	-0.0129	-0.1637	-0.1737			
	(0.2048)	(0.1318)	(0.1339)			
Peer Choice Highest Scoring Within Pair*			-0.2767*	-0.1905	-0.1979	-0.5702***
			(0.1644)	(0.2116)	(0.1276)	(0.2016)
*Peer Choice*ESSR* Highest Scoring Within Pair*			-0.1168			
			(0.2272)			
Peer Choice TO* Highest Scoring Within Pair*			0.1393			
			(0.2445)			
ESSR Highest Scoring Within Pair*			7.3707			
			(11.0539)			
TO Highest Scoring Within Pair*			-1.2169			
			(12.1174)			
Highest Scoring Within Pair			8.0095	6.4083	8.5158	16.3823*
			(7.5971)	(10.5283)	(6.6324)	(8.7612)
Choice	0.4643***	0.5362***	0.5080***	0.5752***	0.4406***	0.5518***
	(0.1414)	(0.0991)	(0.0819)	(0.1628)	(0.1314)	(0.1239)
Equal-Split-Sharing-Rule	-0.1763	-7.2984	-6.7533	5.1430	-1.6493	-0.6523
	(8.2884)	(7.3446)	(7.6241)	(4.1141)	(3.4625)	(4.0318)
Tournament	-0.8375	0.9509	1.3022	-5.8817*	-0.8456	-3.1101
	(10.5738)	(5.8779)	(5.9495)	(3.1024)	(4.2664)	(2.8420)
Woman	-1.7002	-5.9525**	-3.6983**	-0.4816	-2.7928	-8.1251**
	(2.5793)	(2.4341)	(1.7843)	(3.5219)	(3.6745)	(3.3636)
Most Risky	4.8680	3.0174	3.7293	2.6954	3.1853	3.9336
	(3.7767)	(3.1079)	(2.4222)	(3.9188)	(4.4584)	(3.3783)
Constant	17.1439**	10.0700*	8.9995*	6.1136	10.4248	8.6130
	(7.6893)	(5.9926)	(5.3985)	(8.5639)	(7.5633)	(9.9560)
Observations	81	79	160	58	62	40
Adj. R-squared	0.400	0.632	0.532	0.490	0.538	0.603

In Table 5 columns (1) and (2) we run the same specification as in Table 4 column 4 in the subsamples indicated by the columns' label. In the remaining columns, we also add interaction terms with the outcome of the coin task. Standard errors (corrected for heteroscedasticity) are reported in parentheses. The symbols ***, **, * indicate that the coefficients are statistically significant at the 1, 5 and 10 percent level, respectively.

In column (3), we estimate the same specification on the whole sample adding the interaction term between the choice of the peer and being the highest scoring subject in the Coin Task for each treatment. We run this estimation in order to check the statistical significance of the difference in peer effects depending on the binary outcome of the effort task that we have shown in columns (1) and (2). Data show that subjects who obtain the lowest score within the peer group in PR are significantly influenced by their peers (+0.38 significant at the 1 percent level) while peer effects are significantly smaller and no longer statistically significant for subjects obtaining the highest score (coeff.=0.10, p-value=0.438). Interaction terms between peer effects and treatment status are never statistically significant. However, it is worth to comment their economic relevance pointing out that while the differences across treatments are close to zero for the highest scoring subjects, they become bigger for the lowest scoring subjects: the influence of better performing teammates is about one third higher than that of better random people while the influence of winners is lower by about a half compared with the piece-rate.

To sum up, the relative rank of performance in the effort task matters and while high performers exert influence, low performers do not.

The performance in the coin task is an important indicator of peers' homogeneity that in ESSR represents also teammates contribution to the group output and in TO the margin of the win/defeat. The binary outcome may thus be more or less salient depending on the difference in performance. To investigate this, in columns (4) to (6) we split our sample according to the absolute value of the difference in the number of correct answers within the pair and we consider the first quartile (<=3), the interquartile range and the fourth quartile (>9.5). In the specifications reported in Table 5 we look at the overall heterogeneity in peer effects according to the binary outcome for each subsample; when we add also interaction terms with the treatment status (as in column 3) we find again that differences across treatments are very imprecisely estimated and never statistically significant.

Data in columns (4) to (6) suggest that the difference in peer effects between the highest and lowest scoring subjects within the pair and the absence of peer influence for the highest scoring participants come mainly from the right hand tail of the distribution of absolute difference in performance: when the difference in performance is very big (i.e. very heterogeneous peer groups), highest scoring subjects are not influenced by their peers; instead for smaller differences in performance peer effects are statistically similar for the two outcomes (although the point estimates of the interaction terms in the first two subsamples are quite big in relative terms).

4.4. Incentive schemes, attachment to peers and self-reported peer influence

This section analyses if incentive schemes change the individual's feeling of attachment to the assigned peer and their perception of peer influence. We use two questions from the final questionnaire to create our measures of attachment to peers and perceived peer influence. The first question asks subjects to rate, on a scale from 0 to 10, how closely attached they felt to their peer throughout the experiment. Based on participants' answers we create the variable *Attached* taking values form 0 to 10. On average, subjects' reported level of attachment is 3.2. The second question, that we use to create an indicator of *Self-Reported Peer Influence,* asks subjects if, in the second performance of the BRET, they considered their peer's previous choice when taking the decision. On average 55 percent of subjects state to have been influenced by their peer's choice.

In Table 6 we estimate a linear regression model where we regress *Attached*[21] (columns 1 to 3) and *Self-Reported Peer Influence*[22] (columns 4 to 6) on the two treatment dummies (PR is our reference category) and our control variables.

Table 6: Incentive Schemes, Attachment to Peers and Self-Reported Peer Influence

	ATTACHED			***SELF-REPORTED PEER INFLUENCE***		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Equal-Split-Sharing-Rule	0.5726	0.4617	0.4546	0.0990	0.1005	0.1048
	(0.5071)	(0.5207)	(0.5191)	(0.0945)	(0.0963)	(0.0962)
Tournament	-1.1481**	-1.1551**	-1.0231**	-0.1667*	-0.1676*	-0.1673*
	(0.4513)	(0.4533)	(0.4404)	(0.0958)	(0.0971)	(0.1001)
Woman		-0.6846	-0.5725		0.0125	0.0036
		(0.4531)	(0.4571)		(0.0856)	(0.0866)
Highest Scoring Within Pair		0.2720	0.3259		-0.0338	-0.0372
		(0.3765)	(0.3667)		(0.0815)	(0.0824)
Most Risky		-0.6837*	-0.8418		-0.0324	0.0461
		(0.4121)	(0.5828)		(0.0937)	(0.1224)
Choice		0.0069	-0.0068		0.0004	-0.0001
		(0.0128)	(0.0165)		(0.0025)	(0.0033)
Peer Choice			-0.0087			0.0031
			(0.0141)			(0.0028)
Choice After			0.0295			-0.0016
			(0.0184)			(0.0036)
Constant	3.3889***	3.7591***	3.3562***	0.5741***	0.5797***	0.5088***
	(0.3696)	(0.7545)	(0.8927)	(0.0679)	(0.1375)	(0.1836)
Observations	160	160	160	160	160	160
Adj. R-squared	0.071	0.075	0.079	0.036	0.014	0.008

Standard errors (corrected for heteroscedasticity) are reported in parentheses. The symbols ***, **, * indicate that the coefficients are statistically significant at the 1, 5 and 10 percent level, respectively.

[21] Since *Attached* has a floor at 0 and a ceiling at 10, to check the robustness of our results we also ran Tobit regressions for the three specifications in the table, with left-censoring limit at 0 and right-censoring limit at 10. Our results do not change: we always find a negative and significant effect for participants in the tournament treatment.
[22] Results do not change when we estimate a Probit model.

We find that participants in the TO treatment feel significantly less attached to their peer than individuals in both PR (-1.1481) and ESSR (-1.7208) treatments and that they are less likely than in PR (-0.1667) and ESSR (-0.2657) to state that they have considered their peer's choice. These results are robust when we control for gender, outcome of the effort task and ex-ante risk behaviour (columns 2 and 5) and when we add among controls peer's ex-ante risk behaviour and the individual choice in the second performance of the BRET (columns 3 and 6).

Our results suggest that incentivizing performance using tournaments has an effect on peers relationship as it reduces the feeling of attachment to the assigned peer. Also, despite the absence of a statistically significant change in observed behaviour, tournaments significantly attenuate self-reported peer influence.

5. Concluding Remarks

In this paper, we study the relationship between incentive schemes and peer effects on risk behaviour.

Risk attitudes are an important driver of many decisions that individuals take in their daily life: what to eat, what to study, where to work, whom to marry. Recent evidence shows that they are not exogenously given by nature and immutable, but they are shaped by environmental factors like peer influence. The understanding of what determines the existence and the magnitude of peer effects on risk behaviour has received particular attention because it has been show that not all peers matter and that some matter more than others. We contribute to this research by investigating if teammates or competitors exert a different influence compared with random peers.

Work environments and educational institutions often implement incentive schemes as equal-split-sharing-rules or tournaments to improve their employees/students' performance. By changing peers relationship, these incentives may affect the extent to which subjects are influenced by their peers and, since peer interactions outlast the incentivized task, the effects of the change in peer influence may spread to subsequent decisions. Also, in a setting of complete information, where employees/students interact and can observe each other both before and after the incentivized tasks, peer effects may differ depending on the outcome of the incentivised task.

We answer our research question by collecting data from a laboratory experiment with three treatment conditions corresponding to three different compensation schemes, piece-rate, equal-split-sharing-rule and tournament, associated to a real effort task, the Coin Task, that consists in recognizing the value and the country of Euro coins. Risk preferences are measured by using the Bomb Risk Elicitation Task (Crosetto and Filippin, 2013), that is performed both before and after the Coin task to measure ex-ante and ex-post risk behaviour, respectively.

We find evidence of peer effects on subsequent risk behaviour that, despite being statistically similar across treatments, are economically weaker after competition: the influence of a random person is about three times as big as the influence of a competitor. Moreover, the outcome of the incentivized task matters and peer influence on risk behaviour is mostly driven by participants with the lowest score in the effort task within the pair. Peer effects are instead significantly smaller and no longer statistically significant for subjects obtaining the highest score. This result mainly comes from very heterogeneous peer groups in terms of performance in the effort task.

When investigating deeply into subjects' feelings, we find that subjects feel significantly less attached to their competitors than to teammates and random peers and that self-reported peer influence is significantly lower among competitors than under the other two incentive schemes.

Establishing the existence of peer influence on decisions involving risk is important from a policy perspective because in several environments policy makers or private companies may be interested in influencing individuals' choices involving risk: peer effects may amplify the effects of any intervention because by targeting few subjects the effects will spread to their peers as well.

Also, our results contribute to a better understanding of different consequences of implementing incentive schemes, above all tournaments. Our findings suggest that if peers are viewed as competitors, the feeling of attachment to the peer group weakens and so does the likelihood of considering peers' choices before deciding. It would be interesting to investigate whether there is complementarity or substitutability in the influence of different "kinds" of peers, whether these results hold under repeated competition and what happens when peer groups need to face both cooperative and competitive situations, as it is the case in many work environments.

Finally, our evidence that the relative performance matters for peers to exert an influence on subsequent risk behaviour and that the lowest scoring individuals are influenced by the highest scoring individuals but not vice versa highlights the study of the role of group size and composition of the peer group as a promising direction for future research.

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