



Incentives and culture in risk compliance

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ABSTRACT

In the finance industry, risk compliance has become an important issue after numerous policy violations resulting in significant costs for financial institutions and society as a whole. We run a lab-in-the-field experiment with 269 finance professionals, to investigate the effects of financial incentives and workplace culture on risk compliance. Relative to variable remuneration (linked to expected profits), fixed remuneration increases the proportion of people complying by as much as 25.1 percentage points. This is achieved with no diminution in productivity. Relative to a profit-focused workplace culture, a risk-focused workplace culture increases the proportion of people complying by 16.3 percentage points.

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1. Introduction

Compliance with risk policy in financial institutions has become an important issue for investigation in the post-crisis environment. Numerous cases with significant costs both to institutions and society as a whole suggest that non-compliance with risk policy is a serious problem. The literature currently offers little guidance for directors and senior executives wishing to promote staff compliance. In this study we therefore investigate, using experiments, whether changes to remuneration and corporate culture may improve compliance behaviour in a sample of finance professionals.

Our paper contributes to several strands of the literature. First, our results are informative for current discussions among policy makers and regulators about the fundamental drivers of risk non-compliance in the finance industry. Second, to the best of our knowledge, it is the first study experimentally investigating financial professionals' compliance behaviour in relation to risk policy. The experimental design allows us to better understand how professionals balance the often-contradictory goals of short-term profit generation and risk compliance for long-term resilience. Although there are a number of studies examining tax compliance,

surprisingly little is known about compliance behaviour within financial institutions. While violations of tax rules cheat the government/society, risk compliance relates to the policies of employers and hence may be regarded very differently by employees. Third, we conduct a lab-in-the-field experiment, with finance professionals, to provide the first empirical evidence on how risk compliance is affected by two issues of great interest to regulators and industry leaders: financial incentives and organisational culture. Fourth, we also contribute to the literature analysing behaviour of financial professionals, which is still in its infancy. Finance professionals differ from students in market experience, age, income, education, etc. For example, it is found that, compared to students, finance traders exhibit myopic loss aversion to a greater extent (Haigh and List, 2005), finance professionals are better in discerning the quality of public signals (Alevy et al., 2007), are less sensitive to low and high payment status (List and Haigh, 2010), and respond more to rankings and tournament incentives (Kirchler et al., 2019). In this study, we successfully recruit finance professionals who differ in gender, age and industry segments. Notably, more than 30% of our subjects have more than 10 years working experience in the finance industry.

We find that financial incentives are the most important determinant of consistent compliance behaviour. Specifically, we find that fixed payments significantly improve compliance rela-

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tive to variable pay-for-performance remuneration (based on expected profits). Contrary to theory, we find that fixed remuneration does not decrease productivity, suggesting that such remuneration schemes may be, on balance, of benefit to the finance industry. Relative to a profit-focused organisational culture, our risk-focused culture construct also increases the proportion of individuals choosing compliance with policy.

Compliance is an issue that affects all bank staff across all risk types (including credit, market and operational), as the following examples demonstrate. Anti-money laundering (AML) and counter-terrorism financing policies, for example, are designed to protect banks from the possibility of regulatory sanctions, fines and reputational damage; yet HSBC staff failed to comply with internal AML policies leading to fines of \$1.9 billion (Guardian, 2012). At Wells Fargo, staff opened some two million accounts without proper customer authorization despite having controls to prevent such abuses (Tayan, 2016). Rogue trader cases at Barings, NAB, Allied Irish Bank, Societe Generale, J.P. Morgan, UBS etc. (McConnell, 2014) have repeatedly shown that staff can circumvent controls to place unauthorised trades that violate limits designed to control market risk. Even credit limits can be circumvented when credit applications include false information, resulting in credit risks being in excess of appetite (McConnell, 2016).

Non-compliance is extremely costly for financial institutions and for society as a whole. Harm to customers produces reputational damage and necessitates expensive remediation programs as in the infamous Payment Protection Insurance scandal (Guardian, 2016). Regulatory fines are increasingly onerous; according to the Boston Consulting Group (BCG, 2017) total fines to the financial sector from the end of the crisis until the end of 2016 had reached US\$321 billion. Apart from these significant costs one must also consider the costs associated with staff investment of time/resources in concealment and the monitoring and regulatory costs associated with detection of non-compliance (e.g., Bayer and Sutter, 2009).

Compliance with policy can be understood in the context of current risk management practices in financial institutions (Stulz, 2015). Risk-taking decisions are the prerogative of senior leaders,¹ and therefore the primary risk management role for most staff is to comply with risk limits and policies. It is clear that most staff throughout the firm are not 'risk-takers' in the sense that has typically been studied in the finance literature. The role of staff is to generate profits provided that their activities are consistent with risk limits and other policies designed to protect financial institutions from excessive risk. Compliance with risk limits and policy is essential for ensuring that the strategic risk decisions of the board are implemented and ultimately for ensuring the resilience of financial institutions.

While the importance of compliance with risk policy is clear for long-term resilience of financial institutions and society as a whole, surprisingly little is known about compliance behaviour. We hypothesize that non-compliance with risk policy is caused by the requirement to produce short-term profits. Compliance with risk policy sometimes requires the rejection of profitable opportunities (at least in the short-term) and carries with it opportunity costs; time spent on compliance obligations might otherwise be devoted

to profit generation. How finance professionals manage this fundamental tension between short-term profits and compliance with risk policy (in order to achieve long-term resilience) is the focus of this study.

In many financial institutions the profit imperative is made salient for staff through the widespread use of remuneration structures with a significant variable component. In the immediate aftermath of the crisis, such compensation practices were identified as a contributing factor that caused staff to pay inadequate attention to longer-term risks (Financial Stability Board, 2009). But despite reforms and new regulations in this area (Financial Stability Board, 2017; European Banking Authority, 2015), such remuneration systems are still contributing to scandals. In the Wells Fargo case that became public in 2016, financial incentives were identified as a causal factor encouraging cross-selling (Tayan, 2016). While "high-powered" performance-contingent monetary incentives (i.e., variable payments) are designed to motivate effort (Lazear, 2000), they have often been seen as a source of various types of institutional misconduct. In the literature, Johnson et al. (2009) find that the shape and vesting status of incentive payoffs help to explain corporate fraud. Bannier et al. (2012) argue that bonus systems in the banking industry which contribute to excessive risk-taking can be explained by competition for talent. Recently Boyallian and Ruiz-Verdu (2017) link CEO risk-taking incentives to bank failure during the 2007–10 financial crisis. As shown during the crisis (Senior Supervisors' Group, 2009) excessive focus on short-term profits had disastrous risk management consequences.

In the typical multi-task framework, incentives given for one task affects the agent's engagement in other tasks (Holmstrom and Milgrom, 1991). Problems are likely to arise when multiple dimensions of performance exist and if one or more crucial aspects of staff behaviour are difficult to measure. In such cases staff tend to be unduly focused on the dimensions of performance that are most easily and objectively managed. For example, agents with a piece-rate contract focus on quantity and disregard quality (Fehr and Schmidt, 2004). This issue is likely to be relevant to the finance industry where the profit measures are relatively unambiguous but risk management behaviour is subjectively assessed and non-compliance with policy is difficult to perfectly monitor and discover. A recent study based on interviews with CEOs and CFOs (Graham et al., 2017) has highlighted similar concerns about financial incentives. Participants (representing a variety of industries) were asked about the potential for financial incentives to undermine the corporate culture. A significant number agreed that incentives work against the culture because of their focus on short-term goals and imperfect metrics.

Another notable feature of the post-crisis industry environment is the emphasis placed on risk culture, that is, the behavioural norms relating to risk management in financial institutions. This is consistent with the previously mentioned need for greater staff compliance with risk policy and an acknowledgement that controls are inevitably imperfect. The Financial Stability Board (2014), for example, emphasizes the importance of risk culture for influencing the behaviour of staff and ensuring that business activities are within risk appetite/policy. While regulatory attention is now firmly focused on the topic of risk culture (e.g., BCBS, 2015; APRA, 2018), little evidence has been provided to support this, nor to guide leaders wishing to embed a risk culture. A variety of prescriptions exist to enhance organisational culture in financial services (Financial Conduct Authority, 2018), but with a dearth of supporting evidence.

In the finance literature, human behaviour is found to be affected by professional norms (e.g., Cohn et al., 2017), national culture (e.g., Stulz and Williamson, 2003) and corporate culture (e.g., Guiso et al., 2015). For the purposes of this study, culture related to

¹ Post-crisis governance structures (e.g., as prescribed by the Basel Committee on Banking Supervision in BCBS, 2015) have emphasised that strategic decisions regarding risk appetite are the responsibility of the board. The role of senior management is to ensure that the firm's activities are consistent with the strategy, risk appetite and policies approved by the board. This is achieved with the assistance of the risk appetite framework defined as 'the overall approach including policies, processes, controls and systems, through which risk appetite is established, communicated and monitored. It includes a risk appetite statement, risk limits and an outline of the roles and responsibilities of those overseeing the implementation and monitoring of the risk appetite framework' (BCBS, 2015, p. 1–2).

risk management practices in organisations is arguably most relevant, i.e., risk culture. The term 'risk culture' is sometimes used to mean 'risk appetite' i.e., the amount of risk an organisation is willing to accept in order to achieve its strategic objectives (e.g., Ellul and Yerramilli, 2013; Fahlenbrach et al., 2012). Elsewhere scholars distinguish between risk appetite and risk culture, noting that regardless of the chosen risk appetite, the organisational culture may or may not encourage staff to respect that boundary (e.g., Fraser and Simkins, 2007; Sheedy and Griffin, 2018). This is a crucial distinction in the present study where we are concerned with the extent to which staff comply with risk policy.

Our understanding of risk culture is drawn from the literature on focused organisational culture² (Schneider et al., 2013) of which risk culture is an example. According to Schneider et al. (2013), staff discern the true priority of the business through their workplace experiences. While most financial institutions these days espouse a commitment to risk management in formal communications such as annual reports, staff will look beyond policies and statements made for the benefit of external stakeholders. Rather they look to what is enacted on a day-to-day level; they distinguish between what 'is' (descriptive norms) and what 'ought to be' (injunctive norms). If they discern that those who break the risk rules are typically excused if they are big profit-generators, they will conclude that risk management is not the true priority. The importance of rewards as an indicator of the true priority of an organisation has also been highlighted in the industry literature (Financial Stability Board, 2014).

We employ the definition of risk culture by Sheedy et al. (2017), that is, risk culture is 'the shared perceptions among employees of the relative priority given to risk management, including perceptions of the risk-related practices and behaviours that are expected, valued, and supported'. This definition of risk culture highlights the issue of 'relative priority'. It is crucial to note that there are other competing priorities in financial institutions such as the need for short-term profits, a priority that may not be consistent with effective risk management. As has been shown in many risk management disasters, it is often possible to earn high short-term profits by taking risks that will only become apparent over time (as shown in cases such as LTCM, Lehman Brothers, AIG, HBOS). Staff may find it easy to comply with risk management policies in normal circumstances, but when a business is struggling to meet short-term profit targets, staff may be tempted to let risk management policies slide. It is exactly at these pressure points that staff seek clarification regarding the true priority of the organisation; a favourable risk culture may ensure that staff comply with risk policy despite the competing requirement to produce profits.

Specifically, the behaviour of leaders or respected co-workers are important contributing factors in organisational culture in the workplace. For example, the words and actions of leaders are crucial (Dragoni, 2005) as group members look to supervisors for information about relative priorities and the behaviour that is expected and rewarded. Informal communication is often seen as a better indicator of true priorities rather than formal communication with its emphasis on espoused policy. As well as leaders, Fugas et al. (2011) note the importance of co-worker behaviour in determining workplace culture. Social learning theory (Bandura, 1986) suggests that most people learn how to behave at work by observing the actions of others (especially respected others) rather

than by reading manuals. When respected co-workers consistently comply with risk policy, risk compliance becomes the standard way of behaving or the norm that influences the behaviour of new workers who join the group.

The literature linking culture to workplace compliance is only recently emerging. Graham et al. (2017) link culture to compliance and short-termism. The association between risk culture and risk compliance has been demonstrated in Sheedy and Griffin (2018). Unfortunately, both these studies, relying on survey methods, can be criticized for common methods variance and reporting bias. Relevant but indirect evidence can be drawn from the safety literature: in meta-analysis favourable safety culture has been shown to predict greater compliance with safety policies (Clarke, 2006).

To better understand risk compliance and risk culture, we conducted an experiment with 269 financial services executives designed to mimic aspects of the post-crisis financial services workplace. That is, staff are expected to take risks on behalf of the employer to generate profits, while complying with risk policy. Participants were randomly and exogenously assigned to one of five treatments differing in two dimensions: financial incentives (fixed vs. variable pay-for-performance remuneration schemes) and the description of organisational culture related to risk management (profit-focused or risk-focused). Our culture constructs, grounded in social learning theory, focus on descriptive rather than injunctive norms: the words and actions of peers and managers in the local work environment rather than the aspirational statements of senior leaders and the glossy representations of annual reports and websites.

The use of experimental methods is a crucial aspect of the research design due to both the difficulty of collecting compliance data in the field and the endogeneity concerns that plague research using happenstance data. Risk compliance data is difficult to measure, primarily because individuals often undertake substantial efforts to conceal their non-compliance. A further disadvantage of investigating this topic in the field is the need to observe compliance in heterogeneous culture/remuneration contexts. Changing remuneration and business culture in the field is both costly and disruptive, and such costs are difficult to justify in the absence of scientific evidence. Survey measures of compliance behaviour are another research alternative but may be affected by reporting biases (e.g., Hertwig and Ortmann, 2001), including social desirability. Experimental methods avoid these biases and address the endogeneity issue through random assignment to treatments. In daily life, finance professionals self-select in to different institutions with different financial incentives and organisational norms, making the estimation of treatment effects difficult or biased. Using experiments, our study allows causal inferences to be made for the first time regarding the impact of incentives and organisational norms. The caveat of non-field experiments may be their external validity. However, if we are careful in designing the experiment and generalizing results, our experiment provides important insights on how finance professionals' compliance behaviour responds to remuneration incentives and risk culture.

The remainder of the paper proceeds as follows. We demonstrate our experimental design in Section 1 and provide detailed information of subject and the recruitment in Section 2. In Section 3 we present our data and outline the main results. We conclude in Section 4, also providing discussion of industry implications and study limitations. Participant instructions are provided in the appendix.

2. Experimental design

We conducted an experiment with between-subjects design; participants participated in one and only one of the five treatments. The treatments varied in two dimensions: financial incen-

² Our definition of risk culture is in the tradition of organisational climate (developed by psychologists and related to workplace practices and experiences) rather than organisational culture (developed by sociologists and related to values, beliefs and assumptions). Consistent with industry practice we have adopted the term 'risk culture' rather than the more accurate 'risk climate'. For more information about the distinction between organisational climate and culture, see Schneider et al., 2013.

Table 1
Treatments.

	Nil framing	Profit-focused	Risk-focused
Fixed payment	FN.	FP	
Variable payment (pay-for-performance)	VN	VP	VR

tives (fixed vs. variable remuneration) and framing of the workplace environment (risk- vs. profit-focused), as shown in Table 1. In all we tested five treatments being: VN (variable and nil framing); VR (variable and risk-focused); VP (variable and profit-focused); FP (fixed and profit-focused); and FN (fixed and nil focus).³ The experiment was approved by the Macquarie University Ethics Committee.

The location of the experiment was intentionally chosen to create professional priming. The experiments were conducted in the university's city campus which is housed on level 24 of an A-grade office tower, with harbour views, in the central business district of Sydney. The office fit-out is recent, and to a high standard, very similar to nearby financial institutions. Contemporary art-works from the university's collection are plentiful. Branding and signage relates to the university but in all other respects the environment is very similar to that of a financial institution. On arrival, for example, participants were greeted as professionals by the receptionist, and they waited in an area with business newspapers, before being ushered through to the laboratory.

The experiment was designed to mimic investment decisions taken by financial services executives (e.g., buying securities, granting loans, and underwriting insurance) where the risk is borne by the employer. Participants were expected to make as many investment decisions as possible on behalf of their employer, provided the investments complied with the employer's risk policy/limits. During a 20-min trading session, they could invest in up to 60 transactions, depending on their productivity. We intentionally designed the experiment so that participants would be working under time pressure, consistent with the industry environment.

In each transaction, the participants were first asked to calculate the expected value of the investment across two possible outcomes (with a calculator) before deciding whether to invest. An example transaction is shown here:

The screenshot shows a window titled 'Deal: 1 out of 60'. It contains the following information:

- Time remaining in seconds: 190
- Time remaining in minutes: 19
- Deal 1: Analysis
- Chance of Profit = 80 %
- Profit Amount = \$ 200,000
- Chance of Loss = 40 %
- Loss Amount = \$ 250,000
- Expected Profit is:
- An 'OK' button is located at the bottom right.

In this example the expected profit is $(0.6 \times \$200,000) + (0.4 \times -\$250,000) = \$20,000$. The requirement to calculate expected value serves three purposes. First, it mimics

³ We did not include the treatment of FR (Fixed and Risk Focus) ex ante, because we thought it was trivial. As participants do not have incentives to violate risk policy under fixed incentives, providing a risk focused environment/culture seemed unnecessary. Given our finance budget and statistical power considerations, we decided to focus on just five treatments.

the work and cost involved in real-world investment decisions. The decision scenario becomes more vivid/realistic to finance professionals and the professional context is made more salient. Second, participants' effort in calculating the expected value and their investment in compliant transactions is a measure of their profit generating effort (as opposed to possible shirking behaviour) which is a key variable of interest in this study. Third, the requirement to calculate expected value is likely to engage participants in a more deliberative, careful and analytical mindset as opposed to an automatic/intuitive mindset. Kahneman (2011) refers to these two mindsets as System 2 and System 1 respectively, highlighting the fact that the automatic System 1, while more efficient, is more error prone.

To reflect the industry context, the participants were given risk limits to prevent investments considered too risky (defined in terms of maximum possible loss), even if highly profitable. In other words, any investment in transactions with possible loss exceeding the risk limit of \$200,000 is not compliant with risk policy, and any investment in transactions with possible loss no larger than the risk limit of \$200,000 is compliant with risk policy. The figure of \$200,000 was chosen arbitrarily, just as risk limits in the workplace would often seem arbitrary to employees, who are usually not involved in risk appetite decisions. We selected a round figure and maintained a consistent risk limit throughout, in order to minimize cognitive load. Of the 60, 20 transactions exceeded the risk limit, thus providing plenty of opportunities for violations of policy. Participants were told that 20% of transactions would be checked for compliance with policy and their payments would be penalized if non-compliance was discovered. This reflects the likelihood that in industry settings compliance cannot be enforced comprehensively. The penalty for non-compliance was set at three times the expected value of the non-compliant investment.

In the variable payment treatments participants were told that they would receive a cash payment of 0.023%⁴ of the total expected value of investments during the session, less compliance penalties (if any). For this level of penalties the payment-maximizing strategy in the variable payment treatments is zero compliance, that is, to invest in every deal even if it violates policy. In other words we designed the experiment such that the temptation to violate policy is meaningful.

In the fixed payment treatments participants were given a payment of A\$120⁵ less compliance penalties (if any). In these treatments the profit-maximizing strategy is 100% compliance since there is no financial benefit for non-compliance and the possibility of a penalty.

In all treatments we guaranteed a minimum payment of A\$50, regardless of performance and compliance penalties.

In order to address the organisational environment, participants in some treatments were given a paragraph of text and a picture describing the workplace environment. As noted in the literature section, implementation of a risk-focused culture has been proposed as way of increasing compliance with risk policy. Importantly, risk culture is defined as a *relative* priority, where the

⁴ The figure of 0.023% reflected budget constraints, the need to provide payments that reflected the opportunity cost of their time and a desire to ensure that the average payment across all treatments was consistent.

⁵ At the time of the experiment one Australian dollar was equivalent USD 0.80, so A\$120 is equivalent to US\$ 96.

competing priority in most financial institutions is short-term profits. Therefore, we provided either profit-focused or risk-focused framing information (see Appendix A). The framing information was designed to capture elements of co-worker and manager behaviour which are considered important in the aforementioned literature on workplace culture. In relation to managers we included informal statements (especially at times of performance pressure), modelling of risk management behaviour and response to breaches; in relation to co-workers we included informal statements, relative status of various roles and modelling of compliance behaviour. The framing information was repeated after period 15, 30 and 45 to increase salience. In other experimental studies, similar framing statements have been found to influence ethical behaviour which is likely to be related to compliance behaviour (Jones and Kavanagh, 1996; Gino and Margolis 2011).

At the beginning of each session, participants read and signed their consent forms. They then received the experimental instructions and could ask questions. The experiment started once all participants in the same session correctly answered a set of comprehension questions. The experiment was implemented in z-Tree (Fischbacher, 2007). At the end of the experiment, participants filled in a short non-incentivized online-survey before they were paid out in cash. Sessions lasted 50 min on average, and the average earnings were about \$115 per person (with a minimum of \$50 guaranteed).

In order to control for participants' risk preferences, personality, Employer Risk Culture and personal attitudes toward risk compliance, we asked them to answer further questions as explained below:

Individual Risk Tolerance: 5 items from the financial domain in Domain-Specific Risk-Taking (DOSPRT) scale (Blais and Weber 2006). Its Cronbach's alpha is 0.71. We did not employ incentivized methods for eliciting risk attitudes (e.g., Holt and Laury 2002). First, they would require us to scale up the payments to incentivize finance professionals. And if we pay them both for their decisions in the main experiment and in the risk attitudes elicitation task, we need to randomly pick one for final payment to rule out the possibility of hedging. Second, the experiment will be much longer if we implement Holt and Laury (2002) tasks. Given our primary focus on risk compliance behaviour, we chose DOSPRT to elicit participants' risk tolerance.

Conscientiousness⁶: This personality variable (one of the Big Five personality traits) is assessed using 4 items from Mini International Personality Item Pool (Donnellan et al., 2006). Its Cronbach's alpha is 0.66. We selected conscientiousness on the grounds that it refers to socially prescribed impulse control that facilitates rule-following behaviour (John et al., 2008). In the field of safety, meta-analyses (Christian et al., 2009; Clarke, 2006) and primary studies (e.g., Wallace and Vodanovich, 2003) suggest that of the five major personality traits, conscientiousness is the best predictor of compliance with safety procedures.

Employer Risk Culture (Avoidance): 6 items were used from the avoidance factor of risk culture in a scale due to Sheedy et al. (2017). Items refer to the participant's own workplace in case this may influence behaviour in the laboratory. We selected the Avoidance factor as this has been found to be associated with non-compliance in a previous survey study (Sheedy and Griffin, 2018). Note that high scores for this measure are considered undesirable or indicative of an unfavourable risk culture.⁷ Cronbach's alpha is 0.86. Sample item: The behaviour of

those who breach risk policy is typically excused if they are a top performer

Individual Attitudes to Risk Management/Compliance: In the safety literature personal attitudes or motivation regarding safety have been found to be a significant determinant of compliance with safety policies (Neal and Griffin 2006; Neal et al., 2000). We adapted sample items from Neal et al. (2000) and created a set of 3 new slider items designed to capture individual attitudes to risk management and compliance in the workplace (Cronbach's alpha = 0.70).

Risk management is:		
An unnecessary impediment to doing business	vs.	An enabler for doing business
The focus on risk management and compliance these days is:		
Excessive	vs.	Should increase
Compliance is:		
An excessive drag on business	vs.	Crucial for firm reputation and resilience

3. Participant recruitment and sample information

We recruited finance professionals with the assistance of a professional membership body that offers professional development and networking opportunities to the financial services industry. This body contacted its mailing list (consisting of several thousand individual members), inviting members to make contact with the researchers in order to participate in the study. In total, 269 financial services professionals currently working in Sydney (Australia) participated in our experiment. Sydney is currently ranked as the eighth most important global financial centre (Z/Yen, 2017). We required a minimum of six months' industry experience.

Table 2 presents the breakdown of our sample according to various demographic factors. In terms of industry segment, 45% of our sample work in banking and finance, 14% in financial planning and wealth management, 10% in superannuation, 8% in funds management, and 5% each in broking, consulting and professional services. 71% of the participants are male and the median age range is 25–34 years. The median industry tenure is 10–15 years. According to the 'three lines of Defense' model,⁸ 75% of the sample identify as line 1 (business), 18% as line 2 (independent risk/compliance) and 3% as line 3 (assurance). One notable aspect of our sample is the fact that we have a significant number of participants with long industry tenure; 26% have worked in the industry for twenty years or more. This may be related to the fact that participants were recruited through a professional membership association which is likely to attract those with long-term involvement in the industry.

In our sample both the median and modal category for annual gross income is A\$80,000–A\$100,000. A small number of participants earns much more; 6.3% of our sample earns more than A\$300,000 p.a. For the later regressions we combine some income categories to ensure that each category has at least forty observations. The combined category with gross income <\$80,000 is used as the reference group.

A majority of participants (53.5%) have received incentive payments in the past year, either in the form of cash, shares or options. Excluding those who decline to disclose remuneration details, the proportion rises to 58.8%, highlighting that variable remuneration remains a feature of the industry despite post-crisis reforms. While 24.5% of our sample declined to disclose the value

⁶ The main reason for excluding the other four personality types (extraversion, neuroticism, openness and agreeableness) was concern about the survey length. To measure each one with any reliability takes at least four survey items.

⁷ Sample item: "staff perceive that risk issues and policy breaches are ignored, downplayed, or excused."

⁸ In the three lines of Defense model of risk management, first and primary responsibility lies with the business itself. The second line of Defense consists of specialist risk managers and compliance officers. The third line of Defense is internal audit or assurance. The model is considered international best practice (Institute of Internal Auditors 2013) and has been adopted by Australian financial institutions with support from the local prudential regulator (APRA, 2018).

Table 2
Sample demographics.

	Percentage of responses (Number of valid answers)
Gender	(269)
– Male	70.4%
– Female	29.7%
Age	(269)
– Less than 25 years	6.3%
– 25–34 years	43.9%
– 35–44 years	19.3%
– 45–54 years	19.3%
– 55 years and above	11.2%
Industry tenure	(269)
– 6 months to less than 1 year	1.9%
– 1 year to less than 3 years	11.5%
– 3 years to less than 5 years	13.4%
– 5 years to less than 10 years	20.8%
– 10 years to less than 15 years	13.0%
– 15 years to less than 20 years	11.9%
– 20 years to less than 25 years	7.8%
– More than 25 years	19.7%
Finance industry segment	(269)
– Banking and finance	45.7%
– Superannuation (Pension funds)	9.7%
– Broking	5.2%
– Financial planning/Wealth management	14.1%
– Funds management	7.4%
– Consulting	4.8%
– Professional services	5.2%
– Other	7.8%
Seniority	(269)
– Team member / front-line employee	12.6%
– Professional employee (but not a manager)	41.3%
– Team leader	8.9%
– Middle management	11.9%
– Report to senior management	11.9%
– Senior management	13.4%
What best describes your role (also known as the three line of Defense model)?	(269)
– Line 1 (Business)	75.5%
– Line 2 (Independent/Specialist risk manager, including Compliance)	18.6%
– Line 3 (Internal audit/Assurance)	3.4%
– Don't know	2.6%
Estimated Gross Income from all sources this year (AS)	(269)
– <\$40,000	0.7%
– \$40,000–\$80,000	11.5%
– \$80,000–\$120,000	28.6%
– \$120,000–\$160,000	19.7%
– \$160,000–\$200,000	8.2%
– \$200,000–300,000	12.6%
– \$300,000–\$400,000	4.8%
– >\$400,000	1.5%
– Decline to disclose	12.3%
Have you received any incentive payments relating to your work in the financial services industry in the past year?	(269)
– Yes, in the form of cash	33.1%
– Yes, in the form of shares or options	3.0%
– Yes, in the form of both cash and shares or options	17.5%
– No	37.6%
– Decline to disclose	8.9%
What was the total value of these incentive payments (AS)	(269)
– <\$10,000	46.8%
– \$10,000–\$20,000	11.5%
– \$20,000–\$30,000	5.2%
– \$30,000–\$50,000	4.5%
– \$50,000–\$75,000	1.9%
– \$75,000–\$100,000	1.9%
– >\$100,000	3.7%
– Decline to disclose	24.5%
What ethnic background to you most associate with?	(269)
– Aboriginal/Torres Strait Islander	0.0%
– Anglo/European	47.6%
– Chinese and North Asian	18.6%
– South-East Asian	14.5%
– South Asian	6.0%
– Polynesian/Islander	0.0%
– South American	0.4%

(continued on next page)

Table 2 (continued)

	Percentage of responses (Number of valid answers)
- African	1.1%
- Middle Eastern	4.1%
- Other	3.7%
- Decline to disclose	4.1%
How long have you lived in Australia?	(269)
- Less than 5 years	10.4%
- 5–9 years	5.2%
- 10–14 years	5.2%
- 15–19 years	7.8%
- 20 years or more	17.1%
- All my life	53.2%
- Decline to disclose	1.1%

Note: Numbers in brackets indicate the sum of all valid answers for the relevant attribute. Percentages give the share of responses in each category (will not always add up to 100% due to rounding error).

of these incentives, it appears that in many cases the value is relatively modest (less than A\$10,000 for 46.8% of participants).

Table 2 also presents details of ethnic background and length of time spent in Australia. We elected to include these measures of ethnicity given the large migrant population residing in Sydney which may have implications for workplace culture and compliance behaviour. According to the 2016 Australian census (Australian Bureau of Statistics, 2017), nearly half of all Australians are either born overseas or have an overseas-born parent. Of the overseas-born population in 2016, 40% are born in Asia while Sydney has the largest migrant population of any Australian city.

In our sample, 53.2% of subjects have lived all their lives in Australia; 10.4% have lived in Australia for less than five years. We asked participants which ethnic group they most identified with, following the recommended approach of the Australian Bureau of Statistics.⁹ The largest group (Anglo/European) comprises 47.6% of our sample. The next largest group is Chinese and North Asian with 18.6% of the sample, followed by South-East Asian being 14.5% of the sample. As no other ethnic grouping has more than 20 subjects, for the later regression analysis we combine all other ethnicities (including 'Decline to Disclose') into one category, namely: 'Other'.

4. Results and discussion

In this section we analyse the results and discuss our findings on risk compliance and productivity.

4.1. Risk compliance

Hypothesis 1. risk compliance:

- Increases under *Fixed Payment* (VP vs. FP, VN vs. VP)
- Increases in the absence of the *profit-focused culture* (VP vs. VN, FP vs. FN)
- Increases under *risk-focused culture* (VP vs. VR)

Table 3 presents summary statistics for risk compliance (both by subject and by deals).¹⁰ In the compliance analysis we examine only those transactions that contravened policy. While participants could maximize their payoffs in the variable payment treatments

with zero compliance rates, we observed much higher compliance rates, consistent with the professional norms of the industry.

We expected that compliance rates would be higher under fixed remuneration treatments; and they should approach 100% for participants to maximize their payments. In this treatment violations of policy have no upside yet there is potential for penalties to be imposed if a breach is discovered. As shown in Table 3, the compliance rates in the fixed payment treatments are noticeably lower than 100%. This outcome is consistent with participant errors and also the possibility that participants are habituated to a degree of non-compliance in their professional lives. The finding that professional framing invokes non-compliance is consistent with the finding from Cohn et al. (2014) that professional framing invokes dishonesty.

In the presence of profit-focused culture, the fixed payment remuneration significantly increases the compliance rate by subject from 38% to 60.8% (two-sided Fisher's exact test, $p=0.018$), and also increases the compliance rate by deal from 63.7% to 85.3% (two-sided Wilcoxon rank-sum test, $p=0.091$). Similarly in the absence of profit-focused culture (i.e., no culture), the fixed payment remuneration significantly increases the compliance rate by subject from 42.3% to 68.6% (two-sided Fisher's exact test, $p=0.010$), and also increases the compliance rate by deal from 78.4% to 85.9% (two-sided Wilcoxon rank-sum test, $p=0.027$).

Turning to culture, we expected that the absence of profit-focused culture (VN and FN) would produce higher compliance rates than treatments with profit-focused culture (VP and FP). When variable payment is provided, we find the compliance rate by deal drops from 78.4% in VN to 63.7% in VP, although the difference is statistically insignificant (two-sided Wilcoxon rank-sum test, $p=0.161$). The difference in the compliance rate by subject is also statistically insignificant (38.0% in VP vs. 42.3% in VN, two-sided Fisher's exact test, $p=0.690$). Under the fixed payment, we do not find any significant difference between FP and FN in compliance rate by subject (Fisher's exact test, $p=0.535$), compliance rate by deal (two-sided Wilcoxon rank-sum test, $p=0.573$) or the number of compliant investments (two-sided Wilcoxon rank-sum test, $p=0.118$).

We expected risk-focused culture to increase compliance rates relative to profit-focused culture and the absence of risk-focused culture. Compared to profit-focused culture, risk-focused culture significantly increases the compliance rate (by deals) from 63.7% in VP to 82.9% in VR (two-sided Wilcoxon rank-sum test, $p=0.011$) but the increase in compliance rate by subject of 17.4% is not statistically significant (two-sided Fisher's exact test, $p=0.690$). Compared to the treatment with no culture information, risk-focused culture increases the compliance rate (by deals) from 78.4% (VN) to

⁹ The Bureau has adopted the 'self-perceived group identification approach' as explained in Australian Standard Classification of Cultural and Ethnic Groups (ASCEG), 2016, at <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1249.0Main+Features12016?OpenDocument>.

¹⁰ All tests are two-sided tests.

Table 3
Summary statistics.

Payment Culture	Fixed payment		Variable payment (linked to expected profits)		
	Nil (FN)	Profit-focused (FP)	Nil (VN)	Profit-focused (VP)	Risk-focused (VR)
(a) Number of participants	51	51	52	50	65
(b) Compliance rate by subject	68.6% (46.9%)	60.8% (49.3%)	42.3% (49.9%)	38.0% (49.0)	55.4% (50.1%)
(c) Compliance rate by deal	85.9% (27.0%)	85.3% (26.0%)	78.4% (31.1%)	63.7% (42.0%)	82.9% (30.2%)
(d) Average number of investments in compliant deals (per participant)	26.5 (8.82)	28.65 (9.82)	26.73 (8.30)	26.32 (10.81)	27.70 (8.30)

Note: standard deviations are provided in brackets. Compliance rate by subject: the proportion of participants in the treatment group that were fully compliant with risk policy across all investments. Compliance rate by deal: the proportion of non-compliant investments rejected relative to the number of non-compliant investments analysed.

Table 4
Regression results.

Model Dependent variable	Logit (1) Full compliance	GLM (2) Compliance rate	OLS (3) Investment in compliant deals
Fixed payment	0.251*** (0.093)	0.131 (0.087)	2.224 (2.152)
Risk culture	0.163* (0.088)	0.193** (0.092)	2.758 (2.031)
No culture	0.102 (0.093)	0.231*** (0.084)	0.521 (2.094)
Fixed payment * No culture	-0.023 (0.134)	-0.258** (0.117)	-2.314 (2.830)
Age	-0.001 (0.048)	0.046 (0.053)	-2.061** (0.974)
Gender (Female)	0.030 (0.077)	0.054 (0.084)	0.079 (1.493)
Industry tenure	0.069*** (0.026)	0.009 (0.029)	-0.682 (0.550)
Seniority	0.008 (0.022)	0.007 (0.023)	0.022 (0.463)
Gross Income _decline to answer	-0.106 (0.131)	0.196 (0.143)	5.655** (2.742)
Gross income \$80,000-\$120,000	-0.082 (0.100)	0.015 (0.108)	2.335 (2.161)
Gross income \$120,000-\$160,000	-0.240** (0.115)	-0.057 (0.118)	2.515 (2.570)
Gross Income > \$160,000	-0.179 (0.119)	-0.016 (0.120)	6.144** (2.618)
Time in Australia	-0.017 (0.018)	-0.019 (0.020)	0.472 (0.388)
Ethnicity: Chinese and North Asian	-0.057 (0.091)	-0.038 (0.105)	2.164 (2.061)
Ethnicity: South-East Asian	-0.117 (0.086)	-0.026 (0.103)	1.594 (1.610)
Ethnicity: others	0.026 (0.086)	0.097 (0.089)	-3.040* (1.817)
Attitude to risk Mgt/Compliance management/Compliance	0.039** (0.017)	0.052*** (0.019)	0.240 (0.381)
Individual Risk Tolerance	-0.017 (0.023)	-0.011 (0.026)	0.256 (0.524)
Conscientiousness	0.007 (0.041)	0.010 (0.046)	-0.298 (0.874)
Industry segment: banking	-0.087 (0.113)	0.310** (0.147)	0.333 (2.524)
Industry segment: superannuation	-0.349** (0.136)	0.235 (0.165)	-2.212 (2.943)
Industry segment: broking	-0.042 (0.187)	0.449** (0.192)	-2.257 (3.262)
Industry segment: Fin'l planning	-0.062 (0.127)	0.438*** (0.167)	-0.442 (2.892)
Industry segment: funds Mgt	-0.226 (0.148)	0.197 (0.162)	-1.638 (3.453)
Industry segment: consulting	-0.075 (0.164)	0.114 (0.264)	4.246 (3.299)
Industry segment: Prof. services	-0.147 (0.165)	0.196 (0.226)	-1.927 (3.577)
Lines of defense (Line 1)	-0.068 (0.075)	0.164 (0.101)	-0.620 (1.444)
Employer Risk Culture: Avoidance	-0.020 (0.027)	-0.002 (0.028)	0.080 (0.576)
Daily incentives	0.052 (0.094)	0.114 (0.088)	-3.107 (2.313)
Constant			29.462*** (8.159)
N	267	126	269
(Pseudo) R-squared	0.162		0.175

Note: Marginal effects are reported for Logit and GLM models. We use the robust standard errors which are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1%-level, respectively.

Treatment variables: variable payment and profit-focused culture (VP) is the reference group. *No Culture* refers to the treatments where no culture framing is used in the simulated workplace environment.

Gender is a dummy variable with female taking the value one. *Age*, *Industry Tenure*, *Time in Australia*, *Seniority* are categorical variables. *Gross Income* uses 'less than \$80,000' as the reference group. *Ethnicity* is a categorical variable with the reference being Anglo/European. *Industry Segment* is a categorical variable with the reference group being Other. *Lines of Defense* is a dummy variable taking the value one for staff in the first line of Defense for risk management (business roles). *Daily Incentives* is a dummy variable taking the value one if participants receive incentive payments in their regular workplace. *Individual Risk Tolerance*, *Attitudes to Risk Management/Compliance*, *Conscientiousness*, *Employer Risk Culture (Avoidance)* are all calculated from multi-item survey measures.

82.9% (VR) with the difference being statistically insignificant (two-sided Wilcoxon rank-sum test, $p=0.205$). The compliance rate by subject increased from 42.3% (VN) to 55.4% (VR) but the difference is statistically insignificant here also (Fisher's exact test, $p=0.194$).

Table 4 presents regression results for the effects of financial incentives and organisational culture and controlling for participants' demographics, personal attitudes and daily workplace environment. We use the combination of variable payment and profit-focused culture (VP) as the baseline because it best represents the traditional industry environment. *No Culture* refers to the treat-

ments where no culture framing is used in the simulated workplace environment; it measures how the absence of profit-focused culture affects compliance behaviour. *Risk Culture* refers to treatments where risk-focused framing information is provided. *Fixed payment* refers to treatments in which the fixed payment remuneration structure is implemented. We also include an interaction term to examine the case where fixed payments are implemented with no culture framing. *Age*, *Industry Tenure*, *Time in Australia*, *Seniority* are categorical variables. We use *Gross Income* of less than \$80,000 as the reference group for decline to answer, \$80,000-

\$120,000, \$120,000–\$160,000 and above \$160,000. *Ethnicity* is a categorical variable with the reference being Anglo/European. *Industry Segment* is a categorical variable with the reference group being Other. *Gender* is a dummy variable taking the value one for female gender. *Lines of Defense* is a dummy variable taking the value one for staff in the first line of Defense for risk management (business roles). *Individual Risk Tolerance* is measured by the score of 5 items from the DOSPERT scale (financial domain). *Individual Attitudes to Risk Management/Compliance* is measured by the score of survey items designed to capture personal attitudes to risk management and compliance in the industry. *Conscientiousness* is a personality variable, measured by the score of 4 items from Mini International Personality Item Pool. *Employer Risk Culture (Avoidance)* is measured by the score of 6 survey items from the avoidance factor of risk culture (referring to the participants' daily workplace). We also control for whether the participants receive pay-for-performance incentives in their workplace with the dummy variable *Daily Incentives*.

In Model 1, we investigate the decision of whether to always comply with risk policy using a Logit model (i.e., the dependent variable full compliance = 1 if a participant never invests in deals that violate risk policy throughout the experiment). Of the treatment variables, fixed remuneration has the largest impact, supporting our hypothesis that individuals will take compliance risks in the workplace for the chance of higher reward. *Fixed payment* increases full compliance by 25.1 percentage points, suggesting that the impact of eliminating variable remunerations systems is potentially very important for changing compliance behaviour. *Risk Culture* also significantly increases full compliance by 16.3 percentage points, relative to the case of profit-focused culture.¹¹ The absence of profit culture framing i.e., *No Culture* does not significantly change full compliance either on its own or in combination with fixed remuneration. Relative to the case of *No Culture*, *Risk Culture* adds $16.3 - 10.2 = 6.1$ percentage points to the full compliance rate, a difference that is not statistically significant (p -value = 0.476).

Turning to demographics, we note that longer tenure is associated with greater compliance. This could be explained by greater appreciation for the benefits of risk management due to experience of losses and scandals. It might also be explained by greater commitment to the industry and desire to protect against losses through effective risk management. The finding suggests that employers wishing to improve risk compliance could benefit by implementing policies aimed at increasing staff retention.

In a similar vein we observe that personal *Attitudes to Risk Management/Compliance* are a significant predictor of compliance.¹² Participants who score high on this scale are likely to see the benefits of risk management for ensuring that firms meet their long-term objectives. Not surprisingly, such people are more likely to act in compliance with risk policy. We do not find any significant association between this variable and age, gender or Individual Risk Tolerance. The finding has implications for recruitment and promotion decisions.

¹¹ Culture statements are repeated after deals 15, 30 and 45 but participants vary in the extent to which they complete transactions, and hence the number of times they see the culture reminder. The distribution of completed transactions is as follows: minimum=12, 25th percentile = 36, average=44, 75th percentile = 56 and maximum = 60. We checked whether the number of reminders seen influences compliance behaviour. We do not find any statistical significance. The number of times the participants see the culture reminder affects neither full-compliance behaviour or the compliance rate.

¹² Intrinsic preferences (i.e., attitudes to risk management) may potentially interact with treatment interventions on compliance behaviour. To check this we tested the interaction term "*Attitudes to Risk Management/Compliance*" with all treatment dummies, none of which showed statistical significance. We thank a referee for raising this point.

Participants with gross income between \$120,000 and \$160,000 p.a. are significantly less compliant than the reference group (having income less than \$80,000 p.a.). Interestingly the income effect drops out at higher levels. Those working in the superannuation (pension fund) industry are also less likely to fully comply with risk policy. Other demographic variables such as age, gender, time in Australia and ethnicity are not significant for explaining full compliance.

In Model 2, we examine the compliance rate i.e., the percentage of non-compliant deals rejected as per risk policy. As the dependent variable ranges from 0% to 100%, we employ the generalized linear model (GLM) with a logit transformation function of the dependent variable. We focus on participants who violate risk policy on at least one occasion, reducing the sample to 126.¹³ This model provides insights into the policies likely to be most effective for increasing the rate of compliance among those individuals who violate policy occasionally.

In this model, the distinction between fixed and variable remuneration is not significant for determining the compliance rate. Under variable payments, removing profit-focused culture and replacing it with risk-focused culture or with no cultural context at all increases the compliance rate by 19.3 and 23.1 percentage points respectively. And when fixed payment is implemented, the absence of profit-focused culture does not affect the compliance rate.¹⁴

Among people who sometimes violate risk policy, neither industry tenure nor gross income has a statistically significant effect. Finance professionals who work in banking, broking or wealth management (financial planning) have a higher compliance rate. Favourable attitudes to risk management and compliance are associated with significantly higher rates of compliance.

4.2. Productivity

Hypothesis 2. Productivity (number of compliant investments) will decrease under *Fixed payments* (FP vs. VP, FN vs. VN).

Table 3 also presents summary statistics for productivity measured using the number of investments in compliant deals. This is a crucial aspect of the experimental design as finance professionals are required to exert effort to produce profits as well as comply with risk policy. As mentioned in the experimental design section, we asked participants to calculate the expected value of each deal before making an investment decision. We use the number of compliant investments as a measure of effort directed at profit generation. We expected that productivity would decrease under fixed remuneration treatments. However, our data rejects **Hypothesis 2**, finding no diminution in productivity under fixed remuneration. As shown in Table 3, there is no difference in the number of investments in compliant deals (FP vs. VP, two-sided Wilcoxon rank-sum test, $p = 0.280$) in the presence of culture. The result is robust in the absence of culture. There is no difference in the number of investments in compliant deals between FN and VN (two-sided Wilcoxon rank-sum test, $p = 0.929$).

The result is also robust when we control for demographic factors in our regression. Model 3 investigates how incentives and organisational culture affect participants' productive effort. We find that none of the treatment variables has a significant effect on productive effort. While the fixed payment (with profit culture) increases effort by 2.224 deals, the effect is statistically insignificant. In the absence of profit culture, the effect of fixed payment is both economically and statistically insignificant (see the sum of coefficients of "fixed payment" and the interaction term "fixed payment

¹³ We also performed the analysis using the full sample but this yielded no new insights.

¹⁴ The difference is measured by No culture + Fixed payment * No culture.

* No culture"). It confirms that fixed payment remuneration does not lead to shirking and the risk-focused culture does not result in any diminution in production.

The failure of variable remuneration to significantly boost investment productivity is not entirely at odds with prior literature. The relationship between incentives and performance is a complex one depending on a number of variables related to the individual, the task and the environment (Bonner and Sprinkle, 2002). For example, where intrinsic motivation is high, the use of incentives (extrinsic motivation) may not be necessary and some have argued that incentive payments may even reduce intrinsic motivation. In a meta-analysis of the relationship between financial incentives and performance quantity, Jenkins et al. (1998) report that while positive on average, laboratory studies produce lower correlation than field experiments and experimental simulations. It is possible that our subjects found the task sufficiently interesting/motivating that financial incentives were not needed to induce effort over a short period. It's not clear whether such a result would generalize to the real world but we note a recent report (Mercer, 2017) which finds that recent reductions in financial incentives in the UK industry have had no significant adverse impact on business outcomes.

Several demographic variables are however associated with investment productivity. Not surprisingly, younger participants produce more investments and this can be explained by greater mental processing speed (Salthouse, 2000). We note that the experiment involved a large number of simple calculations causing us to predict that faster mental processing would be an advantage. Those with higher *Gross Income* also produce more investments, suggesting that *Gross Income* may be a proxy for underlying factors such as mental processing speed. Those who have lived longer in Australia produce more investments; finally, those in the *Other* ethnic group produce fewer compliant investments.

5. Conclusion, implications, limitations

In this study we investigate how finance professionals balance the competing priorities of short-term profit generation and compliance with risk policy, to ensure long-term firm resilience. The compliance issue is of special interest to the finance industry in the post-crisis environment due to frequent observed violations of policy and the high costs these violations impose for financial institutions and society as a whole. To our knowledge we are the first to investigate compliance with risk policy – a crucial workplace expectation these days in financial institutions.

We conducted a lab-in-the-field experiment using 269 finance professionals as participants. We analysed variation in risk compliance on two dimensions currently of interest to the industry: financial incentives and workplace culture. In recent years, variable remuneration schemes linked to profits/sales have come under considerable scrutiny and are now regulated in some jurisdictions. The behavioural norms regarding risk management are also of great interest to the industry and its regulators. While a consultant and regulatory literature exists promoting 'risk culture' and providing prescriptions for transforming culture, rigorous and peer-reviewed supporting evidence is scarce. The experimental design allows us to compare the traditional profit-focused culture with the risk-focused culture that has been promoted by regulators and others.

We provide evidence that fixed remuneration can improve risk compliance relative to variable remuneration linked to expected profits. In our experiment it increases the proportion of people who consistently comply with policy by 25.1 percentage points, even after a wide range of controls. While the benefits are substantial there is no observed loss in terms of productivity (measured by the number of compliant investments generated). In our

experiment, finance professionals who were provided with fixed payment exerted the same level of effort and made the same number of compliant investments as those who were incentivized by variable remuneration payments. This suggests that industry concerns about the negative impacts of fixed remuneration on motivation may be over-stated. At the very least, further investigation of fixed remuneration schemes is warranted.

In order to examine whether workplace culture affects risk compliance behaviour, we provided finance professionals with exogenous descriptions of the workplace environment. The framing information was designed to capture descriptive norms relating to co-worker and manager behaviour (e.g., informal statements and observed behaviour reflecting the relative priority of risk management relative to short-term profit generation). Replacing the traditional profit-focused culture with a risk-focused culture increases the proportion of people who consistently comply with policy by 16.3 percentage points. For those who sometimes violate risk policy, the distinction between fixed and variable remuneration is not significant for determining the compliance rate. The introduction of a risk culture, however, increases compliance rates at the transaction level by 19.3 percentage points. Similarly, removing all information about the cultural context also increases compliance rates at the transaction level by 23.1 percentage points in the presence of variable remuneration.

For the industry and regulators, the study confirms that the reform agenda regarding both remuneration and workplace culture is likely to be effective and should be pursued. These reforms are likely to boost risk compliance, potentially improving the long-term resilience of financial institutions and improving societal outcomes. Adverse consequences in terms of productivity loss appear to be negligible.

The study also provides some much-needed evidence regarding the characteristics of desirable workplace culture which might serve as a guide to practitioners. In such a culture there is frequent communication about the benefits/importance of risk management and compliance with risk policy; non-compliance is not socially acceptable (even by top performers); risk managers enjoy high status and are seen as adding value to the organisation; managers and top performers are good role models of risk management behaviour, even or especially when profits are suffering. The study highlights the importance of the local work environment for influencing behaviour; what is enacted rather than what is espoused in formal statements to the public. Risk culture is seen as a *relative* priority; relative to the competing objective of short-term profits.

We also find that personal attitudes to risk management/compliance matter in risk compliance behavior. Finance professionals with favourable attitudes are more compliant, a factor that could be considered in recruitment/promotion decisions.

The main limitations of this study (like all experimental research) relate to external validity. The use of finance professionals as participants helps mitigate this concern but it is possible that the size of treatment effects may differ in the real-world. This may occur if our sample is not representative of finance professionals generally. In addition, our culture treatments using framing text and pictures may not be as salient as culture in the field. In that regard the study is likely to provide the lower bound for the impact of heterogeneous workplace environments.

Second, we only investigate two types of finance incentives, either fixed or variable remuneration which is based on expected profits generated. Nowadays staff often face performance assessments based on a balanced scorecard of measures where both profit/sales outcomes and risk management behaviour are considered (Mercer, 2017). The effectiveness of such combined remuneration needs further investigation.

Disclosure statement

The cost of participant payments for this research was met from the consulting income of the lead author. FINSIA (a professional membership body for people working in the Australian financial services industry) provided in-kind support by recruiting participants. No organisation had any right of review in relation to the research. There are no non-disclosure obligations. The experiment was approved by the Macquarie University Ethics Committee.

Elizabeth Sheedy is a member of the Professional Risk Managers' International Association (PRMIA) and the Risk Managers' Association of Australia. In the past three years she has received funding support from Deloitte Australia, Insurance Council of Australia, Dell-EMC².

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Kenny Chi Ho Tam has nothing to disclose. His affiliation with the university was as a graduate student but his studies are now completed.

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Appendix A. Participant instructions

Experiment instruction:

(VP: variable payment, profit-focused culture
VN: variable payment, no culture framing
VR: variable payment, risk-focused culture
FP: fixed payment, profit-focused culture
FN: fixed payment, no culture framing)

A.1. Instructions

Thank you for participating in this experiment. Please do not talk to any other participant until the experiment is over. Please switch off your mobile phone and put it away. If you do not adhere to these rules, we will have to exclude you from any payments.

Your participation and performance in this experiment will not be revealed to anyone; similarly the identity and performance of other participants will not be revealed to you. In this sense, your decisions are completely anonymous.

You will be asked to make up to 60 investment decisions in this experiment within [VP/VR/FP:21] [VN/FN:20] minutes.

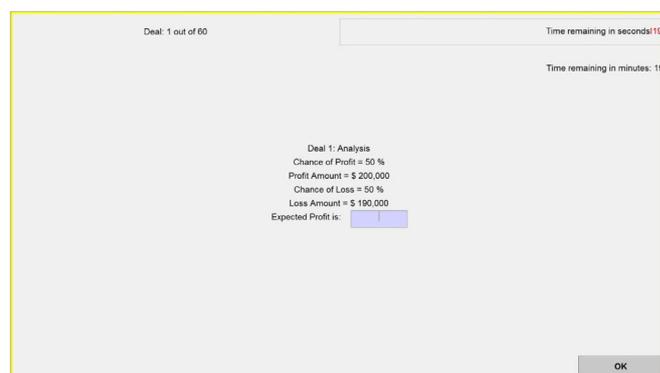
After the experiment you will be asked to complete a short survey (around 5 min) to help us control for demographic factors.

Be sure to read all [VP/VN/VR/FP:4] [FN:3] pages of instructions.

A.2. Investment analysis

The experiment is designed to mimic investment decisions taken by financial services executives (e.g., granting loans, buying securities, insurance underwriting). You will have to do some analysis (with a calculator) and then decide whether to invest on behalf of your employer.

Example:



The investment has 50% chance to gain \$200,000 and 50% chance to lose \$190,000. You must calculate the expected profits for your employer.

The expected profits are calculated as follows:

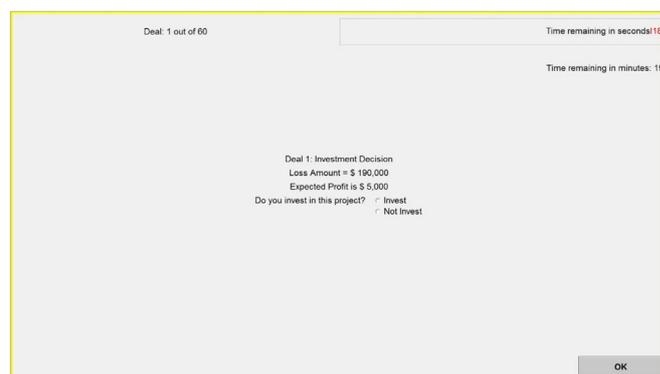
Expected profits = Probability of profiting × Profit amount – Probability of losing × Loss amount

In this example, the expected profits are:

$$0.5 \times 200,000 - 0.5 \times 190,000 = 5000$$

A.3. Investment decisions

After you enter the correct expected profits, you choose whether or not to invest on behalf of your employer. The employer is willing to take risk in order to earn expected profits, but has established policies to limit the risk (see below). As an employee, you are expected to make as many profitable investments as you can on behalf of your employer, provided they comply with the employer's risk policy/limits.



A.4. Your cash payment

Your decisions will determine how much cash you receive at the end of the session. [VP/VN/VR: Specifically, your payment will be 0.023% of the *total expected profits* from all your investments net of compliance penalties (see below) but we guarantee a payment of at least \$50.] [FP/FN: Specifically, your payment will be \$120 less any compliance penalties (see below) but we guarantee a payment of at least \$50.]

Please note that your payment in the experiment will not be determined by the realised outcome of each investment i.e., whether the investment wins or loses.

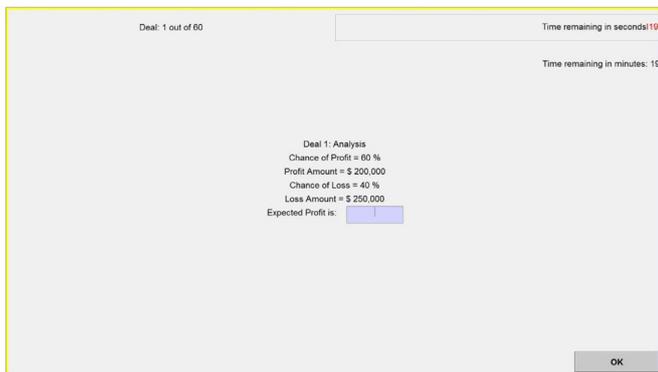
A.5. Risk policy/Limits

Just like any financial services employee, in this experiment you operate under certain risk policies/limits. Policies are designed to prevent investments that are considered too risky for the employer, even if they are highly profitable. For this experiment, investments with a *loss amount of \$200,000 or more* are prohibited by the policy, regardless of the probabilities and expected profits.

Compliance with policy is audited at the end of the experiment. There is an *audit rate of 20%* i.e., there is a 20% chance that each investment will be checked for compliance with risk policy. You will not know which deals have been audited until the end of the experiment.

If you are caught breaking this policy, you will be penalized i.e., your expected profits (and ultimately your cash earnings) will be reduced. [VP/VN/VR/NC: The penalty to your total expected profits is 3 times the expected profits from the non-compliant investment. Therefore, the net loss is 2 times the expected profits for the non-compliant investment if audited.] [FP/FN: the penalty is 0.046% of the expected profits from the non-compliant investment.]

Example:



The investment has 60% chance to gain \$200,000 and 40% chance to lose \$250,000.

In this example, the expected profits will be:

$$0.6 \times 200,000 - 0.4 \times 250,000 = 20,000$$

This investment violates risk policy (the loss amount of \$250,000 is more than the specified limit of \$200,000). [VP/VN/VR: if you invest, then total expected profits will increase by \$20,000. If you are caught (20% chance) then you will be penalised by 3x\$20,000 or \$60,000 i.e., the net impact of the investment on expected profits = \$20,000 - \$60,000 = -\$40,000.] [FP/FN: if you invest and you are caught (20% chance) then you will be penalised by 0.046% of \$20,000 or \$9.20.]

A.6. Work environment

[VP/FP: in your workplace compliance with risk policy seems to have a low priority compared with meeting *profit* targets. Non-compliance is common. Your manager rarely mentions the risk policy but talks often about the need to *meet budget*. He is always giving you motivational messages to encourage you to boost *profits*. You notice that colleagues who breach policy are excused if they are top performers. The risk policies are often criticised by staff because they can interfere with meeting *profit* targets; risk managers have low status compared with people who have *great profit figures*.



[VR/FR: In your workplace non-compliance with *risk policy* is taken very seriously and is extremely rare. Breaches are not excused or tolerated, even if they produce high profits. Your manager is an excellent role model of risk management behaviour and talks frequently about the *need to comply with risk policy*, even when the team is behind on profit targets. It is clear from what colleagues do and say that compliance with risk policy is regarded as essential for the firm to survive and prosper. *Risk managers* are highly respected because they are seen as adding value to the organisation.



To summarise:	
Session length	: [VP/VR/FP:21] [VN/FN:20] minutes
Number of deals	: Up to 60
Risk policy/Limit	: Loss amount must be less than \$200,000
Penalty	: [VP/VN/VR:3x] [FP/FN:0.046%] expected profits for the non-compliant deal if caught
Audit rate	: 20% of deals checked for compliance
Payment	: [VP/VN/VR:0.023% of your total expected profits] [FP/FN:\$120] less penalties
Minimum payment:	\$50

We will start a set of questions to confirm your understanding and two trial rounds to let you get familiar with the system. We will start the experiment once you finish two trial rounds.

Do you have any questions?

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