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Qun Harris,[1] Analise Mercieca,[2] Emma Soane[3] and Misa Tanaka[4]

Abstract

We conducted a lab experiment to examine how bonus caps and malus affect individuals' choices of risk and effort. We find that a bonus structure that rewards individuals proportionally to realised investment returns, but does not penalise negative returns, encourages risk-taking; while a bonus cap and malus mitigate risk-taking. However, the difference in risk-taking between the bonus cap and malus treatment groups and the proportional bonus group weakened significantly when the participants' bonus was conditional on hitting an absolute or relative performance target. We also find some evidence that the bonus cap discourages project search effort relative to the proportional bonus, whereas the difference in the levels of effort between the malus treatment group and the proportional bonus group was not statistically significant.

Key words: Bonus cap, bonus regulation, incentive pay.

JEL classification: C91, G28, G40, J33, M52.

(1) Bank of England. Email: qun.harris@bankofengland.co.uk
(2) Bank of England. Email: analise.mercieca@bankofengland.co.uk
(3) London School of Economics. Email: e.c.soane@lse.ac.uk
(4) Bank of England. Email: misa.tanaka@bankofengland.co.uk (corresponding author)

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Publications and Design Team, Bank of England, Threadneedle Street, London, EC2R 8AH
Telephone +44 (0)20 7601 4030 email publications@bankofengland.co.uk

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1. Introduction

One of the ironies of the 2007-08 global financial crisis was that many senior employees of banks that have been bailed out by taxpayers walked out of it with their wealth – accumulated through bonuses paid up to that point – largely intact. Financial regulators across the world have since reached a consensus that 'compensation practices at large financial institutions are one factor among many that contributed to the financial crisis' (Financial Stability Forum, 2009). Based on this consensus, a number of jurisdictions have introduced compensation regulations, with the aims of discouraging excessive risk-taking and short-termism. In the European Union (EU), the so-called 'bonus cap' was introduced for 'material risk-takers' at banks, restricting their variable pay to be no more than 100% of their fixed pay (or 200% with shareholders' approval).[3] A proportion of the bonus also needs to be deferred, and is subject to 'malus', such that a deferred bonus could be forfeited if certain conditions materialise before it vests. The UK regulators also introduced a clawback rule, which requires at least 40% of affected[4] bankers' variable pay to be deferred for a period of three to seven years, and enables their variable pay to be clawed back for a period of seven to ten years after it is awarded.[5]

Given that these regulations on remuneration are new and applied exclusively to banking institutions, it is important to assess whether they achieve their intended aims of mitigating excessive risk-taking, *without* causing significant unintended, detrimental consequences. However, the empirical identification of the impact of pay regulations on bankers' choices and behaviour is extremely difficult for a number of reasons. First, the data that link individuals' pay with their choices or performance generally are unavailable, even to the regulators. Second, an empirical study linking firm performance with employee pay contracts may not necessarily enable identification of the impact of remuneration regulations, as actual pay contracts are likely to be endogenous to unobservable firm, industry and executive characteristics, which in turn could influence observed firm performance (Edmans, Gabaix and Jenter, 2017). Finally, a field experiment with 'material risk takers' would be impractical, as they normally earn more than €500,000 per annum, making it too expensive to financially incentivise them to participate, or to influence their behaviour.

We therefore conducted a lab experiment in order to examine how the imposition of specific constraints on bonus – such as bonus cap and malus – could affect risk and effort choices. The experiment was conducted in a behavioural research lab in two separate stages, with a total of 392 participants. Participants engaged in a set of four paid investment tasks, and were paid a cash bonus according to the random realisation of the return on the investment asset that they selected. Participants were randomly assigned to three different bonus groups: 1) proportional bonus (the control group, representing the 'unregulated' benchmark); 2) bonus cap treatment group; and 3) malus treatment group. We used our experiment to examine the following specific questions. First, does proportional bonus, which pays proportionally to realised investment returns when the returns are positive but pays nothing when the returns are negative, encourage individuals to take greater risks than they would take if they had to invest their own money? Second, do bonus cap and malus mitigate risk-taking, relative to proportional bonus? Third, does the risk-mitigating effect of bonus cap and malus change when bonus is conditional on meeting an absolute or relative performance target? Finally, how do bonus cap and malus affect incentives to engage in project search effort?

Our key findings are as follows. First, a greater proportion of the participants in our control group chose to invest in higher risk assets when offered a proportional bonus, than they did when asked to

[3] For the EU bonus cap rules, see DIRECTIVE 2013/36/EU.
[4] For example, those identified as Material Risk Takers.
[5] For the UK, see the Policy Statement PRA12/15 FCA PS15/16; Remuneration Part of the PRA Rule Book; and the Supervisory Statement on Remuneration, SS 2/17. The rules apply to Material Risk Takers at proportionality level 1 and 2 firms.

invest their own money. This suggests that, consistent with the consensus in the regulatory community, the proportional bonus can indeed encourage excessive risk-taking. Second, we found that bonus cap and malus treatment groups tended to choose lower risk assets than the control group, suggesting that, *other things equal*, such regulations on pay could help mitigate risk-taking. Third, we found that the difference in risk-taking between the bonus cap and malus treatment groups and the proportional bonus group weakened significantly when participants' bonus was conditional on hitting an absolute or relative performance target. This could suggest that the risk-mitigating effect of bonus regulations could be undermined through tweaks to parameters that are under banks' control. Finally, we also found some evidence that the bonus cap group exerted less effort than the control group, although this was not the case for the malus group.

The rest of the paper is organised as follows. Section 2 sets out the paper's contributions to the existing literature and policy debate over remuneration regulation. Section 3 explains the design of our lab experiment. Section 4 presents our findings on how bonus cap and malus affect risk choices. Section 5 presents our results on how these remuneration restrictions affect effort choice. Section 6 discusses the policy implications, and Section 7 concludes.

2. Related literature

The case for regulating remuneration contracts arises if the contracts agreed between the employer and the employees are likely to give rise to outcomes that are socially sub-optimal. The post-crisis bonus regulations for banks were introduced based on a justification that, when left unregulated, banks offer remuneration contracts that encourage excessive risk-taking.

While the possibility that banks could incentivise excessive risk-taking through their remuneration schemes is well recognised, there is an active debate over whether remuneration regulations are an effective means to curb excessive risk-taking. The existing literature raises two concerns over the impact of remuneration regulations. First, remuneration regulations aimed at curbing excessive risk-taking could also have unintended effects, for example on effort. The existing theoretical literature, e.g. Edmans and Liu (2011) and Hakenes and Schnabel (2014), suggests that pay structure affects both risk and effort choices. For example, Hakenes and Schnabel (2014) show that, while a bonus cap can reduce bankers' risk-taking, it can also result in a sub-optimal level of effort. They conclude that bonus cap is optimal only when the probability of bank bailout is high and bankers have strong incentives to take excessive risks at the expense of taxpayers. The experimental literature also suggests that incentive pay often induces responses other than those for which it was intended (see Levitt and Neckermann 2014, for a review).

The second concern is that the existing remuneration regulations may fail to curb excessive risk-taking. As these regulations do not control the entire pay structure, banks can tweak pay parameters that are under their control to restore risk-taking incentives for their employees, if they wish to do so. Thanassoulis and Tanaka (2018) argue that malus and clawback regulations can, *ceteris paribus*, mitigate bank executives' excessive risk-taking, which is created by the possibility of a bank bailout. But they also show that the bank owners may respond to these regulations by altering pay contracts so as to undermine their risk-mitigating effects, for example by offering the bank executives' pay that is convex to the bank's market value. Their analysis suggests that bank supervisors may need to examine the overall structure of pay in order to identify and prevent features that could encourage excessive risk-taking, as is often done in practice.

To inform this debate, it is important to conduct empirical studies to examine how remuneration regulations affect incentives and behaviour. Yet, empirical identification of the impact of these regulations is likely to be impossible for a number of reasons, including the lack of data, and the fact that several different types of remuneration regulations were introduced around the same time as other banking regulations. That said, there are some existing studies based on field and lab experiments that give clues on how different types of bonus structure might affect incentives. For example, Cole, Kanz and Klapper (2015) conduct a framed field experiment with commercial bank loan officers in India to test how different remuneration structures affect their effort in screening loan applications. Effort in their study was measured as the amount of money that loan officers spent on acquiring more detailed information about each loan application. They find that a bonus scheme that both rewards profitable lending decisions and penalises unprofitable lending decisions leads to greater effort to screen loan applications than a bonus scheme which simply rewards profitable lending decisions. At the same time, they also find that pay deferral – implemented by a 90-day delay in payment – significantly reduced the impact of bonus pay, with dramatically lower effort and profitability of lending. Their findings suggest that bonus regulations, such as deferral and malus, could have an ambiguous effect on project screening effort.[6]

Our research based on lab experiments can help identify the effects of specific types of restrictions on bonus, and thus contributes to the existing literature and policy debate in a number of ways. First, our study systematically examined how specific restrictions on bonus pay influence both risk-taking and project search effort. We found strong evidence that bonus cap reduces risk-taking, and some evidence that it also reduces effort. Our results are thus consistent with Hakenes and Schnabel's (2014) hypothesis. In addition, we found evidence that malus, which reduces the probability of receiving bonus pay when choosing risky projects relative to the proportional bonus, reduces risk-taking. But we found no evidence that malus reduces effort.

Second, we examined the robustness of bonus cap and malus in achieving their aims. Specifically, we examined the extent to which the impact of such regulations could be diluted through tweaks in parameters that are under banks' control, such as setting absolute and relative performance metrics to benchmark employees' bonuses. As these are commonly used by banks to reward top executives and other senior employees, it is important to understand whether such metrics can be used as tools to undermine the risk-mitigating effect of remuneration regulations. Although there are other experimental studies that have examined how specific restrictions on bonus pay affect risk-taking (e.g., Hartmann and Slapnicar, 2014), or how high-powered incentives influence risk shifting to others (e.g., Andersson, Holm, Tyran, and Wengström, 2013), we are not aware of any experimental study which has examined the specific question of how robust remuneration regulations are. Our findings are consistent with the hypothesis advanced by Thanassoulis and Tanaka (2018) that the risk-mitigating effect of remuneration regulations – both bonus cap and malus – could be undermined if banks can tweak pay parameters in response to encourage risk-taking, unless a supervisory mechanism is in place to prevent such responses. We also find some evidence that bonus cap reduces effort, consistent with Hakenes and Schnabel's hypothesis (2014).

Third, we offer a novel approach to regulatory policy analysis when empirical identification of the impact of regulation is either inherently challenging, or hampered by lack of data. To our knowledge, experimental approaches such as ours have not been previously used to assess the likely impacts of a specific form of financial regulation. The experimental approach used in our study allows us to isolate the impact of specific types of remuneration regulation on behaviour, and thus offers qualitative evidence on how they might influence bankers' behaviour in practice.

[6] Deferred bonus has also been used by banks prior to the introduction of remuneration regulations as a tool for retaining staff.

3. The experimental design

A. The set up

The experiment was conducted in a behavioural research lab in two stages: Study 1 was conducted in January 2017; and Study 2 was conducted in March 2017.

Participants were recruited via the behavioural research lab, and the experiment was advertised through offices of MSc Finance and MSc Management programmes. Thus, most of the participants were students (see Table 1). Participants were recruited with a promise of £10 participation fee (equivalent to US$12.5 or €11.7 as at end-March 2017) and an opportunity to earn an additional bonus for participating in an hour-long lab experiment. A Math A-Level or an equivalent qualification was set as a minimum requirement for participating in the experiment, in order to increase the likelihood that the participants make reasonable choices in investment tasks which require an understanding of probabilities.

Table 1 reports the sample characteristics: Study 1 used a sample of 219, while Study 2 used a sample of 173.

Table 1: Sample characteristics

		Study 1				**Study 2**				**Whole Sample**			
		Total	Control	Bonus Cap	Malus	Total	Control	Bonus Cap	Malus	Total	Control	Bonus Cap	Malus
Number o fparticipants		219	74	74	71	173	57	57	59	392	131	131	130
of which:		100.0%	33.8%	33.8%	32.4%	100.0%	32.9%	32.9%	34.1%	100.0%	33.4%	33.4%	33.2%
Students		92%	92%	91%	93%	79%	84%	72%	81%	86%	89%	82%	88%
Sex	Female	61.2%	56.8%	58.1%	69.0%	61.3%	59.6%	68.4%	55.9%	61.2%	58.0%	62.6%	63.1%
	Male	38.4%	43.2%	40.5%	31.0%	38.2%	40.4%	31.6%	42.4%	38.3%	42.0%	36.6%	36.2%
	Undisclosed	0.5%	0.0%	1.4%	0.0%	0.6%	0.0%	0.0%	1.7%	0.5%	0.0%	0.8%	0.8%
Age	Mean	23.6	23.3	24.4	23.0	26.2	25.0	29.0	24.7	25.3	24.5	27.0	24.5
	Median	22.0	21.0	22.0	22.0	23.0	23.0	24.0	22.0	23.0	22.0	23.0	22.0

Both studies consisted of the following three parts:

Part 1: Questions relating to their personality and risk preference, and a set of probability questions presented as a ‘tutorial’.

Part 2: Participants were given four tasks in which they were asked to select an asset from a list of options, and were paid according to a specific bonus scheme which was explained to them before engaging in the task. Participants were randomly assigned to three different bonus groups: i) proportional bonus, which is also the control group, ii) bonus cap treatment group, and iii) malus treatment group.

Part 3: Questions on biographical information (age, sex, education, work experience, etc).

Participants in both Studies 1 and 2 completed a common set of questions in Parts 1 and 3. However, the design of Part 2 differed in Studies 1 and 2, as explained more in detail below. Participants’ bonus payments were determined by the outcome of their choices in Part 2.

B. Hypothetical investment task (Task 0, Part 1)

To isolate the impact of the bonus regime on risk choice, we needed to control for individuals' inherent risk preference. Thus, Part 1 of both Studies 1 and 2 included a series of psychological questions, which were aimed at extracting individuals' risk preference.

In addition, Part 1 of both Studies 1 and 2 included a common *hypothetical* asset choice task, which we called Task 0. In Task 0, participants were given a hypothetical scenario in which they inherited £100,000 from a distant relative whom they had never met before. Participants were then asked to choose one asset from the list of six assets, shown in Table 2. The assets were listed in ascending order of riskiness (Asset 1 is risk-free and Asset 6 is the riskiest), and they differed in risk-return characteristics. The 6-asset choice task was designed in such a way that achieving a high return was not possible without taking risks. Asset 4 represents the 'risk neutral' choice, as it maximises the expected return (see column (e)), but any choice in Task 0 is plausible and would reflect individuals' inherent risk preference. In Task 0, columns (c), (d), and (e) were presented in units of £ thousand. No cash bonus was paid for this task.

Task 0 represents a 'frictionless' benchmark, in which there is no principal-agent problem between the participant (agent) and other hypothetical 'stakeholders' (principal). In subsequent analysis, we use the participants' choice in this hypothetical task as a variable to control for their inherent risk preference.[7]

Table 2: 6-asset choice task

	Probability of failure	Probability of success	Return when failure	Return when succcess	Expected return
	(a)	(b)	(c)	(d)	(e)
Asset 1	0%	100%	0.0	1.0	1.0
Asset 2	10%	90%	-0.5	2.0	1.8
Asset 3	20%	80%	-1.5	3.0	2.1
Asset 4	30%	70%	-2.5	4.5	2.4
Asset 5	40%	60%	-3.5	6.0	2.2
Asset 6	50%	50%	-4.5	8.0	1.8

Note: In both Studies, columns (c), (d) and (e) were given in units of £ thousand in Task 0, whereas they were given in £ million in all other 6-asset Tasks (Study 1 Tasks 1 and 3, and Study 2 Tasks 1, 3 and 3A).

C. Bonus groups in paid tasks (Part 2)

In Part 2 of both Studies 1 and 2, participants were asked to engage in four investment tasks, which gave them the opportunity to earn a cash bonus. In each task, participants were given a scenario in which they had to act as an investment manager at a hypothetical 'ABC Bank', and were asked to choose one asset to invest in from a list of assets that differed in risk-return characteristics. Participants were told that they could earn a bonus depending on the return on the asset they chose in each task. After completing the study, participants received a cash payment that represented 1/1000 of the hypothetical bonus that they had earned in Part 2 of the study. For example, if a participant earned a hypothetical bonus of £10,000 in the study, he or she received a cash bonus of £10, in addition to the £10 participation fee. To prevent the possibility that information about the outcome of one investment task influences subsequent choices, participants were informed of the outcome of their investments and the bonus they had earned only after completing all the tasks. There is an implicit principal-agent problem embodied in the scenarios. In particular, the investment choice that maximizes expected bonus for participants does not necessarily maximize the bank's asset return.

[7] Kühberger, Schulte-Mecklenbeck and Perner (2002) find that hypothetical choices match real choices for both for small and large payoffs.

Before engaging in the four investment tasks in Part 2, participants were randomly allocated into one of the three bonus regime groups:

Group 1: Proportional bonus (control) group. Participants were paid a bonus proportional to the asset return, if the return exceeded a pre-specified threshold. No bonus was paid if the return was below the threshold. So for example, if their chosen asset in a given task yielded £1 million, they earned a hypothetical bonus of £1,000 in that task, which was then converted into an actual cash payment of £1 at the end of the experiment.

Group 2: Bonus cap treatment group. Participants were paid a bonus proportional to the asset return, once the return exceeded a pre-specified threshold, but the maximum bonus a participant could earn in each task was capped at £4,000 (i.e. £4 real cash bonus per task paid at the end of the study). No bonus was paid if the return was below the threshold.

Group 3: Malus treatment group. Participants were paid a bonus proportional to the asset return, only if the return exceeded a pre-specified threshold in the first 'year', and conditional on the project not failing for another 'year'. The probability of success in each 'year' was set to be the same. In the case of the baseline asset choice task presented in Table 2, the probability of success in each year is given in column (e), so for example, the probability of Asset 6 succeeding for two consecutive years was $(50\%)^2 = 25\%$. No bonus was paid if the return was below the threshold.

There was no framing effect in presenting the bonus regime groups. As explained in the next section, the threshold for bonus payments varied across tasks for each group. The actual payment was rounded up to the nearest £0.50.

The bonus formula offered to the control group represents the 'unregulated' benchmark. The existing literature shows that when banks' debt holders and depositors enjoy some form of implicit or explicit guarantee (due to the possibility of a bailout, or the presence of risk-insensitive deposit insurance), banks' shareholders have incentives to take excessive risks at the expense of taxpayers or the deposit insurance fund[8], especially when they are undercapitalized (e.g., Keeley, 1990 and Rochet, 1992, *inter alia*). This argument that banks, if left unregulated, will offer their employee pay contracts that would induce excessive risk-taking from society's point of view was also a key justification for creating new bonus regulations. Our design of the 'unregulated' benchmark bonus contract follows Thanassoulis and Tanaka (2018). Thanassoulis and Tanaka have shown that, when bonus is unregulated, a bank's shareholders will offer the bank managers bonuses that are proportional to the bank's market value in order to maximize returns to shareholders but will lead to excessive risk-taking for society as a whole.

Table 3 shows the maximum bonus and total pay that participants could earn in the four tasks in both Studies 1 and 2. For all three bonus groups, the amount of bonus that participants could earn was sufficiently large relative to their fixed participation fee in order to increase incentives to make considered choices. Because the bonus was capped at £4 per task for Group 2 (bonus cap), participants in this group could earn only up to a maximum of £16 in total in the four investment tasks. The level of the bonus cap was calibrated to be consistent with the EU-wide regulation that restricts bankers' variable pay to be no more than 100% of the fixed pay, and no more than 200% of the fixed pay with shareholders' approval. Thus, total bonus that the bonus cap group could earn was calibrated to 160% of the fixed pay (i.e. the participation fee) of £10. The maximum bonus that participants in Group 3 (malus) could earn was as large as that of the control group, but as we explain below, the probability that the malus group participants could earn this amount was much lower than that facing the control group.

[8] For example, the Financial Services Compensation Scheme (FSCS) in the UK.

Table 3: The maximum possible bonus and total pay for different bonus groups

	Fixed participation fee (a)	Maximum possible bonus (b)	Maximum possible total pay (a) + (b)
Group 1 (control)	£10	£33	£43
Group 2 (bonus cap)	£10	£16	£26
Group 3 (malus)	£10	£33	£43

Group 3 is designed to mimic certain features of malus, by which an individual receives a bonus if the investment is successful, but could lose the entire bonus if the investment fails in the subsequent years. We acknowledge that the design of Group 3's bonus scheme differs from the typical use of malus in the real world in two ways. First, in reality bankers very rarely lose their entire unvested bonus, even if malus is applied. Second, Group 3's bonus scheme does not capture the impact of bonus deferral in terms of time discounting, as all participants were paid in cash immediately after the experiment. We opted for this design to ensure that: a) the explanation of the bonus scheme was sufficiently simple for participants to understand; and b) to focus our analysis on the impact of incentivizing participants to care about risk over multiple periods, since this is the main aim of the existing malus regulation.

D. The design of paid investment tasks (Part 2)

In both studies, participants were asked to engage in four paid investment tasks (Tasks 1 to 4), in which they had to select one asset from a list given to them. Participants stayed in the same bonus group throughout this part of the study and were given full information about their bonus scheme before engaging in each task.

<u>Study 1:</u>

The 219 participants in Study 1 were randomly assigned into the three different bonus groups, and engaged in the following four paid investment tasks.

Task 1 (the baseline risk choice task): All participants were asked to choose from the list of 6 assets in Table 2, where the bonus threshold for all bonus groups was set at zero: columns (c), (d) and (e) in Table 2 were presented in units of £ million in this task (as well as in Task 3, which is explained below). That means that participants in Group 1 and 2 could earn a bonus in Task 1 as long as the asset return was positive; and those in Group 3 could earn a bonus as long as the asset return was positive for two consecutive 'years'. Our objective in designing this task was to examine whether different bonus groups make systematically different choices.

Task 2 (the baseline effort choice task): The bonus scheme for each group remained the same as in Task 1. But now, participants were asked to select from a list of 30 assets, presented in Table 4 below: columns (c), (d) and (e) in Table 4 were presented in units of £ million in this task (as well as in Task 4, which is explained below). The first 6 assets in the list were designed to be the same as in Task 1 (see Table 1). The following 24 assets were grouped in sets of 6 assets, and were designed to be either dominant to, or dominated by, the first 6 assets in terms of the probability of success, the payoff when successful, or both. So, compared to Assets 1-6, Assets 7-12 have lower probability of success, Assets 13-18 have a lower payoff, Assets 20-24 have a higher probability of success, and Assets 25-30 have a higher probability of success and higher payoff when successful. Of these 30 assets, Assets 19, and 25-30 are the 'dominant' assets, in the sense that they offer a better return for the same risk, or lower risk for the same return, than the other assets in the list. Identifying these assets would have required cognitive effort of having to evaluate the assets by scanning through a large number of assets by scrolling up and down the screen, but any rational participants should have chosen one asset from this set, regardless of his or her risk preference. Thus, we deemed a participant to have exerted effort only if that person selected an asset from this ‘dominant’ set (Assets 19, 25-30). Our objective in designing this task was to examine whether the bonus regime influences project search effort.

Table 4: 30-asset choice task (Study 1, Task 2)

	Probability of failure	Probability of success	Return when failure	Return when succcess	Expected return
	(a)	(b)	(c)	(d)	(e)
Asset 1	0%	100%	0.0	1.0	1.0
Asset 2	10%	90%	-0.5	2.0	1.8
Asset 3	20%	80%	-1.5	3.0	2.1
Asset 4	30%	70%	-2.5	4.5	2.4
Asset 5	40%	60%	-3.5	6.0	2.2
Asset 6	50%	50%	-4.5	8.0	1.8
Asset 7	5%	95%	0	1.1	1.0
Asset 8	15%	85%	-0.5	1.5	1.2
Asset 9	25%	75%	-1	2.5	1.6
Asset 10	35%	65%	-2	4	1.9
Asset 11	45%	55%	-3	6	2.0
Asset 12	55%	45%	-4	7.5	1.2
Asset 13	0%	100%	0	0.9	0.9
Asset 14	10%	90%	-0.5	1.9	1.7
Asset 15	20%	80%	-1.5	2.9	2.0
Asset 16	30%	70%	-2.5	4.4	2.3
Asset 17	40%	60%	-3.5	5.9	2.1
Asset 18	50%	50%	-4.5	7.9	1.7
Asset 19	0%	100%	0	1.1	1.1
Asset 20	9%	91%	-0.5	1.5	1.3
Asset 21	19%	81%	-1	2.5	1.8
Asset 22	29%	71%	-2	4	2.3
Asset 23	39%	61%	-3	6	2.5
Asset 24	49%	51%	-4	7.5	1.9
Asset 25	0%	100%	0	1.1	1.1
Asset 26	9%	91%	-0.5	2.3	2.0
Asset 27	19%	81%	-1	3.3	2.5
Asset 28	29%	71%	-2	4.8	2.8
Asset 29	39%	61%	-3	6.3	2.7
Asset 30	49%	51%	-4	8.3	2.3

Note: This table was used in Study 1 Tasks 2 and 4, and Study 2 Task 2A. In all these tasks, columns (c) to (e) were given in units of £ million.

Task 3 (the risk choice task with an absolute performance target): Participants were again given the 6-asset choice task as in Task 1 (see Table 2). But now, participants were given an absolute performance target of £5 million of asset return, and were told that they would not be paid a bonus unless the asset return was £5 million or greater. Thus, Task 3 raised the minimum asset return required for being eligible for a bonus from £0 in Task 1 to £5 million.

Our objective for setting Task 3 was to examine whether any differences in risk choice by the three bonus groups observed in Task 1 remained, even when an absolute performance target is set in such a way that incentivises risk-taking. In this task, only those that chose Assets 5 or 6 had the chance of earning a bonus.

Task 4 (the effort choice task with an absolute performance target): Participants were again given the 30-asset choice task, but under the same bonus regime as in Task 3. Participants were given a table containing the same 30 assets as in Task 2 (shown in Table 4), but the assets were re-ordered so as to eliminate the incentive to choose the same asset as that chosen in Task 2, without scrutinizing the characteristics of the assets. The objective here was to examine whether any differences in effort choice under different bonus regimes observed in Task 2 remained, even when the bonus was conditional on hitting a high absolute performance target.

Table 5 summarises the bonus structure for each task by each bonus group. Let p_i, $r_{i,s}$ and R_i be the probability of success, the return (on the assets of the hypothetical ABC Bank) when success, and the *realized* return when the participant chose Asset *i*, respectively. In Tables 2 and 4, p_i is given in column (b), $r_{i,s}$ is given in column (d), and R_i takes the value in column (c) if the investment fails, and the value in column (d) if it succeeds. Table 5 provides a summary of the bonus regimes for each task in Study 1: for example, in Task 1, if a participant chose Asset 3, he or she was paid £3 for the task if the investment was successful (and the asset yields £3 million) and £0 otherwise. Note that, for malus group, p_i could be interpreted as short-term probability of success, whereas $p_i^{\ 2}$ can be interpreted as long-term probability of success of Asset *i*. After completing all four tasks, each participant was paid a bonus which was based on the randomly generated return of the asset he or she chose in each task, and the bonus group that he or she was assigned to.

Table 5: Bonus regimes in Study 1

	Task 1 (6 assets)	**Task 2 (30 assets)**	**Task 3 (6 assets)**	**Task 4 (30 assets)**
Group 1 (control)				
Probability of bonus payment	p_i	p_i	p_i if $r_{i,s} \geq$ £5 million 0 otherwise	p_i if $r_{i,s} \geq$ £5 million 0 otherwise
Cash bonus paid to participants (in £)	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq 0$ 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq 0$ 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq$ £5 million 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq$ £5 million 0 otherwise
Group 2 (bonus cap)				
Probability of bonus payment	p_i	p_i	p_i if $r_{i,s} \geq$ £5 million 0 otherwise	p_i if $r_{i,s} \geq$ £5 million 0 otherwise
Cash bonus paid to participants (in £)	$Min(\frac{Ri}{1{,}000{,}000}, 4)$ if $R_i \geq 0$ 0 otherwise	$Min(\frac{Ri}{1{,}000{,}000}, 4)$ if $R_{i,s} \geq 0$ 0 otherwise	*4* if $R_i \geq$ £5 million 0 otherwise	*4* if $R_i \geq$ £5 million 0 otherwise
Group 3 (malus)				
Probability of bonus payment	p_i^2	p_i^2	p_i^2 if $r_{i,s} \geq$ £5 million 0 otherwise	p_i^2 if $r_{i,s} \geq$ £5 million 0 otherwise
Cash bonus paid to participants (in £)	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq 0$ 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq 0$ 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq$ £5 million 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq$ £5 million 0 otherwise

Note: p_i, $r_{i,s}$ and R_i are the probability of success, the return when success, and the *realized* return when the participant chose Asset *i*, *respectively*. In Tables 2 and 4, p_i is given in column (b), $r_{i,s}$ is given in column (d), and R_i takes the value in column (c) if the investment fails and the value in column (d) if it succeeds.

Study 2:

Study 2 builds on Study 1 to examine two issues: i) whether participants in different bonus groups exert different levels of effort when the effort task was made harder; and ii) how the relative performance target influenced risk-taking under different bonus regimes. As in Study 1, participants were randomly assigned to three bonus groups. A total of 173 participants were included in the sample for Study 2.

In Study 2, Tasks 1 and 3 were exactly the same as in Study 1. This allowed us to examine the key questions of: i) whether proportional bonus increases risk-taking relative to inherent preference; and ii) whether bonus cap and malus reduce risk-taking relative to the proportional bonus, with an expanded sample. But Study 2 differed from Study 1 in three ways.

First, Task 2 in Study 1 Part 2 was replaced by Task 2A in Study 2.

Task 2A (the 'hard' effort choice task): Participants were shown the first 6 (out of 30) assets in Table 4. Columns (c), (d) and (e) in Table 4 were presented in units of £ million in this task. But they were told that to reveal an additional asset, they had to perform a 5-digit, 3-number summation or subtraction question correctly (e.g. 30582+28951+49501=?; 48206-17829-12938=?) for each of the additional 24 assets.[9] Participants were given a pencil and paper to perform the calculations manually, and were not allowed to use a calculator or similar devices. Participants were given the opportunity to do up to 24 sets of calculations in order to reveal the full set of 30 assets in Table 4, but they were not informed about whether the 24 hidden assets were better or worse than the first 6 assets. Thus, the reward from their effort was *ex ante* uncertain. Participants could choose not to do any calculations, or stop doing calculations at any point in time. So for example, if they attempted 10 questions, answered 8 correctly and stopped at that point, they could see an additional 8 assets: so they could see Assets 1 to 14 in Table 4 before making their final asset choice. Participants were informed whether they had correctly answered the math question before deciding whether to attempt the next question or stop the math task and view the assets revealed.

In this task, participants' effort was measured by the number of calculations attempted, which was their choice variable. There were two aims in designing Task 2A in Study 2. First, this task was designed to require more effort than Task 2 in Study 1, as participants had to engage in tasks that require more effort in order to reveal each asset. At the same time, the math problems were set at levels that did not require learning, high-level math education or ability in order to perform them correctly. Second, unlike Task 2 in Study 1, this task introduced uncertainty in the return from effort. This set-up seeks to capture the reality in which bankers searching for investment opportunities typically do not know *ex ante* whether their effort would lead to a discovery of good projects, and hence make their effort choices under uncertainty.

Second, Task 4 in Study 1 Part 2 was replaced by Task 3A in Study 2.

Task 3A (the risk choice task with a relative performance target): Participants were asked to choose from the list of six assets shown in Table 2, but were told that to receive a bonus, their asset return has to be as high as, or higher than, that of a fictitious competitor. Participants were also told that the competitor had chosen Asset 5 (see Table 2). Columns (c), (d) and (e) in Table 2 were presented in units of £ million in this task.

Note that in Task 3A, the probability of receiving a bonus was designed to be lower than in Task 1 when participants chose Assets 1-4. Because these assets yielded lower return than Asset 5, which was chosen by the competitor and yields £6 million when successful, participants choosing Assets 1-4 could only be paid if their investment was successful, *and* their competitor's investment failed. This should generate incentives to choose high-risk assets (Assets 5-6) for all bonus groups.

As in Study 1, participants in Study 2 did not find out the return on their assets or the bonus earned until they completed all four tasks. The bonus payment was generated using the same method as in Study 1, except in Task 3A where the payment depended both on the randomly generated return on

[9] Performance of mathematical calculations were used as 'real effort task' to measure the level of effort in previous studies, e.g. Brüggen and Strobel (2007), Dohmen and Falk (2011), Eriksson, Poulsen and Villeval (2009).

the asset chosen by the participant, as well as the randomly generated return on Asset 5 which was chosen by the fictitious competitor.

Third, to control for the mathematical ability of participants, Part 1 of Study 2 also included a set of 4 mathematical questions, which were presented as a 'tutorial', in addition to the probability tutorial questions that were included in Study 1 Part 1. Participants were informed of how well they did on the 'tutorial' questions, before moving on to Part 2.

As before, we denote the probability of success, the return when success, and the *realized* return for ABC Bank as p_i, $r_{i,s}$ and R_i, respectively, when the participant chooses Asset *i*. In addition, we denote as ρ_5 the *realized* return on the competitor's chosen Asset 5 in Task 3A, which can take the value of either -3.5 or 6.0 (see Table 2). The mathematical expressions of the bonus regimes in Study 2 are summarized in Table 6. Note that the bonus regimes in Tasks 1, 2A, and 3 in Study 2 were the same as those in Tasks 1, 2, and 3 in Study 1. In Task 3A, those participants that chose assets that would yield less than £6 million if success (Assets 1-4) were paid only if their investment succeeded *and* their competitor's investment failed (which occurred with a 40% probability). By contrast, those participants who chose Asset 5 or 6 were paid as long as their investment succeeded, *regardless of whether the competitors' investment succeeded or not*.

Table 6: Bonus regimes in Study 2

	Task 1 (6 assets)	**Task 2A (30 assets)**	**Task 3 (6 assets)**	**Task 3A (6 assets)**
Group 1 (control)				
Probability of bonus payment	p_i	p_i	p_i if $r_{i,s} \geq$ £5 million 0 otherwise	$0.4*p_i$ if $r_{i,s} <$ £6 million p_i if $r_{i,s} \geq$ £6 million
Cash bonus paid to participants (in £)	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq 0$ 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq 0$ 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq$ £5 million 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq \rho_5$ 0 otherwise
Group 2 (bonus cap)				
Probability of bonus payment	p_i	p_i	p_i if $r_{i,s} \geq$ £5 million 0 otherwise	$0.4*p_i$ if $r_{i,s} <$ £6 million p_i if $r_{i,s} \geq$ £6 million
Cash bonus paid to participants (in £)	$Min(\frac{Ri}{1{,}000{,}000}, 4)$ if $R_i \geq 0$ 0 otherwise	$Min(\frac{Ri}{1{,}000{,}000}, 4)$ if $R_{i,s} \geq 0$ 0 otherwise	4 if $R_i \geq$ £5 million 0 otherwise	$Min(\frac{Ri}{1{,}000{,}000}, 4)$ if $R_i \geq \rho_5$ 0 otherwise
Group 3 (malus)				
Probability of bonus payment	p_i^2	p_i^2	p_i^2 if $r_{i,s} \geq$ £5 million 0 otherwise	$0.4*p_i^2$ if $r_{i,s} <$ £6 million p_i^2 if $r_{i,s} \geq$ £6 million
Cash bonus paid to participants (in £)	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq 0$ 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq 0$ 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq$ £5 million 0 otherwise	$\frac{Ri}{1{,}000{,}000}$ if $R_i \geq \rho_5$ 0 otherwise

Note: p_i, $r_{i,s}$ and R_i are the probability of success, the return when success, and the *realized* return when the participant chose Asset *i*, *respectively*. In Tables 2 and 4, p_i is given in column (b), $r_{i,s}$ is given in column (d), and R_i takes the value in column (c) if the investment fails and the value in column (d) if it succeeds. ρ_5 is the realised return on the competitor's chosen Asset 5, which could take a value of -3.5 or 6.0 (see columns (c) and (d) in Table 2.)

4. The impact of bonus regimes on risk-taking

To examine the impact of bonus regimes on risk-taking, we examine participants' asset choices under the common risk choice tasks (Task 0, Task 1 and Task 3) in Studies 1 & 2, and Task3A, which was included only in Study 2 to study the impact of relative performance benchmarking. Participants' choices in these tasks are found in Table A in the Annex.

A. Impact of proportional bonus on risk-taking

To first assess the impact of proportional bonus on risk-taking, we compare the choices of the participants assigned to the control group (Group 1) in Studies 1 and 2 in Task 0 and Task 1. A total of 131 participants were assigned to the control group in Study 1 (74 participants) and Study 2 (57 participants). In both Task 0 and Task 1, participants were asked to choose from the same list of 6 assets in Table 2. In Task 0, participants were asked to invest a hypothetical inheritance, for which no cash bonus was paid. In Task 1, participants acted as investment managers for a hypothetical bank and earned a cash bonus proportional to the realised return of the asset they chose. We used these two tasks to examine the following hypothesis (H1):

H1: Proportional bonus encourages individuals to take greater risks than they would take with their own money.

For the purpose of statistical analysis, participants' asset choices were grouped into three risk level categories: *Risklevel_1* (Assets 1-3), *Risklevel_2* (Asset 4), and *Risklevel_3* (Asset 5-6). The rationale for categorising the assets into these three risk buckets is as follows: in the absence of any distortion in incentives, Asset 4 represents a *risk neutral* choice[10], as it offers the maximum expected returns on the bank's investment asset. Assets 1-3 represent *risk averse* choices: they offer lower expected returns on the bank's investment asset relative to Asset 4, but also lower probabilities of failure. Assets 5-6 represent *risk loving* choices: they offer a higher return when successful, but a higher probability of failure, such that they yield lower expected return on the bank's investment asset than Asset 4.

To assess the impact of the proportional bonus scheme on risk-taking, we compare the choice of the control group in Task 0 and Task 1 in both Studies. The proportion of the control group choosing Assets 5-6 (*Risklevel_3*) in Task 1 was 10.8 percentage points higher than in Task 0 in Study 1, and 8.8 percentage points higher in Study 2 (see Table A in the Annex, bottom panel). This suggests that the participants in the control group were more likely to choose higher risk assets when offered a proportional bonus than when they had to invest their hypothetical inheritance. To test the statistical significance of this effect, we used the following maximum-likelihood multinomial logit models with discrete dependent variables for the control group in both Studies:

$$ln\frac{Pr(Risklevel = 1)}{Pr(Risklevel = 2)} = C_{10} + C_{11}Bonus + C_{12}Male + C_{13}Age$$

$$ln\frac{Pr(Risklevel = 3)}{Pr(Risklevel = 2)} = C_{20} + C_{21}Bonus + C_{22}Male + C_{23}Age$$

where the dependent variables were the risk levels chosen in Task 0 and Task 1 (*Risklevel*). The right-hand side variables included a dummy *Bonus*=1 if the asset choice was made in Task 1, and

[10] We label Asset 4 as the risk neutral choice as it represents the optimal choice of risk neutral individuals who seek to maximise the expected return. However, it is possible that some risk averse (or risk loving) individuals will also choose this asset, if they consider the risk-return trade-offs of lower (or higher) risk assets to be unattractive relative to Asset 4.

Bonus=0 when in Task 0, and a dummy *Male* =1 if the participant a male and 0 otherwise. We also included *Age* in the regression.

Table 7 summarises our results. Consistent with our hypothesis (H1), the *Bonus* dummy was positive and significant for *Risklevel_3*. This suggests that, when the participants were paid a proportional bonus, they were more likely to choose a highly risky asset (*Risklevel_3*) than in a hypothetical scenario in which they were asked to invest their inheritance. We interpret this result as supporting the hypothesis that the proportional bonus increases risk-taking. Age was statistically significant: older participants were more likely to choose lowest risk assets (*Risklevel_1*) than Asset 4 (*Risklevel_2*), and older participants were marginally more likely to choose highest risk assets (*Risklevel_3*) than Asset 4 (*Risklevel_2*) in Tasks 0 and 1. Gender was also statistically significant: male participants were more likely than female participants to choose highest risk assets (*Risklevel_3*) than Asset 4 (*Risklevel_2*) in these two tasks.[11]

Table 7: Impact of proportional bonus on risk choice (Studies 1 & 2, Tasks 0 and 1, control group only)

	Risklevel	
Risklevel_1		
Bonus	0.022	(0.271)
Male	-0.000	(0.280)
Age	0.067^{***}	(0.023)
Constant	-1.967^{***}	(0.567)
Risklevel_3		
Bonus	1.196^{**}	(0.478)
Male	0.944^{**}	(0.446)
Age	0.053^{*}	(0.031)
Constant	-4.094^{***}	(0.877)
Observations	262	
Pseudo R^2	0.049	

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

B. Impact of bonus cap and malus in mitigating risk-taking

Next, we examine how bonus cap and malus affect the participants' Task 1 risk choices, in order to test the following hypothesis:

H2: Bonus cap and malus mitigate risk-taking, relative to proportional bonus.

To test the above hypothesis, we examine whether the choices made by the bonus cap and malus treatment group in Task 1 in the two Studies was materially different from the choice made by the control group. To do this, we estimated the following maximum-likelihood multinomial logit models with discrete dependent variables (i.e. the participants' choices of assets in *Risklevel*=1, 2 or 3 categories in Task 1), controlling for participants' inherent risk preferences (i.e. their asset choices in Task 0):

$$ln\frac{Pr(t1\_risklevel = 1)}{Pr(t1\_risklevel = 2)} = C_{10} + C_{11}(\text{Bonus cap}) + C_{12}(\text{Malus}) + C_{13}\text{Inheritancechoice}$$

[11] Other studies have also found evidence that women take fewer risks than men in financial and other domains. For example, see Harris, Jenkins and Glaser (20060 and Charness and Gneezy (2007).

$$ln\frac{Pr(t1\_risklevel = 3)}{Pr(t1\_risklevel = 2)} = C_{20} + C_{21}(\text{Bonus cap}) + C_{22}(\text{Malus}) + C_{23}\text{Inheritancechoice}$$

Note that *t1_risklevel* denotes the *Risklevel* (=1,2 or 3) that the participants in the two Studies chose in Task 1, *Bonus cap* is a dummy which equals one only for the bonus cap treatment group, and *Malus* is a dummy which equals one only for the malus treatment group. *Inheritancechoice* denotes participants' asset choice in Task 0, where *Inheritancechoice*=1 when Asset 1 was chosen, *Inheritancechoice*=2 when Asset 2 was chosen, etc. This variable was included in order to control for individuals' inherent risk preference.

Table 8 summarises our results. We found that, compared with those in the control group, when controlling for participants' inherent risk preference (as captured by their Task 0 choice), the participants in the malus group were less likely to choose the assets of the highest risk level (*Risklevel_3*) than Asset 4, and more likely to choose the assets of the lowest risk level (*Risklevel_1*) than Asset 4. Relative to the control group, the participants in the bonus cap group were also less likely to choose the assets of the highest risk level (*Risklevel_3*) than Asset 4. Thus, the evidence is consistent with our hypothesis (H2).

Table 8: The impact of bonus regime on Task 1 risk level choice (Studies 1 & 2)

	t1_risklevel	
Risklevel_1		
Bonus cap	0.335	(0.292)
Malus	0.743***	(0.288)
Inheritancechoice	-0.990***	(0.139)
Constant	2.882***	(0.503)
Risklevel_3		
Bonus cap	-2.125***	(0.663)
Malus	-2.519***	(0.829)
Inheritancechoice	1.574***	(0.344)
Constant	-7.457***	(1.421)
Observations	392	
Pseudo R^2	0.193	

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

These findings are consistent with what one might expect. Under the malus treatment, participants were paid a bonus proportional to the asset's return, conditional on the asset's return being positive for another 'year'. Participants became more cautious under this regime: they were both less likely to choose the assets of the highest (=3) risk level and more likely to choose assets of the lowest (=1) risk level. For the bonus cap treatment group, participants were paid a bonus proportional to the asset return, subject to a cap. Therefore, relative to the bonus scheme of the control group (proportional), bonus cap reduced the bonuses that participants could get by investing in the high-risk, high-return assets, but not the bonus that they could get by investing in the lower risk/lower return assets (where returns are unaffected by the cap). It is therefore not surprising that under the bonus cap regime, participants were less likely to choose assets of the highest (=3) risk level, while there was not a statistically significant change in their risk preference among assets of the lowest (=1) risk level.

Inheritancechoice is also found to be statistically significant. The negative coefficient between the relative log probability of choosing *t1_risklevel=1* and *Inheritancechoice* suggests that participants who chose high-risk, high-return assets in Task 0 were less likely to choose assets of the lowest risk level (*Risklevel_1*). The positive coefficient between the relative log probability of choosing t1_risklevel=3 and inheritance choice suggests that participants who chose high-risk, high-return assets in Task 0 were more likely to choose assets of the highest *Risklevel* (=3).

In addition, we fitted data to a multinomial logit model including age and gender variables. However, neither age nor gender was found to be significant. This could suggest that there was no additional effect from age or gender, other than their influence on the participants' choice of asset at Task 0, which was already captured in the variable *Inheritancechoice*.

Next, we examined whether the bonus regime influenced how the risk level chosen in Task 1 has changed from that chosen in Task 0. If the risk level of the asset chosen in Task 1 was higher than that chosen in Task 0, we call it 'risk up'; if it was the same, 'no change'; and if the risk level in Task 1 was lower than in Task 0, 'risk down'. We estimated the following maximum-likelihood multinomial logit models with discrete dependent variables (i.e., risk up, no change, risk down from Task 0 to Task 1) to test the statistical significance of the observed differences, and to identify the contribution from the different bonus regimes:

$$ln\frac{Pr(i\_task1 = 1)}{Pr(i\_task1 = 2)} = C_{10} + C_{11}(\text{Bonus cap}) + C_{12}(\text{Malus}) + C_{13}\text{Inheritancechoice}$$

$$ln\frac{Pr(i\_task1 = 3)}{Pr(i\_task1 = 2)} = C_{20} + C_{21}(\text{Bonus cap}) + C_{22}(\text{Malus}) + C_{23}\text{Inheritancechoice}$$

where *i_task1* denotes the change of participants' choices in Task 1 and Task 0, with *i_task1*=1, 2 and 3 corresponding to "risk down", "no change" and "risk up" respectively.

Table 9 summarises our results. We found that, compared with those in the control group, participants in the malus treatment group were statistically less likely to risk up and more likely to risk down, while the participants in the bonus cap treatment group were statistically less likely to risk up. Participants in the malus treatment group were more cautious: they were less likely to risk up, and more likely to risk down. Participants in the bonus cap treatment group were less likely to risk up, as the potential bonus from choosing a higher–risk, higher-return asset was capped. However, there was no evidence that the bonus cap treatment group was less likely to risk down than the control group, as the cap did not affect the potential bonus from choosing lower risk/lower return assets. These findings are consistent with our hypothesis (H2) that, when compared with the control group (proportional bonus scheme), both bonus cap and malus mitigate greater risk-taking, in the absence of any other intervention.

Table 9: The impact of bonus regime on risking up and down in Task 1, relative to Task 0 (Studies 1 & 2)

	i_task1	
risk_down		
Bonus cap	0.525	(0.367)
Malus	1.110***	(0.348)
Inheritancechoice	0.505***	(0.160)
Constant	-3.625***	(0.694)
risk_up		
Bonus cap	-0.747**	(0.351)
Malus	-1.300***	(0.410)
Inheritancechoice	-0.957***	(0.147)
Constant	2.250***	(0.513)
Observations	392	
Pseudo R^2	0.133	

Standard errors in parentheses.
* p < 0.10, ** p < 0.05, *** p < 0.01

Inheritancechoice was found to be statistically significant. Other things being equal, participants who chose high-risk/high-return assets in Task 0 (*Inheritancechoice*) were less likely to risk up. This is because in the experiment set-up, the probability of risk up (in Task 1) for a participant who chose Asset 6, the highest risk/return asset among the available choices, in Task 0 was zero. Participants who chose lower-risk, lower-return assets in Task 0 (*Inheritancechoice*) were less likely to risk down. This is because in the experiment set-up, the probability of risk down (in Task 1) for a participant who chose Asset 1, the lowest risk/return asset among the available choices, in Task 0 would be zero.

C. Impact of an absolute performance target on the risk-mitigating effects of bonus cap and malus

In Task 3 (Studies 1 & 2), participants were again presented with the same 6-asset choice task as in Task 1 (see Table 2), but now they were given an absolute performance target of £5 million. They were informed that they would be paid a bonus only when the asset they chose generated a return of £5 million or greater. This meant that under all bonus regimes, participants could have a chance of earning a bonus only if they invested in *Risklevel=3* assets (i.e. Assets 5 or 6). This scenario is designed to capture the possibility that banks may tweak pay parameters that are in their control to undermine the risk-mitigating effects of remuneration regulations, as discussed in Thanassoulis and Tanaka (2018).

We now examine the following hypothesis:

H3: The risk-mitigating effects of bonus cap and malus weakens once bonus is made conditional on achieving a high absolute earnings target.

The data in Table A in the Annex show that the introduction of an absolute earnings target increased the number of participants who chose the highest *Risklevel* (=3) assets substantially across all three bonus groups. We fitted data to maximum-likelihood multinomial logit models with discrete dependent variables (i.e., *Risklevel*=1, 2 or 3), controlling for participants' inherent risk preferences (i.e. their choices in Task 0) to test the statistical significance of the observed differences and to identify the contribution from the different bonus regimes:

$$ln\frac{Pr(t3\_risklevel=1)}{Pr(t3\_risklevel=2)} = C_{10} + C_{11}(\text{Bonus cap}) + C_{12}(\text{Malus}) + C_{13}\text{Inheritancechoice}$$

$$ln\frac{Pr(t3\_risklevel = 3)}{Pr(t3\_risklevel = 2)} = C_{20} + C_{21}(\text{Bonus cap}) + C_{22}(\text{Malus}) + C_{23}\text{Inheritancechoice}$$

where *t3_risklevel* denotes the *Risklevel* (=1,2 or 3) participants chose in Task 3.

Table 10: Impact of bonus regimes on risk choice, with an absolute earnings target (Studies 1 & 2, Task 3)

	t3_risklevel	
Risklevel_1		
Bonus cap	-0.964**	(0.454)
Malus	-0.622	(0.429)
Inheritancechoice	-0.383**	(0.168)
Constant	1.945***	(0.641)
Risklevel_3		
Bonus cap	-0.315	(0.368)
Malus	-0.532	(0.364)
Inheritancechoice	0.118	(0.141)
Constant	1.330**	(0.566)
Observations	392	
Pseudo R^2	0.031	

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10 shows that once the earnings target was introduced, bonus cap and malus groups were as likely to choose assets of the highest risk level (*Risklevel_3*) as the control group: the risk-mitigating effect of bonus cap and malus we found earlier becomes insignificant once bonus is made conditional on hitting a high earnings target. This evidence is consistent with our hypothesis (H3). The results in Table 10 also showed that bonus cap group was less likely to choose the lowest risk level (*Risklevel_1*) than the control group. Participants who chose low risk assets in Task 0 were still much more likely to choose low risk assets (*Risklevel_1*) in Task 3. Indeed, as Table A in the Annex shows, some participants have made non-rational choices of selecting Assets 1-4, even though these offered zero chance of earning a bonus in this task. This result points to the possibility that some do indeed have strong psychological aversion to taking risks, even when a strong financial incentive to take risks is offered.[12]

In addition, compared to their inherent risk preferences (choices in Task 0), we found that the introduction of an absolute earning target (£5m) significantly increased the number of participants who chose to risk up, across all three bonus groups. We fitted data to maximum-likelihood multinomial logit models with discrete dependent variables (i.e. risk up, no change, risk down) to test the statistical significance of the observed differences and to identify the contribution from the different bonus regimes:

$$ln\frac{Pr(i\_task3 = 1)}{Pr(i\_task3 = 2)} = C_{10} + C_{11}(\text{Bonus cap}) + C_{12}(\text{Malus}) + C_{13}\text{Inheritancechoice}$$

$$ln\frac{Pr(i\_task3 = 3)}{Pr(i\_task3 = 2)} = C_{20} + C_{21}(\text{Bonus cap}) + C_{22}(\text{Malus}) + C_{23}\text{Inheritancechoice}$$

where *i_task3* denotes the change of participants' choices in Task 3 relative to those in Task 0, with *i_task3*=1, 2 and 3 corresponding to "risk down", "no change" and "risk up", respectively.

[12] See, for example, Baddeley (2010) for a review of psychological, non-rational drivers of financial risk choices, e.g. via herding.

Table 11: Impact of bonus regimes on risking up in Task 3, relative to Task 0 (Studies 1 & 2)

	i_task3	
risk_down		
Bonus cap	-0.765	(0.494)
Malus	0.091	(0.452)
Inheritancechoice	0.852***	(0.229)
Constant	-3.572***	(0.956)
risk_up		
Bonus cap	-0.239	(0.317)
Malus	-0.131	(0.326)
Inheritancechoice	-0.186	(0.131)
Constant	2.007***	(0.510)
Observations	392	
Pseudo R^2	0.053	

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 11 shows that participants in bonus cap and malus treatment groups were no less likely to risk up than the control group, and no more likely to risk down. These findings are consistent with our hypothesis (H3) that the risk-mitigating effects of bonus cap and malus weaken once bonus is made convex via the introduction of a high earnings target.

D. Impact of relative performance pay on the risk-mitigating effects of bonus cap and malus

In Study 2 Task 3A, participants were again presented the same 6-asset choice task as in Task 1 (see Table 2). In this task, participants were informed that to receive a bonus, their asset return had to exceed that of a competitor and that the competitor had chosen Asset 5. This scenario was created to incentivise risk-taking, using a method which is commonly used by banks. Under this scenario, participants who choose Assets 1-4 have to be successful in their own investments, and the competitor has to fail, to be paid a bonus. By contrast, those who choose Assets 5-6 get paid a bonus whenever their own investments succeed. Thus, relative performance benchmarking increases risk-taking when competitors are also taking risks.

H3i: The risk-mitigating effects of bonus cap and malus weaken once a relative performance target is introduced.

Table A in the Annex shows that, compared with choices that participants made in Task 0, the introduction of this relative performance pay and the information that the competitor is taking a risky investment strategy increased the number of participants who chose the Assets 5 or 6 (*Risklevel_3*) across all three bonus groups.

We fitted data to maximum-likelihood multinomial logit models with discrete dependent variables (i.e. *Risklevel*=1, 2 or 3), controlling for participants' inherent risk preferences (i.e. their choices in Task 0) to test the statistical significance of the observed differences, and to identify the contribution from the different bonus regimes:

$$ln\frac{Pr(t3A\_risklevel = 1)}{Pr(t3A\_risklevel = 2)} = C_{10} + C_{11}(\text{Bonus cap}) + C_{12}(\text{Malus}) + C_{13}\text{Inheritancechoice}$$

$$ln\frac{Pr(t3A\_risklevel = 3)}{Pr(t3A\_risklevel = 2)} = C_{20} + C_{21}(\text{Bonus cap}) + C_{22}(\text{Malus}) + C_{23}\text{Inheritancechoice}$$

where *t3A_risklevel* denotes the Risklevel (=1,2 or 3) participants chose in Task 3A.

Table 12: The impact of bonus regime on risk choice in the presence of relative performance benchmarking (Study 2, Task 3A)

	t3A_risklevel	
Risklevel_1		
Bonus cap	0.013	(0.567)
Malus	-0.363	(0.604)
Inheritancechoice	-0.422**	(0.205)
Constant	0.765	(0.756)
Risklevel_3		
Bonus cap	-0.093	(0.424)
Malus	0.193	(0.421)
Inheritancechoice	0.184	(0.162)
Constant	-0.202	(0.665)
Observations	173	
Pseudo R^2	0.032	

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12 shows that the risk mitigation effects of bonus cap and malus observed in Task 1 become statistically insignificant once the relative performance benchmarking is introduced. As before, we observe the presence of some participants who chose low risk assets despite the strong financial incentives to choose high-risk assets. These participants were more likely to have chosen low-risk assets in Task 0, again suggesting that some are psychologically very averse to take risks even in the presence of strong financial incentives.

In addition, comparing with their inherent risk preferences (choices in Task 0), we found that the introduction of relative performance benchmarking significantly increases the number of participants who chose to risk up, across all three bonus groups. We fitted data to maximum-likelihood multinomial logit models with discrete dependent variables (i.e. risk up, no change, risk down) to test the statistical significance of the observed differences, and to identify the contribution from the different bonus regimes:

$$ln\frac{Pr(i\_task3A=1)}{Pr(i\_task3A=2)} = C_{10} + C_{11}(\text{Bonus cap}) + C_{12}(\text{Malus}) + C_{13}\text{Inheritancechoice}$$

$$ln\frac{Pr(i\_task3A=3)}{Pr(i\_task3A=2)} = C_{20} + C_{21}(\text{Bonus cap}) + C_{22}(\text{Malus}) + C_{23}\text{Inheritancechoice}$$

where *i_task3A* denotes the change of participants' choices from Task 0 to Task 3A, with *i_task3A*=1, 2 and 3 corresponding to "risk down", "no change" and "risk up" in Task 3A relative to Task 0, respectively.

Table 13: Impact of bonus regimes on risking up and down, with a relative performance benchmark (Study 2, Task 3A)

	i_task3A	
risk_down		
Bonus cap	0.895	(0.788)
Malus	1.422*	(0.819)
Inheritancechoice	1.095***	(0.356)
Constant	-6.478***	(1.772)
risk_up		
Bonus cap	0.381	(0.423)
Malus	0.772*	(0.441)
Inheritancechoice	-0.474**	(0.187)
Constant	2.102***	(0.738)
Observations	173	
Pseudo R^2	0.107	

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Compared with the control group, there is no longer definitive evidence of a risk mitigation effect from the bonus cap. Compared with the control group, participants in the malus group are marginally more likely to risk down and risk up.

Based on the analysis above, we conclude that while bonus cap and malus can mitigate risk-taking, their risk-mitigating impacts are undermined through an introduction of an absolute or a relative performance metric, both of which are commonly used by banks.

5. The impact of bonus regime on effort

Next, we examine how the bonus regime affects project search effort. In both Studies 1 and 2, participants were given real effort tasks. We use these tasks to examine the following hypothesis:

H4: Bonus cap and malus reduce incentives to engage in project search effort by reducing return from effort.

Study 1:

In Study 1 Task 2 and 4, participants were given a set of 30 assets which they had to examine by scrolling up and down the screen before choosing an asset to invest in (see Table 4). Whereas the participants were offered a bonus if they achieved a return greater than zero in Task 2, they were offered a bonus only if they achieved a return greater than £5 million in Task 4 (see Table 5).

Tasks 2 and 4 required cognitive effort in evaluating the risk-return characteristics of a large number of assets before making a decision. But there was no uncertainty in return from effort in these tasks, as all the probabilities and payoffs from all available investment opportunities were revealed to the participants. In our analysis, the effort variable in these tasks received a binary classification. In particular, participants were deemed to have exerted effort (effort = 1) if they have chosen an asset from a set which dominates all other assets in the set, but otherwise deemed not to have exerted effort (effort = 0). We also examined the time taken to complete the task as an alternative measure of effort.

Table 14 summarises the results. It shows that on average, 86.8% of the participants identified the correct set of assets in Tasks 2 and completed it in 222 seconds (3 minutes and 42 seconds), and 86.8% of them identified the correct set of assets in Task 4 and completed it in 175 seconds (2 minutes and 55 seconds). The bonus cap group had a lower percentage of participants identifying the correct set of assets than the control group both in Tasks 2 and 4. By contrast, the malus group had a higher percentage of participants identifying the correct set of assets in both tasks than the control group. However, the difference between the control group and the bonus cap and malus groups in the likelihood of identifying the correct set of assets was not statistically significant. Similarly, the difference between the control group and the bonus cap and malus groups in the time taken to complete the tasks was not statistically significant. Thus, the results from Study 1 did not support our hypothesis (H4) that bonus cap and malus reduce effort.

Table 14: Study 1 Task 2 and Task 4, correct answers and average time taken to complete the tasks

	Average % correct	**Average time taken (seconds)**
Task 2		
Control	87.8%	211
Bonus cap	82.4%	227
Malus	90.1%	230
All	86.8%	222
Task 4		
Control	86.5%	172
Bonus cap	85.1%	189
Malus	88.7%	165
All	86.8%	175

Study 2:

Effort tasks in Study 1 were relatively easy, as evidenced by the fact that a high proportion of the participants could identify the correct set within a short period of time. This could explain why the bonus treatment had no effect on observed effort. In order to probe hypothesis H4 further, we set a 'hard' project search effort task in Study 2. In this task (Task 2A), participants were given the first set of 6 assets shown in Table 4, but had to perform one 5-digit, 3 number summation or subtraction question correctly in order to reveal an additional asset. Participants could view a maximum of 30 assets by performing all 24 calculations correctly, but they could also decide to stop doing the calculations at any point in time. After each computation, participants were informed whether their answer was correct or not.

Effort was measured by the number of questions *attempted*: this is the right measure in our setting as this was the participants' choice variable, and they faced incentives to perform the calculations correctly given that they decided to attempt. The number of correctly answered questions could be interpreted as output, or return on effort. Thus, correct answers per attempted questions could be interpreted as productivity.

In order to control for participants' mathematical skills, Part 1 of Study 2 also included four 5-digit, 3-number summation and subtraction questions, which were presented as 'Math Tutorial'. After each calculation, they were informed whether their answer was correct or not.

Table 15 summarises our results. On average, the bonus cap treatment group attempted 2.7 fewer questions than the control group, whereas the malus treatment group attempted 1.2 questions fewer than the control group. Strikingly, 19.3% of the bonus cap treatment group did not attempt any question compared to 8.8% of the control group, and 6.8% of the malus treatment group (Figure 1). Figure 1 also shows that the bonus cap treatment group was much more likely to give up very quickly after a few questions, compared to the control group.

Table 15: Study 2 Task 2A number of attempted and correctly answered questions, and correct answers per attempted questions

	Attempted		Correctly answered		Correct answers per attempted	
	Mean	Median	Mean	Median	Mean	Median
Control	11.5	9	9.3	8	79.8%	82.6%
Bonus cap	8.8	6	7.6	5	82.9%	88.2%
Malus	10.3	9	8.6	6	78.5%	85.7%
All	10.2	9	8.5	6	80.3%	85.7%

The OLS regression results on the number of math computations in Task 2 in Study 2 and number of correct answers are reported in Table 16. The variable *Math_tutorial* captures the number of correct answers (from 0 to 4) given in Part 1 of Study 2. *Math_tutorial* was included in regression to control for individual participants' ability to perform calculations similar to those used to measure effort in Task 2A. The positive coefficients on *Math_tutorial* in all the three regressions in Table 16 shows that those who achieved a higher score in the math tutorial questions were likely to attempt more computations, and get more computations correct in Task 2A.

Our regression analysis of the number of attempted questions (first column, Table 16) shows that the negative coefficient on the bonus cap treatment group dummy was significant at the 10% confidence level. By contrast, the coefficient on the malus treatment group dummy was negative but not statistically significant. This result points to some evidence that the bonus cap could reduce effort, by reducing the expected return from effort. This evidence offers some support for our hypothesis (H4) for bonus cap only, but not for malus.

However, the bonus cap was not statistically significant for the number of correct computations, although the coefficient remained negative. This reflects the fact that amongst those that decided to attempt at least one question, the bonus cap treatment group had marginally higher correct computations per attempted question than the control group, although the difference was not statistically significant. Other variables, such as age and gender, were not statistically significant in any of these regressions.

Figure 1: Cumulative distribution, number of questions attempted by bonus group

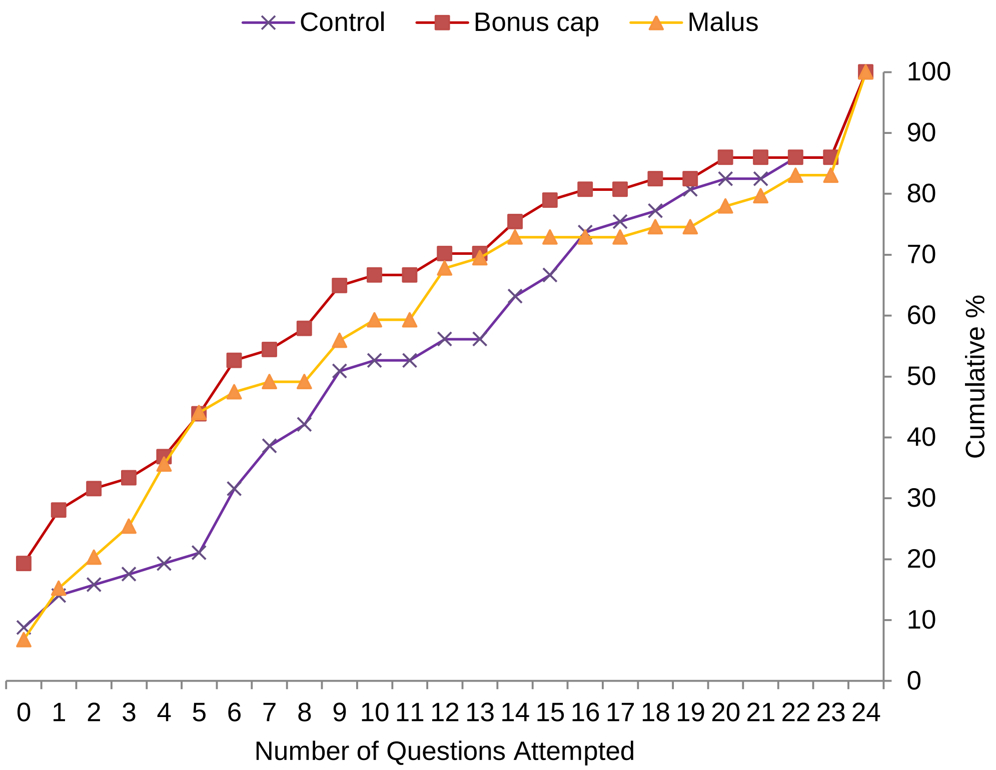

Table 16: Impact of bonus regimes on effort (number of computations) and productivity (number of correct answers)

	(1) No of computations attempted	(2) No of correct computations	(3) Share of correct computation per attempted
Bonus Cap	-2.664*	-1.630	0.019
	(1.497)	(1.315)	(0.045)
Malus	-1.281	-0.780	-0.011
	(1.484)	(1.304)	(0.043)
Math_tutorial	2.134***	2.093***	0.100***
	(0.640)	(0.562)	(0.020)
Constant	4.678**	2.581	0.473***
	(2.301)	(2.022)	(0.071)
Observations	173	173	153
Adjusted R^2	0.062	0.068	0.135

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6. Discussion and policy implications

Our paper makes several contributions, both to the ongoing policy debate on remuneration regulations, and to the existing literature on this area. First, our study provides evidence that proportional bonus that rewards positive investment returns but does not penalise negative returns encourages individuals to take greater risks than they would with their own money (H1). The scenario in which participants were asked to invest their own money (Task 0) represents a 'frictionless' benchmark, in which there is no principal-agent problem between the participant (agent) and other hypothetical 'stakeholders' (principal). Thus, our results can be interpreted as being consistent with the received wisdom that the proportional bonus scheme could encourage greater risk-taking. It also suggests that poorly designed bonus schemes could indeed encourage excessive risk-taking. We demonstrate that bonus cap and malus can mitigate this effect, suggesting that there may indeed be a rationale for regulating bonuses (H2).

Second, however, we find that simple manipulations to the bonus structure, e.g. setting an absolute or a relative performance target, are sufficient to undermine the risk-mitigating effects of bonus cap and malus (H3 and H3i): tweaks to pay parameters can restore risk-taking incentives even in the presence of bonus cap and malus. Thus, our findings point to the possibility that, as long as banks' remuneration committees, which represent shareholders' interests, can freely vary the parameters that determine the incentive structures of 'material risk takers', and the shareholders themselves want to encourage them to take risks, remuneration regulations alone could only have weak impact in restraining risk-taking. Our study highlights the ongoing need for active supervision of the work of banks' remuneration committees. In addition, we find some evidence that bonus cap might reduce project search effort (H4), but no evidence that malus could reduce effort.

Finally, our key contribution to the literature is offering a novel approach to regulatory policy analysis, when empirical identification of the impact of regulation is either inherently challenging, or hampered by lack of data. We recognise that there are limitations in drawing direct inferences about the effectiveness of the actual pay regulations based on our experimental study involving relatively small stakes with students in a lab. That said, we note that remuneration regulations were designed without particular 'banker' characteristics in mind. The fact that we could observe participants' responses to changing bonus structures provides some evidence that bonus structures affect both risk and effort choices, and that imposing specific constraints on bonus structure may not be sufficient to mitigate risk-taking.

We highlight two main policy implications emerging from our study. First, to monitor risk-taking incentives facing bank executives, it may not be sufficient for regulators to check banks' compliance with the existing remuneration regulations, but it may also be necessary to examine the risk-taking incentives embedded in the entire pay structure. More specifically, regulators need to be tuned in to the possibility that features such as absolute and relative performance targets could be used to fuel bank executives' risk-taking incentives, even in the presence of pay regulations.[13] Second, in order to align the bankers' incentives with those of society, regulatory reforms aimed at eliminating distortions in the incentives of the bank's shareholders – whose interests are ultimately mirrored in the bank's executives' pay structure – are an important complement to regulating bankers' pay. The relevant regulatory reforms include those aimed at increasing shareholders' 'skin in the game' (e.g. via higher capital requirements and buffers) and ending 'too-big-to-fail' (e.g. by improving resolvability of failed banks).

[13] We also note that incentives could be manipulated by employment conditions other than bonus, e.g. promotions and sackings, over which regulators may have some, but not complete control. For example, in the United Kingdom, the Prudential Regulation Authority has powers to reject senior appointments at banks if they are deemed inappropriate.

Our study also points to the possibility that, consistent with Hakenes and Schnabel's (2014) hypothesis, bonus cap could have the unwanted side effect of reducing the project search effort. Because bonus cap limits the potential reward from effort, it may be rational for individuals to 'shirk' when effort is costly. By contrast, we did not find any evidence that malus encourages shirking. This result makes sense, as malus does not limit the potential reward from effort in the same way that a bonus cap does.

We note that bonus cap may not have a detrimental effect on effort in practice if banks adjust their pay structures in order to restore incentives for effort. For example, banks can increase the base pay, and thus increase the maximum level of potential bonus consistent with the bonus cap. There is indeed evidence that the proportion of fixed pay in total pay for the material risk-takers in major UK banks has increased from 28% in 2013 to 54% in 2014, when the EU-wide bonus cap was introduced (Angeli and Gitay, 2015). This in turn could give rise to the detrimental effect of reducing flexibility for banks to adjust their costs in response to a negative shock. Thus, our analysis questions whether the bonus cap is achieving its stated aims.

7. Conclusions

The case for regulating remuneration to influence risk-taking incentives arises only when privately agreed pay arrangements between owners of the firm and its employees give rise to socially undesirable incentives. The recognition that the bonus culture was a factor contributing to the 2007-8 financial crisis led to the introduction of new regulations on bankers' pay across a number of jurisdictions. These new regulations were, to some extent, based on *ceteris paribus* reasoning: other things equal, the new regulatory requirements to cap bonuses or to penalise risk management failures through malus and clawback should lead to better alignment of banker executives' incentives. It is, however, more realistic to expect banks to respond to these regulations by tweaking pay structures, in order to maintain bank executives' incentives to maximise shareholder returns. Thus, pay regulations are *robust* in achieving their stated aims only if they can prevent excessive risk-taking even when banks can adjust pay parameters that are within their control. The empirical identification of the impact of pay regulations on bankers' incentives, however, is not possible due to the lack of data on individuals' decisions under different bonus regimes. In this context, our lab experiment provides a novel, alternative approach to improve our understanding of how these regulations might affect incentives.

Our study offers new evidence on how specific constraints imposed on bonus pay could influence risk-taking and project search effort. First, consistent with conventional wisdom, a bonus that is proportional to positive investment returns but that does not penalise for negative returns encourages risk-taking. More specifically, we found that, under such a bonus regime, individuals take greater risks than they would with their own money, suggesting that such a regime could potentially encourage *excessive* risk-taking. Second, we find that bonus cap and malus can mitigate this risk-taking, *ceteris paribus*. Third, however, we also find that the risk-mitigating effects of bonus cap and malus can be undermined by the introduction of an absolute or a relative performance target. Finally, we also find some evidence that bonus cap might reduce project search effort, consistent with the theoretical prediction of Hakenes and Schnabel (2014), but we did not find evidence that malus encourages such 'shirking'.

Our findings suggest that the regulators' original diagnosis that the bonus culture was a factor that contributed to the 2007-8 financial crisis may well have been right. Nevertheless, our findings suggest that the risk-mitigating effects of variable pay regulations could be undermined when, for example, banks' shareholders want to encourage their executives to take greater risks than the levels preferred by taxpayers. Our results therefore imply that the regulators must not only monitor compliance with pay regulations, but also continue to examine bank executives' incentive pay more holistically in order to identify features, such absolute earnings targets, that could potentially encourage excessive risk-taking. Finally, our findings suggest that bonus cap may not be a robust way of mitigating risk-taking, and that it could also have the unintended effect of reducing bank executives' incentives to search for the best investment opportunities.

Annex:

Table A: Asset choices in 6-asset risk choice tasks

i) Frequency

	Study 1								
	Control			Bonus cap			Malus		
	Task 0	Task 1	Task 3	Task 0	Task 1	Task 3	Task 0	Task 1	Task 3
Asset 1	1	2	3	8	3	1	1	5	3
Asset 2	12	10	5	15	12	2	9	14	6
Asset 3	20	16	10	12	20	3	14	19	9
Asset 4	41	38	8	34	38	7	46	32	12
Asset 5	0	2	37	2	0	55	1	1	39
Asset 6	0	6	11	3	1	6	0	0	2
Total	74	74	74	74	74	74	71	71	71

	Study 2											
	Control				Bonus cap				Malus			
	Task 0	Task 1	Task 3	Task 3A	Task 0	Task 1	Task 3	Task 3A	Task 0	Task 1	Task 3	Task 3A
Asset 1	6	4	4	1	3	2	2	4	3	6	2	0
Asset 2	6	5	3	4	6	2	2	2	7	10	3	1
Asset 3	6	9	5	5	9	21	8	4	13	14	2	6
Asset 4	32	27	7	18	34	28	15	19	34	28	12	18
Asset 5	3	4	27	17	2	0	25	17	0	0	37	24
Asset 6	4	8	11	12	3	4	5	11	2	1	3	10
Total	57	57	57	57	57	57	57	57	59	59	59	59

ii) As percentage of total within each bonus groups

	Study 1								
	Control			Bonus cap			Malus		
	Task 0	Task 1	Task 3	Task 0	Task 1	Task 3	Task 0	Task 1	Task 3
Asset 1	1.4	2.7	4.1	10.8	4.1	1.4	1.4	7.0	4.2
Asset 2	16.2	13.5	6.8	20.3	16.2	2.7	12.7	19.7	8.5
Asset 3	27.0	21.6	13.5	16.2	27.0	4.1	19.7	26.8	12.7
Asset 4	55.4	51.4	10.8	45.9	51.4	9.5	64.8	45.1	16.9
Asset 5	0.0	2.7	50.0	2.7	0.0	74.3	1.4	1.4	54.9
Asset 6	0.0	8.1	14.9	4.1	1.4	8.1	0.0	0.0	2.8

	Study 2											
	Control				Bonus cap				Malus			
	Task 0	Task 1	Task 3	Task 3A	Task 0	Task 1	Task 3	Task 3A	Task 0	Task 1	Task 3	Task 3A
Asset 1	10.5	7.0	7.0	1.8	5.3	3.5	3.5	7.0	5.1	10.2	3.4	0.0
Asset 2	10.5	8.8	5.3	7.0	10.5	3.5	3.5	3.5	11.9	16.9	5.1	1.7
Asset 3	10.5	15.8	8.8	8.8	15.8	36.8	14.0	7.0	22.0	23.7	3.4	10.2
Asset 4	56.1	47.4	12.3	31.6	59.6	49.1	26.3	33.3	57.6	47.5	20.3	30.5
Asset 5	5.3	7.0	47.4	29.8	3.5	0.0	43.9	29.8	0.0	0.0	62.7	40.7
Asset 6	7.0	14.0	19.3	21.1	5.3	7.0	8.8	19.3	3.4	1.7	5.1	16.9

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