Incentives and Culture in Risk Compliance in the Financial Industry

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Abstract

This experimental study investigated the effects of remuneration and workplace environment on risk compliance. The study involves 269 financial professionals and was designed to mimic investment decisions taken by financial services executives (e.g., granting loans and buying securities). Participants in a simulated work environment were asked to make profitable investments, provided that these investments complied with the relevant risk policy. Two different framing treatments (relating to the behaviour of the manager and co-workers) were used to reflect either a profit-focused or risk-focused work environment. Two payment treatments were utilised: variable (linked to expected profits) and fixed payment. It was found that variable remuneration reduces compliance with risk policy. Risk culture (measured using participants' perceptions of compliance) was found to mediate this relationship. This study demonstrated that both remuneration policy and the behaviour of managers and peers are determinants of risk culture.

Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

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Chapter 1: Introduction

The recent global financial crisis has highlighted compliance with risk policy as an important issue for investigation. While individual instances of risk-taking (especially those with disastrous consequences) have been a popular topic of discussion, study of compliance is far more productive. In practice, very few employees have direct input into risk-taking decisions. Instead, strategic decisions regarding risk appetite are the responsibility of an organisation's board of directors. 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 to ensure that the strategic risk decisions of the board are implemented and, ultimately, for ensuring the resilience of financial institutions. To date, very little is known about the compliance behaviour of financial executives.

Compliance (and by extension noncompliance) with internal policy in financial institutions is an important, but often neglected issue. The direct costs of an initial breach of risk policy may be compounded by negative press, reputational damage and, potentially, regulatory intervention. For example, in 2014 a UBS trader's unauthorised trades resulted in a loss of approximately US$2.3 billion (Wilson 2014). His manager failed to report the issue and advised his team to lie about the loss. UBS's internal monitoring system did not detect the loss (Rayney, Hough & Ward 2011), suggesting significant operational deficiency and resulting in significant reputational damage. UBS reported the incident to the Financial Services Authority and police after the trader himself told UBS about the loss. The Financial Services Authority fined UBS £30 million (Masters & Schafer 2012).

Breaches of trading and credit limits are a major concern for financial institutions, but so are violations of rules and codes relating to market conduct. Traders from five banks—Citigroup, JPMorgan Chase, Barclays, UBS and Royal Bank of Scotland—were caught manipulating the spot market exchange rate between dollars and euros in their favour for more than five years (Gara 2015). Although the UBS chairman, Axel Weber, and CEO, Sergio Ermotti, claimed in a joint statement that UBS had 'self-detected this matter and reported it to the U.S. Department of Justice' (quoted in Smith 2015), such market manipulation caused public mistrust and reputational damage. The US Department of Justice and the Federal Reserve

fined the five banks a combined total of US$5.4 billion for this forex rigging case (Harrison & Thompson 2015).

There are numerous types risk affecting financial institutions, all of which can lead to reputational damage, fines and expensive customer remediation programs. Consider, for example, the following case of operational risk. The Basel Committee on Banking Supervision (BCBS) conducted a Loss Data Collection Exercise to measure the loss from operational risk in Basel II Framework (BCBS 2009). Losses from operational risk for 119 banks amounted to €59.6 billion.

Reforms of risk governance have been heavily emphasised following the recent global financial crisis. One suggested tool for reform was the framework developed by BCBS for operational risk management (BCBS 2011). In this framework, boards of directors are responsible for identifying the 'nature, types, and levels of operational risk that the bank is willing to assume' and overseeing senior management. The Basel Committee specially recommends that board of directors approve and review a risk appetite for operational risk. Similarly, senior management should develop clear lines of responsibility that are consistent with this risk appetite and tolerance when it comes to the execution of organisational policies. The Basel Committee gives advice on developing lines of responsibility, namely, 'three lines of defence' that are applicable to all other employees. The first line of defence is business line management that aim to identify and manage 'risks inherent in the products, activities, processes and systems'. The second is an independent operational risk function by looking at business, achieved by testing the efficiency of business lines in the form of risk management, risk measurement and reporting systems adopted in banks. The third is an independent review to examine the effectiveness of operational risk management controls, processes and systems. The risk governance reform further raised the importance of compliance in the financial industry.

The guidance on operational risk management was further updated in 2014. BCBS (2014) provides a review of the operational risk framework and explicitly added 'complying with policies, standards and guidelines' to the first line of defence. However, the review did not mention how compliance behaviour changed in banks after the 'three lines of defence' principle was implemented. More importantly, it did not give any recommendations on compliance improvement. Conversely, the Financial Conduct Authority provided some

advice in managing compliance in banks, highlighting regulator interest in the issue of compliance in financial institutions (see Iscenko et al. 2016).

1.1 Risk Culture

While controls are the traditional tools of compliance officers, there is an increasing awareness among regulators and banks of the importance of culture, specifically risk culture, for promoting compliance with risk policy. Risk culture was mentioned in the *Core principles* report (BCBS 2012) and 29 core principles were proposed for sound banking supervision. Principles 14 (Corporate governance) and 15 (Risk management process) advocated communicating corporate culture and promoting a high standard of risk management culture. BCBS (2014) further adds 'promoting risk culture' as responsibilities for each of the three lines of defence. In 2009, a series of surveys were conducted by Ernst & Young (EY) (2014) asking bank executives in 52 firms across 27 countries about risk management practices. Approximately half of the participants (52%) are aware of increasing attention on risk culture during the observed period. This increasing attention on risk culture is due to the effectiveness of risk culture in encouraging employees to comply with risk management policies. According to the International Monetary Fund (Marques et al. 2014), corporate culture can act as a guide in assisting banks to manage risk when incentive structure is ineffective in guiding employees to make 'right' (i.e., policy compliant) decisions.

1.2 Incentives

This study focuses on short term profit/sale performance based incentive as a variable component of remuneration system. Short term profit/sale performance —commonly offered to employees to boost sales (McGrath 2016; Johnson 2017)— is blamed as a reason for staffs to ignore long-term risks when selling and investing for financial institutions (Financial Stability Board 2009). Even the performance assessments are now shifting to focus on multi-dimension basis, short term performance based incentives are still regarded as one of the factors that should be blamed for noncompliance with risk policy. Recently, Wells Fargo employees illegally created two million bank and credit card accounts without customers' permission to maximise their incentive payments (Zoltners, Sinha & Lorimer 2016). This incident was attributed to a strong tie between large capital rewards and the achievement of performance targets. The *Retail banking remuneration review* (Sedgwick 2017) supports this

idea and concludes that performance related rewards intensify the risk of mis-selling. This can damage customers' trust in banks and result in reputational risk.

Besides noncompliance, the sales-based incentive payment system has also been blamed for creating a sale culture in financial institutions. The Reserve Bank of Australia Governor, Philip Lowe, claims that the 'marketing or product distribution' business model creates poor corporate culture (Wilkins 2016). A Commissioner of the Australian Securities & Investments Commission, Greg Tanzer (2015), supports this idea, illustrating that financial professionals tend to maximise their benefit at the expense of their customers. A survey of 41 senior bankers conducted by Deloitte (Doyle, Chung & Quigley 2013) showed that 75% of respondents believed that performance metrics cause cultural problems in the banking industry.

Despite the increasing interest in risk culture, remuneration systems and compliance in the financial industry, the research on these topics is limited. Therefore, this study aimed to fill the gap between industry interest and academic research by inviting 269 financial professionals to participate in an experiment to investigate the effect of incentive payment and risk culture on compliance (and noncompliance) in financial institutions. The experiment consisted of five treatments with different framing information and remuneration structures and participants were randomly assigned one of those. This approach was crucial to the research design, due to the fact that the remuneration information of banking staff is confidential—gaining access to and using actual employee payment data to analyse compliance behaviour is, therefore, exceedingly difficult, especially as an external researcher. Moreover, individuals may select institutions with different remuneration systems—people with higher ability may choose to work in institutions with incentive payment, while people with lower ability may choose to work in institutions with fixed payment. Noncompliance issues in banking are also difficult to record, because inappropriate decisions can be hidden, any adverse consequences may not be felt for some time and both the decisions and consequences will often remain confidential (Australian Prudential Regulation Authority 2016). Given the difficulty of gaining access to relevant data (unless significant consequences are played out in the public sphere), a laboratory experiment was conducted to address these limitations and ensure the reliability of the results.

Chapter 2: Literature Review

2.1 Risk Culture

Risk culture is an emerging concept in academic literature. It is a subset culture of organisational culture. Previous studies have treated organisational culture as comprising three aspects—professional norms (Cohn, Fehr & Maréchal 2017), national culture (Stulz & Williamson 2003) and corporate culture (Guiso, Sapienza & Zingales 2015). This study focuses on culture related to risk management practices. Sheedy, Griffin and Barbour (2017) define risk culture as 'the shared perceptions among employees of the relative priority given to risk management, including perceptions of the risk-related practices and behavior that are expected, valued and supported'. They developed the concept of risk culture using the framework of safety climate (a facet-specific concept in organisational climate) and highlighting the issue of relative priority when it comes to a decision-making process between short-term profit creation and long-term risk management.

Organisational climate is defined as 'the shared perceptions of and the meaning attached to the policies, practices, and procedures employees experience and the behaviours they observe getting rewarded and that are supported and expected' (Schneider, Ehrhart & Macey 2013). Organisational climate was originally considered to be the general environment of a group. However, Schneider (1975) suggested that the focus of climate and outcomes should be able to predict outcomes. Consequently, organisational climate expanded to target some certain areas—climate for customers service (i.e., service climate) (Schneider, Salvaggio & Subirats 2002; Schneider et al. 2005) and safety (i.e., safety climate) (Beus, Bergman & Payne 2010; Christian et al. 2009).

Service climate often connects with customer satisfaction (Dietz, Pugh & Wiley 2004), sales and company financial performance (Schneider et al. 2009). Safety climate usually connects with safety policies and compliance. The safety climate concept is applicable in hospitals (Neal & Griffin 2006), construction sites (Probst, Brubaker & Barsotti 2008) and manufacturing plants (Zohar & Luria 2005). In those workplaces, safety policies and training are designed to protect workers from accidents and injury. These policies and training may provide organisational support to employees, creating a favourable safety climate (Wallace, Popp & Mondore 2006). However, compliance requires an investment of time that could

instead be allocated to production. Additionally, work pressures to increase production often cause employees to breach policy (Kvalheim & Dahl 2016). Safety climate guides staff in how to balance this fundamental tension between safety and production.

In much the same way, in a financial institution, there is tension between risk management and profit. Risk culture provides staff with guidance in balancing this tension as they make decisions to comply (or not comply) with risk policy. Similar to safety climate, risk culture is developed by both formal and informal processes (Power, Ashby & Palermo 2013). The former includes experts who specialise in financial risk management with formal frameworks and technical modelling. However, it is important to note that formal processes are not enough to ensure a sound risk management policy, because risk policy cannot account for all scenarios (John, De Masi & Paci 2016). Simultaneously, staff may be incentivised to breach policy due to performance targets and work pressures. Complying with risk policy inevitably reduces profits, as potentially profitable business, determined as too risky by the relevant risk policies, must be turned away. Note that increasing prudence in a financial institution inevitably leads to reduction in short-term profits and the benefits are experienced longer term. This is because financial services (granting loans, underwriting insurance, providing advisory/broking services, trading securities) produce positive cash flows in the short term but the possible losses (loan defaults, insurance claims, fines, customer remediation, reputational damage, asset value write-downs etc) are all experienced in the longer term. Complying with risk policy means that transactions producing short-term profits are rejected. In addition, compliance obligations are time-consuming resulting in opportunity costs. Therefore, informal processes play a significant role by developing employees' perceptions of the meaning and priority of the formal processes. Given the similarity of safety climate and risk culture, a review of the literature on safety climate is also included in this chapter.

As mentioned in Chapter 1, variable remuneration systems are common in financial institutions. However, there is limited research on the relationship between variable payment and safety climate. Most studies on variable payment are related to safety behaviour in which variable payment is used to motivate safety—itself a contentious topic. For example, Goodrum and Gangwar (2004) reported that companies with an injury- or illness-based incentive program, in which workers are rewarded for accident avoidance and minimisation during predefined periods, have a lower incidence rate and better safety improvement. However, Miozza and Wyld (2002) found that a safety incentive payment system is only

effective if managed properly, otherwise, such a system creates a disincentive to report accidents. The variable payment used in safety behaviour is different from that used in the financial industry. In the financial industry, performance-based remuneration systems aim to encourage productivity. The only study that has examined the performance of variable payment and safety behaviour is Sawacha, Naoum and Fong (1999), which found that workers tend to work faster with unsafe methods when provided with productivity bonuses.

Although there is no study on variable payment and safety climate, similar studies can be found. Zohar (2000) and Zohar and Luria (2005) reported that safety climate will be weakened when there is an inconsistency between policy and practice. Such disparity mainly comes from conflicts between an organisation's safety policy and supervisors' safety practice (including safety priority). It must be noted here that the relationship between organisation policy and supervisor practice is different from that of risk policy and variable payment. Organisation policy is set by top management, while supervisor practice is determined by supervisors (middle-level managers). Variable payment and risk policy, on the other hand, are both set by top management, even though they may have conflicting goals. Variable payment systems aim to encourage increased production, but potentially also encourage noncompliance with risk policy. Risk policy highlights the importance of risk compliance, even at the cost of lowered production. Clearly, these are incompatible goals. Therefore, it is hypothesised that performance-based remuneration will weaken risk culture:

H1a: A variable remuneration system leads to a less favourable risk culture.

As previously stated, supervisor behaviour influences the favourability of safety climate. Top management sets safety policy, which displays their attitude towards safety management. However, supervisors may have different priorities, such as work progress. This potential conflict of priorities changes the favourability of safety climate. Zohar and Luria (2005) supported this idea by showing that the supervisory priorities affect the group safety climate which mediates the positive relationship between organisational safety climate and safety behaviour. They argued that since supervisors have more social interaction with employees, they can provide more frequent feedback to employees than the delayed and uncertain organisation-level outcome. Zohar and Luria (2004) showed that supervisor behaviour is crucial when it comes to conflicting goals; group members will form a perception of the 'true' priority of safety policy (safety or production speed) after witnessing the actions and

decisions of supervisors. The importance of co-workers' and leaders' behaviour in determining workplace culture is supported by Fugas, Meliá and Silva (2011).

This study examines the effects of manager and co-worker behaviours on risk culture. Supervisor and co-worker attitude towards risk policy are incorporated into the research design via a framing statement. A statement framing managerial and peer behaviour (delivered to participants in a laboratory experiment) was used by Jones and Kavanagh (1996), which showed that managerial influences and peer influences have a significant impact on MBA students' compliance behaviour.

This study investigates two situations. In risk-focused treatment, the statement establishes that risk compliance has a higher priority in the workplace, while in profit-focused treatment the statement establishes that meeting profit targets has a higher priority. Based on the literature review, it is expected that supervisor priority and co-worker behaviour will influence the organisational climate, thus forming the following hypotheses:

H1b: Profit-focused work environment (behaviour of manager and co-workers) leads to a less favourable risk culture.

H1c: Risk-focused work environment (behaviour of manager and co-workers) leads to a more favourable risk culture.

2.2 Risk Compliance

This study is also concerned with variable remuneration systems, which may conflict with risk policies. Risk policy may limit some activities, investments or trading amount that are too risky from the perspective of top management. However, these restrictions may result in a lowered performance relative to a performance target and, consequently, a lower salary. For example, a trader thinks there is an opportunity in speculating a price movement of a security that is prohibited by risk policies. A trader paid according to their trading performances may execute an unauthorised trade to earn a bonus. As well as limiting potentially profitable transactions, compliance requirements are often time consuming (e.g., filing of mandatory paperwork), presenting an issue of opportunity cost—time spent on compliance requirements could be devoted to pursuing potentially profitable opportunities that contribute to bonuses.

This type of remuneration system is also called earning-at-risk or pay-at-risk (Brown & Huber 1992). Employees receive a fixed payment that is lower than market level and a variable payment according to their performance. This creates incentive for employees to work harder, since their pay is directly related to their performance. Baker, Jensen and Murphy (1988) examined this issue and suggested that variable remuneration systems encourage employees to focus on the target activity, resulting in unintended and counterproductive outcomes. Prendergast (1999) agreed and suggested that employees will 'game' the remuneration system and avoid activities that are not compensated. Based on the literature, it is expect that when a variable remuneration system encourages sales and profit, employees will prioritise sales and profit objectives and ignore risk policy. Even if the remuneration system includes measures of risk compliance, staff may prioritise sales and profits measures as these amounts are more objective, tangible and easier to observe than risk compliance.

Schweitzer, Ordóñez and Douma (2004) found that when participants were given a goal to achieve, participants paid by variable payment had a higher level of cheating (by overstating their performance) than those paid by fixed payment. This cheating action is explained by Becker's (1968) economic expected utility model, which illustrates that positive expected utility is achieved when economic rewards from cheating are higher than monetary penalties that discourage cheating behaviour. In the experiment for this study, when participants are paid a fixed rate, there are no economic rewards to encourage cheating. Conversely, when participants are paid a variable rate, potential economic rewards based on performance encourage cheating in the form of participants overstating their performance. Therefore, it can be hypothesised that a variable remuneration system is likely to result in a lower compliance level:

H2a: A variable remuneration system leads to a lower compliance level.

Manager and co-worker behaviour may affect risk compliance in the workplace. According to the social learning theory proposed by Bandura (1986), learning occurs in social contexts which create an atmosphere for people to learn from one another. Specifically, Bandura suggested that individuals obtain new information and form new behaviours by observing others' actions. Schneider, Ehrhardt and Macey (2013) supported this, claiming that staff will set a priority for their working behaviour based on their workplace experience. Therefore, the behaviour of leaders is vital, as team members form expectations based on what they are told

and observe (Dragoni 2005). Kvalheim and Dahl (2016) found that work pressure is the most powerful safety climate factor that can negatively influence safety compliance. A potential explanation for poor compliance behaviour is that when supervisors prioritise profit creation over risk compliance, they create a profit-focused work environment and subject employees to work pressure. This is particularly relevant to new employees, who learn the priority of risk policy through observation. For example, if managers and co-workers consistently comply with risk policy and stress the importance of risk management, the perceived importance of risk policy will be impressed upon and internalised by new employees as they are influenced to behave as their peers.

Co-worker behaviour also plays an important role in creating workplace culture (Fugas, Meliá & Silva 2011), as demonstrated in the literature on cheating (Gino, Ayal & Ariely 2009; Fosgaard, Hansen & Piovesan 2013). This literature is included in this review because cheating in an experiment (i.e., breaking the rules set by the experimenters) is comparable to breaching the risk policy (i.e., rules) set by an organisation. Gino, Ayal and Ariely (2009) showed that cheating activities vary given static economic benefit. In their experiment, participants were asked to solve math questions and report their performance, on which their payments were based, without experimenters checking. It was observed that when participants' 'in-group' members solved questions unreasonably fast, which indicated that these members were cheating, participants tended to cheat and report a significantly higher number of question solved. Gino, Ayal and Ariely (2009) argued that when the perceived ethical standard decreases (in the case of their study, by participants observing 'in-group' members cheating) people are more likely to cheat, because of the reduced psychological costs of cheating.

Fosgaard, Hansen and Piovesan (2013) showed that when males know from their peers that cheating is an option, cheating significantly increases. In their study, participants were required to privately flip a coin with two sides (black and white) and report the outcome by writing on a report sheet. They received US$2 if they reported white and US$0 if they reported otherwise. The report sheet had 11 rows, with the first 10 rows already filled. Unknown to participants, the experimenters had filed the first 10 rows with either 10 or five outcomes of 'white'. Since participants did not know that the first 10 rows were filled by the experimenters, instances in which the form showed 10 previous outcomes of white indicated to participants that previous participants were cheating. In these instances, the number of

male participants who reported white significantly increased. Therefore, it can be hypothesised that a profit-focused work environment, as determined by the behaviour of managers and co-workers, will resulted in lowered compliance with risk policy, while the opposite will occur in a risk-focused work environment:

H2b: Profit-focused work environment (behaviour of manager and co-workers) leads to a lower risk compliance level.

H2c: Risk-focused work environment (behaviour of manager and co-workers) leads to a higher risk compliance level.

Sheedy and Griffin (2017) followed the framework of safety climate (Neal, Griffin, & Hart, 2000) and used a survey to measure risk culture, structure and compliance in financial institutions. Neal, Griffin and Hart (2000) reported that employees in a favourable safety climate have a higher degree of safety knowledge and motivation which increased safety compliance. Building on this, Sheedy and Griffin (2017) found that risk culture can explain the influence of risk structure (e.g., perception of the consistency of the remuneration system with prudent risk-taking) on risk behaviour (including compliance with risk policy). Since the measurement of both the dependent variable (behaviour) and the explanatory variables (structures and culture) in this study are based on a self-report survey, there is a risk of the results being influenced by common methods bias. To overcome this bias, Clarke's (2006) study used meta-analysis to show that safety behaviour is significantly correlated to accidents and injuries in the workplace. However, the study's limited sample size reduced the soundness of this conclusion. Neal and Griffin (2006) examined the relationship between safety behaviour measured by survey and the accident rate over a five-year period. It was observed that safety culture had a delayed effect on safety motivation and that there was a significant negative relationship between maintaining safety behaviour in the fourth year and occurrence of accidents in the fifth year. Therefore, it has been shown that a favourable safety climate can reduce accident rate in the workplace by promoting safety compliance.

The present study aims to overcome the bias of the methods in Sheedy and Griffin (2017) by using a laboratory experiment (i.e., controlled environment) to determine whether the relationship between incentive payment (a remuneration system, a part of risk structure) and risk compliance (a part of risk behaviour) can be explained by risk culture. The effect of incentive payment on risk compliance should be explained by risk culture:

H2d: The relationship between a variable remuneration system and risk compliance can be mediated by risk culture.

2.3 Productivity

Variable remuneration systems are designed to improve workers' productivity and are generally used by salespeople, mortgage brokers and traders. Under a variable payment system, an employee's payment is based on an agreed performance indicator. Bonner and Sprinkle (2002) used agency theory to explain why using a variable remuneration system improves productivity. According to agency theory, employees are assumed to be rational and to act in self-interest. They are interested in two components, wealth and leisure. When employees are paid a fixed salary, this amount does not change with the production level. Therefore, employees are not willing to invest additional effort (requiring physical or mental cost) in work, at the expense of their leisure. However, when employees are paid a variable payment, they are more willing to forgo leisure and invest additional effort in work, as their performance is significantly related to wealth.

The precise nature of the relationship between variable remuneration systems and performance is mixed. Previous studies have shown that performance-based payment systems help increase the quantity produced (Lazear 2000; Cadsby, Song & Tapon 2007), but play a limited role in quality improvement (Jenkins et al. 1998). From this, it can be seen that there is a trade-off between quantity and quality under the variable remuneration system. Baker, Jensen and Murphy (1988) supported this idea and showed that people will only focus on measures that can maximise their payment without considering the consequences. Problems are intensified when employees' performance is measured in multiple dimensions. This situation is evident in the financial industry, in which risk management behaviour is subjectively assessed and noncompliant behaviour is hard to monitor.

Previous studies have also looked at the measuring effect of variable payment systems on performance. Camerer and Hogarth (1999) examined how the variable payment system affects performance and found that the results vary across tasks common in financial institutions. For example, participants in variable payment treatment were observed to perform better in judgement and decision-making tasks. Conversely, Camerer and Hogarth (1999) reported that variable payment has no effect on tasks related to market trading,

bargaining and risky choices, because the return from increased effort is not high enough to further improve working productivity.

The importance of productivity in professional organisations has also been highlighted. Young, Beckman and Baker (2012) argued that the financial incentive in professional organisations warrants investigation, because professionals are often involved in handling complex tasks that are harder to monitor and require a greater degree of attention and cognitive processing. The difficulty and cost of monitoring compliance worsens the agency problem. Young, Beckman and Baker (2012) found that variable remuneration systems improved professionals' productivity. Although that study focused on physicians, professionals in the banking industry have the same features of difficulty and cost in auditing. Therefore, it is worth examining this relationship, which gives rise to another hypothesis.

Besides agency theory, the effect of variable remuneration systems on productivity can also be explained by self-determination theory. Self-determination theory suggests that people are motivated by two sources of motivation, extrinsic and intrinsic motivation. Extrinsic motivation refers to performing an activity to obtain a separable outcome (Ryan & Deci 2000). Intrinsic motivation is obtained by performing an activity and receiving 'no apparent reward except the activity itself' (Deci 1971). For example, a trader can gain profit and receive money when trading is successful. Simultaneously, they can gain excitement and enjoyment from the process. In this example, the trader may not necessarily receive the money generated from their trades, but their firm gives them some form of a reward— extrinsic motivation. Further, it is important to note that the excitement and enjoyment the trader gained from successful trading cannot be taken away by anyone—intrinsic motivation. When people are subject to variable remuneration systems their intrinsic motivation and interest in the activity may be undermined (Deci, Koestner & Ryan 1999). This potential decline in intrinsic motivation results from the sense of being controlled (Frey & Jegen 2001). The loss of a sense of autonomy diminishes intrinsic motivation and causes lowered performance and productivity (Deci & Ryan 2000). Given the importance of productivity to organisations and the debate in the literature over the effectiveness of variable remuneration systems in increasing productivity, as previously stated, this relationship needs to be examined:

H3: A variable remuneration system leads to higher productivity.

2.4 Laboratory Experiment

A laboratory experiment is regarded as the most suitable research method for this study (compared to a field study). In a laboratory experiment, the environment can be controlled and randomly assigned to participants, along with a set of rules (Smith 1994). This feature of ceteris paribus is difficult to achieve in a field study, given the constant changing world. Since the treatments are the only observable difference among participants, the changes in observation are attributed to the treatments. There are some 'difficult-to-observe' variables in a field study, such as risk aversion level (Roth 1986). In a laboratory setting, these can be measured by experiment or survey. Although a field study can have a larger sample size, a laboratory experiment with a controlled environment is preferable for testing the predictive power of a theory (Nikiforakis 2010). For example, laboratory experiments aid the understanding and testing of theories in tax compliance, while field studies are ideal for testing the effectiveness of practical implication from theory.

Accordingly, this study used a laboratory experiment to investigate risk compliance. This study utilised the laboratory experiment method by inviting financial professionals to participate and investigating the relationship between risk compliance, the behaviour of supervisor and co-workers, risk culture and variable remuneration systems.

Chapter 3: Experimental Design

3.1 Treatments

The experiment varied in two dimensions, remuneration and workplace environment, and was designed to mimic investment decisions taken by financial services executives (e.g., granting loans, buying securities). In the presented scenario, employees (the participants) were investing on behalf of their employer, subject to risk limits and policies. The employee was not directly exposed to investment risk. The experiment consisted of 60 independent periods. Participants were randomly distributed into one of five treatments (see Table 1) and given 20 minutes (with one additional minute for profit and risk culture treatments) to make decisions. The treatments will be discussed in detail in this section.

Table 1: Five Treatments

	Profit-focused Work Environment	No Framing	Risk-focused Work Environment
Variable Payment	1. Variable, Profit (VP)	2. Variable, No Culture (VN)	3. Variable, Risk (VR)
Fixed Payment	4. Fixed, Profit (FP)	5. Fixed, No Culture (FN)	

Each participant was required to make decisions in two stages for each period. In the first stage, each participant was given information about an investment, including a probability of gain, a probability of loss, possible gain amount and possible loss amount. Each participant was required to do an expected value calculation. This expected value calculation has three purposes. Firstly, it mimics the work and cost involved in financial industry. A more realistic decision scenario can be provided to financial professionals. Secondly, looking at participants' effort in calculating the expected value and their investment in compliant transactions in a key variable of interest in this study as it serves a measure of their profit generating effort. By including this expected value calculation, I can analyse partiicpants productivity by analysing the number of investment they made. Thirdly, the requirement to calculate expected value is likely to engage participants in a more contemplative, careful and analytical mindset compared to an intuitive and automatic one. Without a calculation process, participants will only be required to make decision by looking at a list of numbers. In this case, participants may be more likely to make decision by automic mindset which is not reflective to the real-world experience. The formula for the expected value calculation was

provided in the instructions. Participant could not proceed the second stage if he/she did not enter a correct amount. After entering the correct expected value, participants proceeded to the second stage. In the second stage, the expected value and potential loss amount of the investment were shown on the screen. Participants were then required to decide whether to invest on behalf of their employer. In the instructions, investment guidelines were provided detailing that participants were expected to select investments with positive expected value and that the employer was willing to bear the investment risk. However, a risk policy was imposed—participants were told not to invest in investments with a potential loss amount exceeding $200,000 regardless of any other information given. In this experiment, risk policy was primarily concerned with risk limit, reflecting a major concern in the financial sector. Banking executives have previously highlighted breaches of bank risk limits as a major concern and stressed the need for the frequency of this occurrence to be included in assessments on breaches in risk policy (EY 2014).

Each participant was informed that investment decisions were audited with a probability of 20%, identical for all participants across all treatments, and that they would be penalised if noncompliant behaviour was discovered. Over the 60 investment periods, participants were presented with 20 noncompliant investments (i.e., investments that exceed the risk policy and limits). Participants were not told which investments had been audited (or the extent of penalties incurred) until the end of the experiment.

To facilitate investigation of how different treatments affected risk culture for each participant, participants were asked about their perception of risk compliance behaviour. This article proposes a new measurement of risk culture in experimental study. Given that Sheedy, Griffin and Barbour (2017) definition of risk culture as "the shared perceptions among employees of the relative priority given to risk management, including perceptions of the risk-related practices and behavior that are expected, valued and supported", the following question was asked in the survey conducted immediately after the experiment finished as a proxy of risk culture. This question asked participants their perception of the compliance behaviour of their "co-workers" in the same treatments. Note that this question is not about their perception of their own compliance behaviour. The focus on their "co-workers" in the same treatment is aimed to understand participants share perception of relative priority of risk policy compliance. This perception of expected compliance behaviour among participants in

the same treatment should reflect participants "shared perceptions of relative priority" because if expected priority of risk compliance is low, the number will be small, vice versa.

> *In the experiment you just completed, a number of investments were outside of risk policy because the Loss Amount exceeded $200,000. In your opinion, what percentage of participants in the experiment would ALWAYS follow risk policy (i.e. not invest if outside the risk policy)? (Enter X%)*

Participants were randomly assigned to one of five treatments (shown in Table 1) specified by the two remuneration system treatments (fixed payment versus variable payment) and three framing treatments (profit focused versus no framing versus risk focused). In the planning stages of the experiment we anticipated that noncompliance would be uncommon under fixed payment treatments. Due to limited resources, we made the decision to exclude fixed payment risk focused from the treatment schedule.

In the profit- and risk-focused framing work environment, the workplace environment was framed by inserting one additional paragraph of text with a picture (see Figures 1 and 2). Informing participants of the workplace environment can create an atmosphere of peer influence. Jones and Kavanagh's (1996) study found both managerial and peer influence to have a significant impact on compliance behaviour in MBA students. This study follows Jones and Kavanagh's (1996) approach by using a paragraph in the instructions to participants to describe manager and co-worker behaviour to frame the workplace environment. The paragraph contained information about the behaviour of managers and peers and their perceived work priorities. Perceived work priorities, including risk and profit culture, are effectively a shared perception of risk management priority (Sheedy, Griffin & Barbour 2017). After every 15 periods, the screen showed participants the same information to remind them of the workplace culture. Participants had the same investment sequences for all working environment treatments.

Figure 1: Profit-focused work environment framing statement
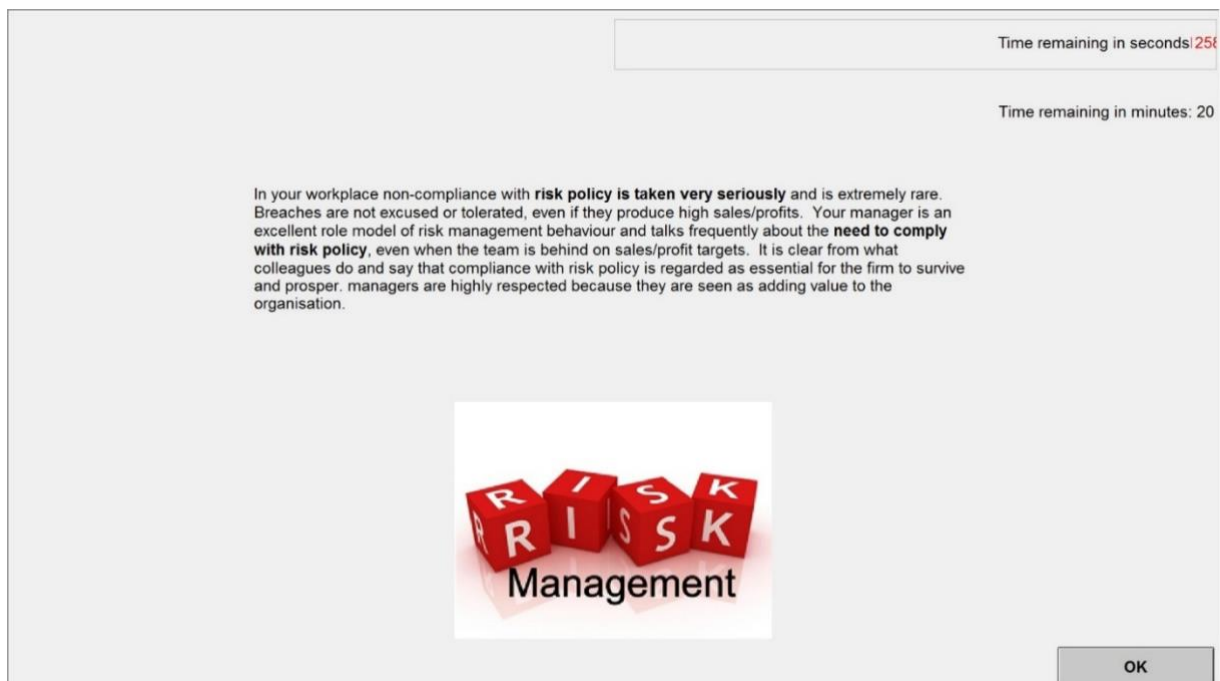

Figure 2: Risk-focused work environment framing statement

In the profit-focused treatment, the paragraph stated that the manager prioritised meeting profit targets over compliance with risk policy and the risk managers have a lower status than those with high profit figures. In the risk-focused treatment, the paragraph stated that

noncompliance with risk policy is taken very seriously and compliance with risk policy is prioritised over meeting profit targets. In the no framing treatment, no instruction was given about workplace culture. The audit rate was uniformly set at 20% and the work environment treatment did not affect the payment structure. Therefore, differences in compliance behaviour across culture treatments can be attributed solely to the workplace culture framed through the paragraph.

According the Australian Bureau of Statistics (2017), the average weekly ordinary time earnings for an adult employed full time is A$1,840.50 or approximately A$50 an hour. Participants were initially offered a minimum payment of A$30 with the potential to earn A$100, but this payment scheme did not attract sufficient participants. Under the principle of providing adequate compensation to attract financial professionals, the minimum payment was increased to A$50 with the potential to earn A$200, with an expected average payment of approximately A$100. The ex post average participant payment across all treatments was A$115.

In the variable payment treatment, participant payment was calculated by two components, investment earnings and noncompliance penalty. To calculate payment, the noncompliance penalty was deducted from investment earnings and the net multiplied by 0.023%. Investment earnings were the total expected value of the investments a participant invested in. Noncompliance penalty was three times the total expected value of audited noncompliant investments a subject invested in. Given an audit rate of 20% and penalty rate of 300%, the expected value of breaking the risk policy in this experiment was 20% of the expected value of an investment. The positive expected value of noncompliance was selected to provide participants with genuine temptation to violate risk policy. This was based on regulator concern regarding weak penalties in financial institutions (Alberici 2016).

The payoffs and probabilities for each investment were designed using values that would lend themselves to ease of calculation with handheld calculators and relevance to finance professionals. Likely participant payments were then simulated, assuming participants invested in all investments (the scenario resulting in the highest payment). The conversion rate of 0.023% was determined by backsolving to ensure that maximum payment was approximately A$200. The maximum possible payment was actually A$213, but only occurs if the participant correctly predicts and avoids the investments that will be audited—a highly unlikely scenario. The ex post maximum payment any participant received was A$193,

corresponding to the case where a participant invested in all investments. The resulting formulas are shown below.

Investment Earning = Total expected value of investments

Noncompliance penalty = 3*Total expected value of audited noncompliant investment

Cash Payment = 0.023%*(Investment Earning – Noncompliance penalty)

Cash Payment = 0.023%*Total expected value of compliant investments and non-audited noncompliant investments – 0.069%*Total expected of audited noncompliant investment

In the fixed payment treatment, each participant was paid a fixed rate of A$120 with penalties for any noncompliance. This fixed rate was determined by the average payment in incentive treatment and sufficiency to attract participants from the financial industry. The noncompliance penalty was calculated based on the total expected value of audited noncompliant investments. When participants invested in a noncompliant investment and were audited, their payment was reduced by 0.046% of the expected value of that investment. The noncompliance penalty conversion rate of 0.046% was chosen to ensure the net noncompliance penalties were the same in the fixed payment and incentive payment treatments.

Cash Payment = 120 – 0.046%*Total Expected Value of Audited Noncompliant Investment

The payment was calculated based on expected value of investments instead of investment outcome. There are three reasons behind this arrangement. Firstly, it reflects the remuneration system in practice. As mentioned in section 1.2, short term performance measure is still an important factor of variable remuneration. Outcomes of investments are generally revealed in long-term, while expected value can be calculated before investing and therefore should be treated as a short term performance measure used in variable remuneration in this study. Secondly, payment based on investment outcome would result in two layers of gambling. The risk compliance decision would be based on both possibility of investment gain and not being audited. As this study aims to study the risk compliance in the financial institution but not the risk taking in investments, expected value was chosen to use as a factor of payment. Thirdly, it may seem unusual for firms to reject a positive expected value investments, even it has a large possible loss. In fact, it is common in the financial industry. Many financial products

(for example colletucal debt obligations, commercial loans, mortgage etc) from financial services have a small probability of a bad outome and a positive expected value. Even so, financial firms still reject those financial products because it breaches the risk policy.

3.2 Participants

Two hundred and seventy-two financial professionals, all with more than six months experience in the financial industry, were recruited with the help of Financial Services Institute of Australasia (FINSIA), a not-for-profit membership association for financial services professionals in Australia and New Zealand. All instructions were returned following the experiment and all participants told to maintain confidentiality about the experiment.

Three observations were excluded, because the individuals had less than six months experience in financial industry,[1] leaving a final sample size of 269 participants—50 in VP, 52 in VN, 65 in VR, 51 in FP and 51 in FN.

Table 2: Sample Demographics

	% of participants
Gender	
Male	70.3
Female	29.7
Age (years)	
Under 25	6.3
25–34	43.9
35–44	19.3
45–54	19.3
55 and over	11.2
Tenure in the financial industry (years)	
0.5 to under 1	1.9

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[1] The behaviour and demographic factors of these three participants was not different from the sample and the results are robust enough to include these participants.

1 to under 3	11.5
3 to under 5	13.4
5 to under 10	20.8
10 to under 15	13.0
15 to under 20	11.9
20 to under 25	7.8
25 and over	19.7
Seniority	
Senior Management	13.4
Report to Senior Management	11.9
Middle Management	11.9
Team Leader	8.9
Professional Employee (but not a Manager)	41.3
Team Member/Frontline Employee	12.6
Line of defence	
Business	75.5
Independent/Specialist Risk Manager	18.6
Internal Audit/Assurance	3.4
Unsure/Did not know	2.6
Business line	
Banking and Finance	45.7
Financial Planning and Wealth Management	14.1
Superannuation	9.7
Other	7.8
Funds Management	7.4
Professional Services	5.2
Broking	5.2

Consulting	4.8
Duration in Australia (years)	
Under 5	10.4
5–9	5.2
10–14	5.2
15–19	7.8
20 and over	17.1
Entire life	53.2
Declined to disclose	1.1
Estimated gross income from all sources this year (A$)	
Under 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
Over 400,000	1.5
Declined to disclose	12.3
Received incentive payment within last 12 months	
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

Declined to disclose	8.9
Total value of incentive payments received (A$)	
Under 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
Over 100,000	3.7
Declined to disclose	24.5
Ethnic background	
Anglo/European	47.6
Chinese and North Asian	18.6
South-East Asian	14.5
South Asian	6.0
South American	0.4
African	1.1
Middle Eastern	4.1
Other	3.7
Declined to disclose	4.1

Descriptive statistics for the demographic characteristics of participants are in Table 2. The majority of participants (70%) were male, with age concentrated between 25 and 34 years old with 10–15 years of experience in the financial industry. Of the 269 participants, 45.7% specialised in banking and financing, 14.1% in financial planning and wealth management,

9.7% in superannuation, 7.4% in funds management, 5.2% in broking, 4.8% in consulting and 5.2% in professional services. Over half of the participants had received incentive payments in the last year. These demographics indicate the appropriateness of all participants for this experiment and the overall investigation of this study's research questions, especially the effectiveness of variable remuneration systems.

Median annual gross income of the sample was A$80,000 to A$100,000, with 6.3% earning over A$300,000 per annum. Further, 53.6% had received incentive payments in addition to their base income, either in the form of cash, shares or options, within the last 12 months, while 8.9% declined to disclose this information. Of those who had received incentive payments, 46.8% claimed that it was less than A$10,000.

A majority of the participants (53.2%) had spent all their lives in Australia, while 10.4% had been in Australia for less than five years. Participants were asked about which ethnic group they most identified with (using the approach recommended by the Australian Bureau of Statistics); it was found that 47.6% identified as Anglo/European, 18.6% as Chinese and North Asian and 14.5% as South-East Asian.

3.3 Procedures

Macquarie University Human Research Ethnic Committee approved the ethical aspects of this study. FINSIA sent out a series of direct emails to their members and individuals who attended FINSIA events in April and May 2017. Recipients were invited to participate in this research project and were advised to bring their own calculators. They were told that they could earn an average of A$100, a minimum of A$50 and a maximum of A$200. The experiment comprised 37 sessions, conducted in the computerised experimental laboratory at Macquarie University City Campus in May 2017 (see Figure 3), with a maximum of 14 participants in each session. Participants were required to read and signed a consent form. Participants who had not brought their own calculator were loaned one from the university (accompanied by an instruction sheet to help participants familiarise themselves with the calculator).

Figure 3: Computerised experimental laboratory at Macquarie University City Campus

The experiment was designed using z-Tree (Fischbacher 2007) and consisted of four phases—comprehension, trial, real and questionnaire. In the comprehension phase, participants in each session were given five minutes to read the instructions (in Appendix A) and were asked to answer seven questions to ensure they understood the instructions. After all the participants in the session finished the comprehensive questions, they entered the trial phase. Participants underwent two trial periods, one compliant investment and one noncompliant investment, to familiarise themselves with the system and calculations. The real phase started after the trial phase. Participants had 20 minutes (with one additional minute of reading time in the profit-focused, risk culture treatment) to complete up to 60 independent periods. The real phase ended when the time ran out regardless of the number of periods completed. Participants were then asked to complete a survey. The average session lasted 50 minutes and participant payment was paid in cash immediately after the session.

While waiting for cash payments to be finalised, participants were asked to complete a short survey. The survey questions (in Appendix B) focused on perceptions of compliance (a proxy measure for risk culture, as explained in Section 3.1) and comprised five areas—personal risk tolerance, personality, attitude towards risk management/compliance, workplace avoidance and demographic information. These areas (except demographic information) are discussed below.

3.3.1 Personal Risk Tolerance

The five items of financial domain in the Domain-Specific Risk-Taking scale (Weber & Blais 2006) were used as the measure of personal risk tolerance. Cronbach's alpha is 0.71. This was included because the decision to comply (or not comply) with risk policy can be thought of as a classic risk–reward trade-off. Participants had to evaluate the potential benefits of noncompliance against the probability of being caught and the associated penalties. It has been established that risk attitudes are financial domain specific. Survey items from financial domain were used because compliance decisions were related to payment.

3.3.2 Personality

Four items from conscientiousness of Mini International Personality Item Pool (Donnellan et al. 2006) were used to assess the level of conscientiousness. Cronbach's alpha is 0.66. Krueger, Hicks and McGue (2001, cited in Ozer & Benet-Martínez [2006]) stated that a low level of conscientiousness related to different aspects of criminal and antisocial actions. Since noncompliance, which may result in unstable financial structures and damage a firm's reputation, is an antisocial action, controlling the level of conscientiousness may provide a more accurate analysis.

3.3.3 Attitude towards Risk Management/Compliance

Three items to measure the attitude towards risk management were created by adapting the sample items from Neal, Griffin and Hart (2000). Cronbach's alpha is 0.70. Attitude towards risk management was measured because personal attitudes towards safety are a significant determinant of compliance with safety policies in safety climate literature (Neal, Griffin & Hart 2000; Neal & Griffin 2006).

3.3.4 Workplace Avoidance

Six items of avoidance of the Macquarie University Risk Culture Scales (Sheedy, Griffin & Barbour 2017) were used. The items referred to the risk culture in participants' real-world workplace. The objective was to control for any influence that the real-world workplace may have on behaviour in the laboratory. Cronbach's alpha is 0.86. Avoidance means that 'staff perceive that risk issues and policy breaches are ignored, downplayed, or excused'. As

reported by Sheedy et al. (2017), negative risk behaviour among employees and managers in banks is associated with a high level of avoidance.

Chapter 4: Results and Discussion

This chapter presents the regression models for each hypothesis and explains the variables used. After that, data analysis is conducted and the results discussed.

4.1 Variables

4.1.1 Dependent Variables

4.1.1.1 Risk Culture

Perception is a measure of risk culture measured in the survey about the perception on risk compliance in a participant's own session. By definition, risk culture is the perception of risk-related behavioural norms. Therefore, perception of risk compliance among employee was used as a proxy of risk culture. The value of *Perception* is presented as a percentage term.

4.1.1.2 Compliance

Compliance is a binary variable so logistic regression models are employed. Risk compliance behaviour can be measured in two ways. The first way is compliance by subject (*Compliance$_A$*), which examines the case of participants who are fully compliant throughout the experiment. The second is compliance by investment (*Compliance$_B$*), which examines compliance for those investments that violate risk policy. Since compliance by subjects has stricter rules for recognising compliance, compliance by investments was expected to be lower than compliance by subjects.

4.1.1.3 Productivity

Productivity is measured in two ways, the number of investments and the number of compliant investments, which provided different insights into the effect of variable payment systems. Despite the fact that participants were expected to invest in as many compliant investments as possible, conservative participants in fixed payment treatments may be reluctant to do so. Analysing the number of compliant investments selected can show whether a fixed payment system will discourage participants from performing their duties.

Conversely, analysing the number of total investments selected can take the noncompliance issue into account. This measure also showed the profit participants earned for their firm.

From the financial institution's perspective, it is impossible to know the number of compliant investments selected before being audited. Auditing also takes time and requires resources which limits the number of investment that can be audited—financial institution can usually only check the total number of investments. As a result, the total number of investments made can help provide a full picture on the productivity of participants from financial institutions' perceptive.

4.1.2 Treatment Dummy Variables

Four treatment dummy variables are included in all above models. They are:

1) *VariablePayment*, takes value of 1 when a participant is in variable payment treatments (VP, VN and VR)

2) *ProfitFocus*, takes value of 1 when a participant is in profit-focused treatments (VP and FP)

3) *VariablePayment* x *ProfitFocus*, takes value of 1 when a participant is in VP treatment

4) *VariablePayment* x *RiskFocus* takes the value of 1 when a participant is in VR treatment.

The coefficient of each dummy variable depicts the difference between treatment groups. *VariablePayment* shows the difference between fixed payment and variable payment treatments. *ProfitFocus* shows the difference between profit-focused treatments and no culture treatments in fixed payment structure (i.e., FP v. FN). *VariablePayment* x *RiskFocus* shows the difference in risk-focused treatments and no culture treatments with variable payment structure (i.e., VR v. VN). Note that *VariablePayment* x *ProfitFocus* cannot show the difference between VP and VN, because *ProfitFocus* includes both FP and VP. The difference between VP and VN is obtained by adding the coefficient of *ProfitFocus* and *VariablePayment* x *ProfitFocus*. Given that the study did not include a treatment of fixed payment and risk focused framing statement, *RiskFocus* only appears in the interaction with *VariablePayment* in the treatment dummy variable.

Given that there is no dummy variable directly showing the comparisons between VN and VP and VP and FP, the regressions are resembled two addition times by using the following independent variables to obtain these two comparisons.

For the comparison between VN and VP, the independent variables used are:

1) *VariablePayment*
2) *FixedPaymentProfit*
3) *VariablePayment* x *ProfitFocus*
4) *VariablePayment* x *RiskFocus*.

FixedPaymentProfit is a binary variable that has a value of 1 when participants are in FP. It is the only variable that is different from the main four independent variables. In this model, *VariablePayment* x *ProfitFocus* shows the difference between VP and VN. The difference between VP and VN is shown as *VP v. VN* under postestimation test.

For the comparison between VP and FP, the independent variables used are:

1) *VariablePaymentNil*
2) *ProfitFocus*
3) *VariablePayment* x *ProfitFocus*
4) *VariablePayment* x *RiskFocus*

VariablePaymentNil is a binary variable that has a value of 1 when participants are in VN and is the only variable that is different from the main four independent variables. *VariablePayment* x *ProfitFocus* in this setting is the variable showing the difference between VP and FP. The difference between VP and FP is shown as *VP v. FP* under postestimation test.

4.1.3 Control Variables

Control variables include the *Age*, *Gender*, *Tenure*, *Seniority*, *Gross income*, *Real World Incentive*, *Duration in Australia*, *Risk tolerance*, *Attitude to risk management*, *Workplace avoidance*, *Conscientiousness*, *Line of defence*, industry segment and ethnicity of participants. These are obtained from the survey (survey items shown in Appendix B).

Age is a categorical variable with values between 1 and 5. The value of *Age* increases with a participant's age. *Gender* is a dummy variable, with a value of 1 indicating participants are female. *Tenure* is a categorical variable with values between 1 and 8. The value of *Tenure* increases with a participant's industry tenure. *Seniority* is a categorical variable with values between 1 and 6. A higher value of *Seniority* indicates a participant's lower seniority in their

firm. *Gross income* is a categorical variable with values between 1 and 8. The value of *Gross income* increases with a participant's estimated gross income for all sources this year. *Real world incentive* is a categorical variable with values between 0 and 7. Participants with no incentive payment from their firms have a value of 0 for *Real world incentive*. The value of *Real world incentive* increases with a participants' incentive payment from their firm last year. *Duration in Australia* is a categorical variable recording how long participants lived in Australia. It has values between 1 and 6, with the value increasing based on the amount of time a participant has spent in Australia.

Survey questions about *Gross income*, *Real world incentive* and *Duration in Australia* contain a choice of 'Decline to disclose'. Although this choice could be recorded as a missing value, the analytical software used excludes observations with missing values. Therefore mean imputation is used—that is, substituting the missing values by the mean value. Behaviour and demographic data does not distinguish between participants that do not disclose *Gross income*, *Real world incentive* and *Duration in Australia* and those that do.

Table 3: Survey item scores

Variable	Mean	SD
Attitude to Risk Management	7.332	1.683
Individual Risk Tolerance	2.956	1.164
Conscientiousness	3.870	0.715
Avoidance	3.328	1.154

Risk tolerance, *Attitude to risk management* and *Workplace avoidance* variables are the average of a set of related item responses. In *Conscientiousness* questions, the second and fourth questions are worded unfavourably, so it is necessary to reverse score these items before calculating the factor score.[2] The average scores of these four measures for the whole sample are shown in Table 3.

Line of defence is a binary variable with a value of 1 when the participants are in the first line of defence or they do not know which line of defence they belong to. The second and third lines of defence are risk and compliance specialists, meaning that people in these groups are

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[2] The value is presented from 1 to 5. The value of 5, for example, will be given a score of 1 and so on (i.e., value 5 = 1 score, 4 = 2, 3 = 3, 2 = 4 and 1 = 5).

more likely to understand their role in the three lines of defence model. Therefore, it is reasonable to categorise participants who do not know their line of defence as belonging to the first line of defence.

Industry segment has seven dummy variables. Each dummy variable indicates the part of the financial industry that a participant is working in. A dummy variable takes a value of 1 when a participant works in that part of the financial industry.

Three dummy variables were generated to capture the ethnicity of participants. Ethnicity may be a contributing factor in risk compliance or affects the effect from framing statements. National culture studies show that people with different nationality have different characteristics. For example, Hofstede et al (2010) summarizes national culture into four dimensions. Power distances and individualism, two of the dimensions, can explain the reason of including ethnicity of participants as one of control variables. Power distances can explain the power of authority. When the power distances are large, power and authority are treated as more important than justice. Since power distances is affecting the attitude towards power and authority, it is reasonable to suggest that people with large power distances will more likely to follow the framing statements. Generally, Anglo has a lower power distances while Asian has a higher power distances. On the other hand, individualists are expected to act on his/her own interest, while collectivists, the opposite of individualists, are expected to act on the society's interest and integrate in to a group. Since individualists are more self-interested, it is reasonable to assume that they are more likely to break the risk policy. Generally, Anglo is an individualist, while Asian is a collectivist. The majority ethnicity, Angelo/European (47%), was set as the reference group. More than 10% of participants were Chinese and North Asian and South-East Asian. Therefore these two ethnic groups had their own dummy variable (*Chinese and North Asian* and *South-East Asian*), while other ethnicities were recorded as *Other*.

4.2 Regression Models

4.2.1 Hypothesis 1

H1a: A variable remuneration system leads to a less favourable risk culture.

H1b: Profit-focused work environment (behaviour of manager and co-workers) leads to a less favourable risk culture.

H1c: Risk-focused work environment (behaviour of manager and co-workers) leads to a more favourable risk culture.

To test hypothesis 1, the research employed the following linear regression model for participants (i):

$$Perception_i = \alpha + \beta_1 VariablePayment_i + \beta_2 ProfitFocus_i$$
$$+ \beta_3 VariablePayment_i \times ProfitFocus_i + \beta_4 VariablePayment_i \times RiskFocus_i$$
$$+ \beta_5 Control_i + \varepsilon_i$$

4.2.2 Hypothesis 2

H2a: A variable remuneration system leads to a lower compliance level.

H2b: Profit-focused work environment (behaviour of manager and co-workers) leads to a lower risk compliance level.

H2c: Risk-focused work environment (behaviour of manager and co-workers) leads to a higher risk compliance level.

H2d: The relationship between a variable remuneration system and risk compliance can be mediated by risk culture.

Logistic regression was run twice, with *Perception* incorporated the second time. The aim was to test hypothesis 2d, which proposed that risk culture explains the effect of variable payment on risk compliance. The logistic regression model showed the effect of independent variables on the choice to comply. Marginal effect of independent variable was reported, because it is a method that can be easily interpreted and widely used in an experimental economic paper (e.g., Schwieren & Weichselbaumer, 2010).

$$Compliance_{A_i} = \frac{1}{1 + e^{-f(x)}}$$

$$f(x) = \beta_0 + \beta_1 VariablePayment_i + \beta_2 ProfitFocus_i + \beta_3 VariablePayment_i \times ProfitFocus_i$$

$$+ \beta_4 VariablePayment_i \times RiskFocus_i + \beta_5 Perception_i + \beta_6 Control_i + \varepsilon_i$$

The second model for participants (i) and noncompliant investments (n):

$$Compliance_{B_{I,t}} = \frac{1}{1 + e^{-g(x)}}$$

$$g(x) = \beta_0 + \beta_1 VariablePayment_{i,n} + \beta_2 ProfitFocus_{i,n}$$

$$+ \beta_3 VariablePayment_{i,n} \times ProfitFocus_{i,n}$$

$$+ \beta_4 VariablePayment_{i,n} \times RiskFocus_{i,n} + \beta_5 Perception_{i,n} + \beta_6 Control_{i,n}$$

$$+ \beta_7 Investment_{i,n} + \varepsilon_{i,n}$$

where *Investment* refers to characteristics of the investment (i.e., the loss amount and expected value).

In the second model, compliance behaviour for each investment is in panel data format. This provides an advantage over the first model—the inclusion of investment information. Specifically, the loss amount and expected value of each investment can be included as a control variable. This is worth analysing, since the loss amount is related to the risk policy and the expected value affects the payment of participants in variable payment treatment. Note that the investments included in the panel data were those inconsistent with risk policy (i.e., noncompliant investments). With reference to data collected from the experiment, each participant on average analysed and decided on 15.4 noncompliant investments, with 269 participants making a total of 4,141 decisions on noncompliant investments (presented in Table 8 in section 4.3.3.2). Under the Hausman test, used to differentiate between fixed effects model and random effects model in panel data, we cannot reject the null hypothesis (p = 0.8982) that random effect estimators are the same as fixed effect estimators. Since using random effect estimators allows for the inclusion of the control variables, it provides more information and is more efficient than random effect estimators.

4.2.3 Hypothesis 3

H3: A variable remuneration system leads to higher productivity.

To test hypothesis 3, the research employed the following linear regression model for participants (i):

$$Productivity_i = \alpha + \beta_1 VariablePayment_i + \beta_2 ProfitFocus_i$$

$$+ \beta_3 VariablePayment_i \times ProfitFocus_i + \beta_4 VariablePayment_i \times RiskFocus_i$$

$$+ \beta_5 Control_i + \varepsilon_i$$

4.3 Data Analysis

This section presents the data analysis, beginning with a correlation analysis followed by a simple comparison of descriptive statistics across treatment groups. Finally, a regression method is generated to control for the demographic factors of participants.

4.3.1 Correlation Analysis

Table 4: Correlation Analysis of Survey Items and Demographic Factors

	Age	Gender	Seniority	Tenure	Attitude to risk management	Risk Tolerance	Conscientiousness	Workplace avoidance	Compliance rate by investments
Age	1								
Gender	–0.029	1							
Seniority	–0.420***	0.155**	1						
Tenure	0.838***	–0.058	–0.472***	1					
Attitude to risk management	0.034	0.036	–0.103*	0.020	1				
Risk Tolerance	–0.181***	–0.258***	0.072	–0.219***	–0.051	1			

Conscientiousness	0.110*	–0.025	–0.008	0.075	0.115*	–0.041	1		
Workplace avoidance	0.049	0.006	–0.101*	–0.015	–0.018	0.120**	–0.029	1	
Compliance rate by investments	–0.188***	–0.089	0.043	–0.197***	–0.156**	0.106*	–0.065	0.055	1

* p<0.05, ** p<0.01, *** p<0.001.

Table 4 shows the correlation analysis of demographic control variables. First, *Age* is positively associated with *Seniority* and *Tenure*. Second, participants with longer tenure are older, more risk averse and more likely to display positive risk behaviour (i.e., achieve a higher compliance rate). Interestingly, higher *Tenure* value did not appear to have a significant association with risk management attitude and workplace avoidance. However, senior employees have a more favourable attitude towards risk management and workplace avoidance. One possible reason for this is that senior employees are more likely to be responsible for supervision of a team, which includes the responsibility of ensuring risk compliance. Third, older participants have a positive association with positive risk behaviour and negative association with individual risk tolerance. Finally, participants, who are more risk averse tended to display more positive risk behaviour. These results are consistent with Sheedy and Griffin's (2017) study, which was based on 30,126 survey responses from financial professionals in Australia and Canada. Despite the significantly smaller sample size in the present study (269 participants), similarity in correlation analysis suggests that this sample is representative of the broader financial industry.

4.3.2 Descriptive Statistics

Table 5 shows the key descriptive statistics for each treatment group. The perception of compliance is used as a proxy measure of risk culture. The perception of compliance in VN (65.63%) was significantly lower (t-test: $p = 0.000$) when compared with that in FN (81.84%), suggesting that remuneration choices have a significant impact on risk culture. Similarly, when participants were given a profit-focused framing statement, the perception of compliance from participants in VP (57.82%) is significantly lower than that of participants in FP (68.18%) (t-test: $p = 0.009$). These findings suggest that risk culture is less favourable under a variable payment system, regardless of the behaviour of managers and co-workers.

The effect of manager and co-workers behaviour was analysed by comparing VP and VR with VN. When compared with VN (65.63%), perception in VP (57.82%) was significantly lower (t-test: $p = 0.044$) while perception in VR (68.05%) did not increase much (t-test: $p = 0.482$). This suggests that, conditional on a variable remuneration system, risk culture is less favourable under profit-focused manager and co-workers, but there was no difference under risk-focused environment. One possible explanation is that participants received mixed messages in the VR treatment—that is, variable remuneration is suggestive of a profit-focused culture, but manager and co-worker behaviour was risk-focused.

While variable payment leads to less favourable risk culture, it results in a lower risk compliance rate according to both measures of compliance behaviour (by subject and by

investment). The compliance rate by subject in VN (42.31%) was significantly lower than that in FN (68.63%) (t-test: $p = 0.000$). When analysing participants in the profit-focused treatments (VP v. FP), the compliance rate by subject in VP (38%) was significantly lower than that in FP (60.78%) (t-test: $p = 0.002$). The same conclusion was drawn by using compliance rate by investments. Compliance rate by investments in VN (78.43%) was significantly lower than that in FN (85.91%) (t-test: $p = 0.089$). When analysing participants in the profit-focused treatments (VP v. FP), compliance rate by investments in VP (63.72%) was significantly lower than that in FP (85.35%) (t-test: $p = 0.001$).

Manager and co-worker behaviour had mixed results when using these two measures. When comparing VP to VN, profit-focused work environment significantly increased compliance rate by investments (t-test: $p = 0.017$), but did not significantly increase compliance rate by subject (t-test: $p = 0.537$). In fixed payment treatments, participants, given a profit-focused framing statement (FP v. FN) had no difference in compliance behaviour as measured by both compliance rate by subject (t-test: $p = 0.261$) and by investments (t-test: $p = 0.877$). Risk-focused work environment did not significantly increase in both compliance rate by subject (Fisher's exact test: $p = 0.144$) and compliance rate by investments (t-test: $p = 0.237$) when comparing VR with VN. Given the mixed outcome from both measures of compliance rate, the regression detailed below will be performed twice using these two measures.

Variable remuneration schemes are often justified, because they are designed to align the incentives of agents and principals and provide motivation for greater effort. Participants in VN did not, however, invest in significantly more investments (t-test: $p = 0.2536$) than participants in FN (30.27 v. 28.41 respectively). Similarly participants in VP did not invest significantly more than those in FP (32.28 v. 28.41 respectively) (t-test: $p = 0.557$). This suggests that variable remuneration is not effective in increasing productivity, consistent with Schweitzer, Ordóñez and Douma (2004). They found that when participants are given a goal, participants in variable payment treatment (reward goal condition) have no significant difference in productivity with participants in fixed payment treatment (mere goal condition).

The failure of variable remuneration to increase productivity in the present study's experiment could be attributed to the fact that the fixed payment was higher than variable payment. Although various literature shows that a variable remuneration system can encourage productivity (Lazear 2000; Cadsby, Song & Tapon 2007), the variable payments in these are higher than fixed payments. In the present study, participants on fixed payment received A\$115 on average, while participants on variable payment received A\$110. The higher fixed payment may explain the reason for no difference in productivity between fixed and variable

remuneration systems. Another possible explanation is that participants found the experiment enjoyable and intrinsically motivating. Anecdotally, a number of participants made unsolicited comments to this effect in the lab. While maintaining motivation during a one hour experiment is relatively easy, maintaining employee motivation for 40 or more hours a week is much harder. Further, Jenkins et al. (1998) showed in a meta-analysis that, despite a positive relationship between financial incentive and productivity, laboratory experiments, on average, show a weaker relationship than field experiments and experimental stimulations. Jenkins et al. (1998) suggested that laboratory experiments have a limitation on replicating the complex field environment and financial incentive has a different meaning in a laboratory, compared with in the field. Therefore, caution needs to be exercised when generalising findings and applying them to the real world.

4.3.3 Regression Analysis

4.3.3.1 Hypothesis 1

Table 6: Linear Regression on Perception of Risk Compliance

Dependent Variable	Perceptions of Risk Compliance
Treatment variables	
Variable Payment	-13.760^{***} (0.004)
Profit Focus	-9.533^{*} (0.085)
Variable Payment, Profit Focus	2.976 (0.701)
Variable Payment, Risk Focus	-0.141 (0.978)
Demographics	
Age	3.020 (0.249)
Gender (Female)	3.235 (0.397)
Industry Tenure	-0.099 (0.949)
Seniority	0.942 (0.443)
Gross Income	2.300 (0.141)
Time in Australia	-1.102 (0.272)
Ethnicity: Chinese and North Asian	-2.148 (0.678)
Ethnicity: South-East Asian	-1.892 (0.720)
Ethnicity: Others	0.466 (0.925)

Personal Attitudes	
Individual Risk Tolerance	−1.257 (0.412)
Attitude to Risk Management/Compliance	0.850 (0.322)
Conscientiousness	1.408 (0.551)
Real-World Workplace	
Industry Segment: Banking	−3.707 (0.613)
Industry Segment: Financial Planning	0.122 (0.987)
Industry Segment: Superannuation	−8.853 (0.285)
Industry Segment: Funds Management	−8.774 (0.315)
Industry Segment: Broking	−4.527 (0.680)
Industry Segment: Professional Services	1.681 (0.871)
Industry Segment: Consulting	−5.447 (0.575)
Lines of Defence (Line 1)	8.244* (0.054)
Employer Risk Culture: Avoidance	−2.458 (0.109)
Value of (real-world) Incentives	0.545 (0.567)
Postestimation Test	
VP v. VN	−6.557 (0.241)
VP v. FP	−10.78* (0.073)
Constant	59.75*** (0.004)
N	269
Adjusted R-Squared	0.074

p-values in parentheses; * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Table 6 shows the linear regression of perception, a proxy measure of risk culture. Robust standard errors are used, because null hypothesis of homoscedasticity in Breusch-Pagan test is rejected ($p = 0.004$). The significantly negative coefficient under *Variable Payment* showed that perception of risk compliance is weaker under all variable payment treatments (VN, VR and VP). When participants were given profit-focused framing statements, perception of risk compliance also significantly weakened (*VP v. FP*: $p = 0.073$) when comparing participants in variable payment treatments and those in fixed payment treatments. This supports hypothesis 1a that a variable remuneration system leads to a less favourable risk culture.

A profit-focused framing statement decreased the perception of risk compliance in a slightly significant way (p = 0.085). This supports hypothesis 1b that a profit-focused work environment will lead to a less favourable risk culture. However, the risk-focused framing statement did not have significant effect on risk culture (p = 0.978), consistent with the treatment analysis. Therefore, hypothesis 1c, that a risk-focused work environment leads to a more favourable risk culture, is not supported.

Among the control variables, only line of defence had significant effect on perception of risk compliance—employees in first line of defence had a higher perception of risk compliance. This can be explained by the fact that employees in the second or third line of defence always focus on noncompliance issue at their workplace (due to the nature of their roles as risk specialists) and, therefore, have a lower perception of risk compliance.

4.3.3.2 Hypothesis 2

Table 7: Logistics Regression on Compliance by Subject

Dependent Variable	Full Compliance = 1 (1)	Full Compliance =1 (2)
Perceptions of Risk Compliance		0.0062*** (0.000)
Treatment variables		
Variable Payment	–0.241*** (0.004)	–0.152** (0.043)
Profit Focus	–0.072 (0.486)	–0.017 (0.860)
Variable Payment, Profit Focus	–0.010 (0.939)	–0.027 (0.830)
Variable Payment, Risk Focus	0.062 (0.466)	0.055 (0.440)
Demographics		
Age	0.010 (0.837)	–0.007 (0.875)
Gender (Female)	0.011 (0.880)	–0.011 (0.865)
Industry Tenure	0.069** (0.010)	0.069*** (0.005)
Seniority	0.003 (0.880)	0.001 (0.955)
Gross Income	–0.061* (0.046)	–0.075*** (0.007)
Time in Australia	–0.017 (0.364)	–0.009 (0.590)
Ethnicity: Chinese and North Asian	–0.047 (0.603)	–0.056 (0.507)

	(1)	(2)
Ethnicity: South-East Asian	–0.142* (0.096)	–0.135* (0.086)
Ethnicity: Other	0.016 (0.854)	0.012 (0.885)
Personal Attitudes		
Individual Risk Tolerance	–0.021 (0.393)	–0.017 (0.457)
Attitude to Risk Management/Compliance	0.038** (0.022)	0.033** (0.033)
Conscientiousness	0.014 (0.727)	0.004 (0.908)
Real-World Workplace		
Industry Segment: Banking	–0.091 (0.431)	–0.069 (0.479)
Industry Segment: Financial Planning	–0.092 (0.471)	–0.090 (0.429)
Industry Segment: Superannuation	–0.329**(0.013)	–0.266** (0.028)
Industry Segment: Funds Management	–0.220 (0.118)	–0.186 (0.144)
Industry Segment: Broking	–0.033 (0.855)	–0.026 (0.869)
Industry Segment: Professional Services	–0.124 (0.449)	–0.155 (0.282)
Industry Segment: Consulting	–0.065 (0.693)	–0.020 (0.901)
Lines of Defence (Line 1)	–0.042 (0.564)	–0.099 (0.143)
Employer Risk Culture: Avoidance	–0.021 (0.421)	–0.004 (0.875)
Value of (real-world) Incentives	0.011 (0.581)	0.008 (0.658)
Postestimation Test		
VP v. VN	–0.082 (0.374)	–0.044 (0.612)
VP v. FP	–0.251*** (0.008)	–0.179* (0.058)
N	269	269
Pseudo R-Squared	0.157	0.247

p-values in parentheses; * p<0.05, ** p<0.01, *** p<0.001.

Table 7 shows the logistics regression of compliance by subject (with robust standard error). Marginal effects are reported. Under column (1), significant negative coefficient in *Variable Payment* suggests that implementing variable payment treatment discourages compliance behaviour (p = 0.004). The relationships are also economically significant, because variable payments decrease the probability of compliance by subject by 24.1%. The results of the

regression analysis support hypothesis 2a that a variable remuneration system leads to a lower compliance level.

None of the other treatment variables were significant in this regression analysis. Therefore, hypothesis 2b, that a profit-focused work environment will lead to lower risk compliance level, is not supported. Similarly, hypothesis 2c, that a risk-focused work environment will lead to a higher risk compliance level, is not supported. Accordingly, the link between manager and co-worker behaviour (risk focused/compliant or profit focused/noncompliant) and resulting compliant or noncompliant behaviour by participants, present in hypotheses 2b and 2c, is not supported. These can be explained by two possible reasons. Firstly, the working environment may not affect the risk compliance level after controlling other factors. Secondly, the framing statement may not reflect the peer pressure from co-workers and supervisors in the working environement.

Under column (2), *Perceptions of Compliance*, a proxy for risk culture, is inserted into the regression. After including this variable, the coefficient for *Variable Payment* decreased (from –0.241 to –0.152). *Variable Payment* was still significant, but the significance had reduced ($p = 0.043$) and *Perception of Compliance* had a significant effect on compliance behaviour ($p = 0.000$). For every 1% increase in *Perception of Compliance*, the probability of compliance by subject increases by 0.62%. This suggests that the effect of variable payment is partially mediated by perception of risk compliance, supporting hypothesis 2d. In other words, the impact of *Variable Payment* is felt through the mechanism of risk culture.

Among control variables, *Tenure*, *Gross income*, *Attitude to risk management* and *Superannuation* had a significant effect on compliance behaviour. The positive relationship between *Tenure* and compliance behaviour can be explained by the amount of experience an individual has when confronted with an economic crisis. Participants who spent comparatively more time pursuing their career were expected to have more experience in handling a financial crisis and, therefore, increased perception of the importance of risk management and risk compliance. Moreover, participants with more experience in the financial industry may have had more opportunities to receive risk training. Participants with a higher score in *Attitude to risk management* were more likely to comply with the risk policy, while a high score in *Attitude to risk management* indicated an understanding on the benefit of risk management. Therefore, there is a positive relationship between compliance behaviour and *Attitude to risk management*. Note that the only industry segment variable that had a significant effect on compliance behaviour was *Superannuation*. Given that fewer than 10% of participants worked in superannuation, this may suggest that the laboratory setting can isolate the firm effect on

participants' compliance behaviour. It is somewhat surprising that individual risk tolerance was not significant for explaining non-compliance. Alternative measures could be used in future research.

Table 8: Panel Logistics Regression on Compliance by Investment

Dependent Variable	Compliant Behaviour=1 (1)	Compliant Behaviour =1 (2)
Perceptions of Risk Compliance		0.00394*** (0.000)
Treatment Variables		
Variable Payment	–0.097** (0.022)	–0.038 (0.355)
Profit Focus	–0.019 (0.698)	0.024 (0.631)
Variable Payment, Profit Focus	–0.128** (0.035)	–0.146** (0.017)
Variable Payment, Risk Focus	0.007 (0.868)	0.018 (0.665)
Investment Variables		
Loss Amount	0.869*** (0.000)	0.870*** (0.000)
Expected Value	–3.380*** (0.000)	–3.378*** (0.000)
Demographics		
Age	0.014 (0.570)	0.006 (0.822)
Gender (Female)	0.028 (0.410)	0.013 (0.697)
Industry Tenure	0.041*** (0.002)	0.039*** (0.003)
Seniority	0.003 (0.779)	–0.001 (0.899)
Gross Income	–0.034** (0.018)	–0.046*** (0.002)
Time in Australia	–0.013 (0.158)	–0.007 (0.427)
Ethnicity: Chinese and North Asian	–0.016 (0.699)	–0.030 (0.478)

Ethnicity: South-East Asian	–0.075* (0.058)	–0.062 (0.143)
Ethnicity: Other	–0.030 (0.465)	0.012 (0.754)
Personal Attitudes		
Individual Risk Tolerance	–0.015 (0.166)	–0.009 (0.411)
Attitude to Risk Management/Compliance	0.035*** (0.000)	0.029*** (0.000)
Conscientiousness	0.012 (0.517)	0.006 (0.753)
Real-World Workplace		
Industry Segment: Banking	–0.012 (0.863)	0.014 (0.821)
Industry Segment: Financial Planning	0.015 (0.832)	0.017 (0.809)
Industry Segment: Superannuation	–0.144** (0.043)	–0.104 (0.122)
Industry Segment: Funds Management	–0.111 (0.143)	–0.068 (0.330)
Industry Segment: Broking	0.050 (0.572)	0.056 (0.491)
Industry Segment: Professional Services	–0.062 (0.457)	–0.076 (0.297)
Industry Segment: Consulting	–0.032 (0.720)	–0.010 (0.905)
Lines of Defence (Line 1)	0.019 (0.604)	–0.019 (0.611)
Employer Risk Culture: Avoidance	–0.007 (0.614)	0.002 (0.870)
Value of (real-world) Incentives	0.014 (0.161)	0.011 (0.265)
Postestimation Test		
VP v. VN	–0.147*** (0.001)	–0.122*** (0.003)
VP v. FP	–0.225*** (0.000)	–0.185 (0.000)
Constant		
N	4141	4141

Pseudo R-Squared	0.055	0.073

Table 8 shows the panel logistics regression on compliance by investments (with robust standard errors). Marginal effects are reported. As expected, both investments-related variables had a significant effect on compliant behaviour. Increases in loss amount encouraged compliance (p = 0.000). One possible reason is that participants may have related the loss amount to risk policy, meaning that participants were reluctant to select investments with a high loss amount. Conversely, expected value has a negative relationship with compliance (p = 0.000). This was expected, as participants can earn a higher income in the variable payment treatments if they select investments with higher expected value.

Similar results were obtained in panel logistics regression. Under column (1), significant negative coefficient in *Variable Payment* suggests that implementing variable payment discourages compliant behaviour (p = 0.022). As shown in Table 7, the relationship is also economically significant, because variable payment decreases the probability of compliance as measured by investments by 9.7% in no framing treatments and 22.5% in profit-focused treatments. This analysis further supports hypothesis 2a that variable remuneration leads to reduced compliance.

Unlike the previous analysis of compliance by subject, compliance by investment was found to be influenced by manager and co-worker behaviour. *Variable Payment, Profit Focus* was significant, but not *Profit Focus*, suggesting that consistency between remuneration and behaviour is important. This is consistent with the earlier analysis in Table 5. A profit-focused framing statement further discouraged compliance for participants in variable payment treatments (p = 0.001) and decreased the chance of compliance by investments by 14.7%. Therefore, hypothesis 2b is partly supported by the panel logistic regression model. A risk-focused framing statement did not affect the compliance behaviour in this analysis (p = 0.868). Therefore, hypothesis 2c, that risk-focused manager and co-worker behaviour leads to a higher risk compliance level, is not supported.

Under column (2), *Perceptions of Risk Compliance*, a proxy of risk culture, is inserted into the regression. After including this, variable payment is no longer significant and perception has a significant effect on compliance behaviour (p = 0.000). For every 1% increase in perception of risk compliance, compliance by investments increases by 0.394%. This suggests that the effect of variable payment is fully mediated by perception of risk compliance. Therefore, hypothesis

2d, that the relationship between a variable remuneration system and risk compliance can be mediated by risk culture, is supported.

As with the result in logistics regression, the control variables of *Tenure*, *Gross income*, *Attitude to risk management* and *Superannuation* had a significant effect on compliance behaviour.

4.3.3.3 Hypothesis 3

Table 9: Linear Regression on Productivity

Dependent Variable	Investments per Participant (1)	Compliant Investments per Participant (2)
Treatment variables		
Variable Payment	1.761 (0.431)	0.450 (0.804)
Profit Focus	1.865 (0.426)	1.733 (0.384)
Variable Payment, Profit Focus	0.691 (0.845)	–2.161 (0.441)
Variable Payment, Risk Focus	2.001 (0.400)	1.994 (0.284)
Demographics		
Age	–2.429** (0.042)	–2.099** (0.035)
Gender (Female)	–0.696 (0.703)	0.371 (0.802)
Industry Tenure	–1.284* (0.062)	–0.579 (0.293)
Seniority	0.201 (0.718)	0.155 (0.738)
Gross Income	2.437*** (0.002)	1.653** (0.011)
Time in Australia	0.960** (0.033)	0.560 (0.137)
Ethnicity: Chinese and North Asian	3.537 (0.130)	32.522 (0.197)
Ethnicity: South-East Asian	72.783 (0.159)	51.605 (0.329)

Ethnicity: Others	–3.515 (0.123)	–3.102* (0.091)
Personal Attitudes		
Individual Risk Tolerance	0.558 (0.393)	0.337 (0.540)
Attitude to Risk Management/Compliance	–0.371 (0.404)	0.206 (0.582)
Conscientiousness	–0.558 (0.596)	–0.440 (0.609)
Real-World Workplace		
Industry Segment: Banking	0.557 (0.871)	0.670 (0.787)
Industry Segment: Financial Planning	–0.655 (0.861)	–0.262 (0.927)
Industry Segment: Superannuation	–0.089 (0.981)	–1.937 (0.514)
Industry Segment: Funds Management	0.702 (0.879)	–0.895 (0.794)
Industry Segment: Broking	–4.132 (0.283)	–2.288 (0.475)
Industry Segment: Professional Services	–0.754 (0.864)	–1.371 (0.700)
Industry Segment: Consulting	5.977 (0.149)	4.851 (0.143)
Lines of Defence (Line 1)	–1.505 (0.398)	–0.665 (0.653)
Employer Risk Culture: Avoidance	0.149 (0.832)	0.042 (0.942)
Value of (real-world) Incentives	–0.792 (0.126)	–0.410 (0.303)
Postestimation Test		
VP v. VN	2.556 (0.361)	–0.428 (0.838)
VP v. FP	1.865 (0.426)	1.733 (0.384)
Constant	32.18*** (0.001)	25.64*** (0.001)
N	269	269
Adjusted R-Squared	0.127	0.079

p-values in parentheses; * p<0.05, ** p<0.01, *** p<0.001.

Table 9 shows the linear regression (with robust standard errors) of number of investments per participant and compliant investments per participant. None of the treatment variables were significant for explaining the number of investments (our measure of productivity). This suggests that variable payment cannot improve the productivity of participants and hypothesis 3, that a variable remuneration system leads to higher productivity, is not supported. These results are consistent with the earlier analysis in Table 5.

Age and *Gross income* had a significant impact on the number of investments and compliant investments. *Duration in Australia* only significantly affected the number of total investments. Older participants were observed to have a lower number of investments and compliant investments, possibly due to slower processing speed (Salthouse 1996). In the experiment, participants were required to perform a calculation exercise before making investments. Therefore, slow processing speed would have limited the amount of investments a participant could make due to the imposed time limit of the experiment. Participants with higher gross income were observed to have invested more, possibly because they are more intelligent (Ceci & Williams 1997), resulting in quicker completion of the calculation exercise and a faster processing of investment decisions (i.e., more investments considered).

Chapter 5: Conclusion and Implications

This study examined the factors affecting risk compliance by conducting an experiment with financial professionals and investigated the behaviour of financial professionals who have multiple, sometimes contradictory, objectives. Employees are expected to generate profit, but they must do so in a manner consistent with risk policy. Compliance obligations are often at odds with profit generation, because potentially profitable business must sometimes be rejected for compliance reasons. Further, compliance in the modern financial industry workplace requires the investment of a significant amount of time, which could otherwise be devoted to profit generation. This study's experiment was designed to mimic investment decisions taken by employees to reflect actual behaviour in the real-world workplace.

The results of this study showed that a variable remuneration system based on profits leads to noncompliance in the financial industry by creating a less favourable risk culture. A variable remuneration system, in which the performance matric is expected profit, may indicate to employees that the true priority of the organisation is profit generation, resulting in poor compliance behaviour.

The behaviour of managers and co-workers is also relevant. Profit-focused manager and co-worker behaviour has an adverse effect on risk culture, thus indirectly influencing compliance behaviour. When profit-focused manager and co-worker behaviour is combined with variable remuneration, compliance is further reduced. These findings support the concern over profit-focused culture within individual firms and in the banking industry (e.g., Wilkins 2016). This study's findings suggest that the profit-focused work environment is an obstacle to creating favourable risk culture.

This study also provides evidence that variable remuneration does not encourage productivity, even if the payment is based on sales or profits. Given variable remuneration's ineffectiveness in significantly increasing productivity and encouragement of poor risk culture and noncompliance behaviour, this study supports the idea of re-examining the effectiveness of the remuneration system and possible elimination of this system in the financial industry.

This study also showed that attitude towards risk management is an important factor in risk compliance. Participants who scored high in attitude towards risk management were more likely to comply with risk policy. This suggests that financial institutions should be aware of their employees' attitudes towards risk management and consider these attitudes during the recruitment and promotion process.

Even though the compliance rate in this study's experiment is low (53.17% of participants breached the set risk policy at least once), this does not necessary mean that a high level of noncompliance exists in the financial industry. Given that this experiment was completely anonymous and participants were not identified as breaching policy, this laboratory setting may result in a higher noncompliance rate than in the real-world workplace. This is supported by the economic and tax literature investigating how anonymity encourages noncompliance or cheating (Yaniv & Siniver 2016). Employees may be reluctant to break the rules in the real-world workplace, since noncompliance may result in reputation damage if caught. Therefore, the noncompliance rate in the workplace should be lower than in this study.

5.1 Limitation of this Study and Suggestions for Future Research

The experiment adopted in this study aimed to reflect the financial industry workplace. However, the experiment was still in a simple form. Additionally, there are many differences between the experiment and workplace environments, resulting in limitations and suggestions for future research.

The compliant behaviour across all the variable payment treatments is surprising. Given the fact that the penalty rate is 300 percent and audit rate is 20 percent, the expected value of each noncompliance decision is 20 percent of the expected value of investment3. Although the risk policy encourages participants to reject risky investments, a rational participant should fully invest. However, there are a surprising number of participants fully comply with the policy, especially under the profit-focused treatment where participants were receiving mixed messages (38% in VP, 42% in VN and 55% in VR). Two possible reasons can explain this surprising compliant behaviour. Firstly, human has a tendency to obey with the rules and follow authority. Milgram (1974) demonstrated that majority (85%) of participants would follow authority and instructions to punish others even they questioned whether it is ethically acceptable. Dolinski et al (2017) repeated the experiment in Poland and showed the same results even 50 years after Milgram's experiment. Secondly, participants learnt the importance of compliance from their workplaces. Reforms of risk governance suggested by The Basel Committee on Banking Supervision and The Basel Committee emphasised the importance of compliance with risk policies. This can also explain the reason of the positive relationship between tenure and compliance rate in this study. Thirdly, participants may comply with the risk policy because of moral costs. Participants may be afraid that their personal image may be damage if they break the risk policy. In tax compliance study, Traxler (2010) found that

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3 Expected value of noncompliance in variable payment treatments is 1x(1-20%) –20%*3 = 0.2

individuals will incur higher moral cost and are less likely to justify tax evasion if they believe others comply with the rule.

In the workplace, there are different types and forms of variable remuneration systems. Two commonly discussed types of variable remuneration systems are target-based remuneration and competition-based remuneration systems. Both encourage cheating, as evidenced in laboratory experiment studies. For example, Schweitzer, Ordóñez and Douma's (2004) study on target-based remuneration systems found that people are more likely to cheat when they are given a target-based payment treatment ('reward goal condition') than people in fixed payment treatment ('do-your-best condition'). Schwieren and Weichselbaumer's (2010) study on competition-based remuneration systems found that poor performers in competition-based payment treatment are more likely to cheat than participants in fixed payment treatment. Competition and pressure still exist in a fixed remuneration system, with employees competing for promotion opportunities. In this study, although fixed payment showed a favourable risk culture and partially favourable risk compliance, the lack of competition may have resulted in overstating the effect of fixed payment on risk culture. Therefore, the effect of different types of variable remuneration systems on risk culture and risk compliance should be investigated in future studies.

The framing statements reflect extremes in terms of organisational culture, i.e. profit-focused versus risk-focused. It is likely that in reality, many workplaces have a culture that lies somewhere on a spectrum between these two extremes. In such cases, the effect sizes may not be as large.

This study shows the variable remuneration system creates a weaker risk culture and therefore reduces risk compliance level. However, in this study, I did not deconstruct the concept of risk culture. For further research, experimental study can still be used to deconstruct risk culture and test each factor in a controlled setting.

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Appendices

Appendix A. Experiment Instructions

(IP: Incentive, Profit Culture

IN: Incentive, No Culture

IR: Incentive, Risk Culture

FP: Fixed, Profit Culture

FN: Fixed, No Culture)

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 [IP/IR/FP:21] [IN/FN:20] minutes.

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

Be sure to read all [IP/IN/IR/FP:4] [FN:3] pages of instructions.

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:

Deal 1: Analysis
Chance of Profit = 50 %
Profit Amount = $ 200,000
Chance of Loss = 50 %
Loss Amount = $ 190,000
Expected Profit is:

OK

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 x Profit amount − Probability of losing x Loss amount
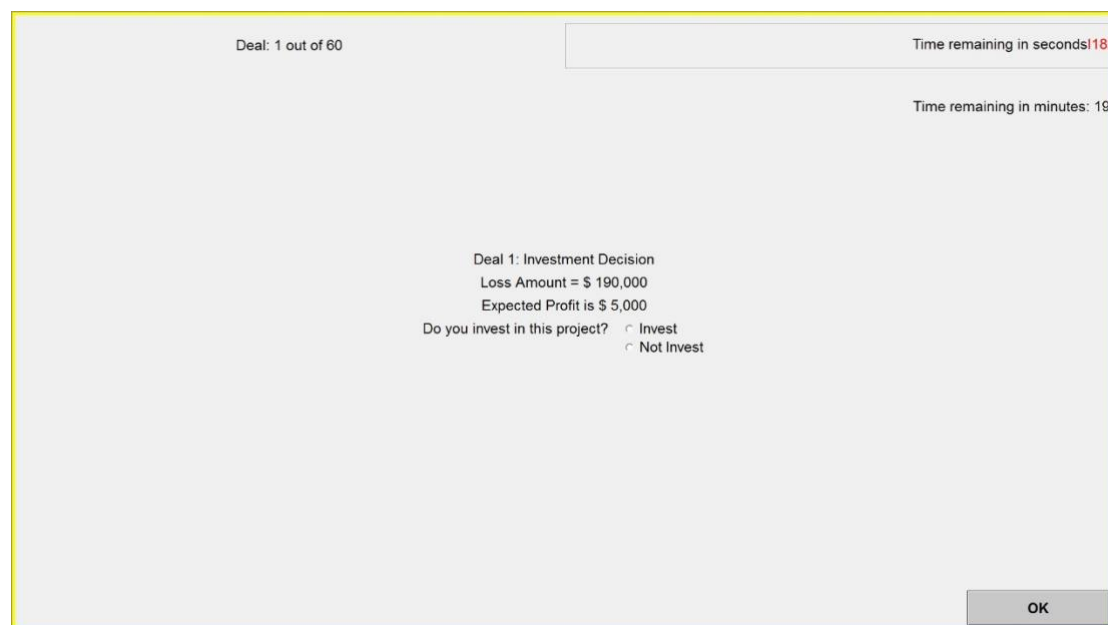
In this example, the expected profits are:

0.5 x 200,000 − 0.5 x 190,000 = 5,000

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.

Deal: 1 out of 60

Time remaining in seconds|182

Time remaining in minutes: 19

Deal 1: Investment Decision
Loss Amount = $ 190,000
Expected Profit is $ 5,000
Do you invest in this project? ○ Invest
                                 ○ Not Invest

OK

Your Cash Payment

Your decisions will determine how much cash you receive at the end of the session. [IP/IN/IR: 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.

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. [IP/IN/IR/NC: The penalty to your total expected profits is **3 times** the expected profits from the noncompliant investment. Therefore, the net loss is 2 times the expected profits for the noncompliant investment if audited.] [FP/FN: The penalty is 0.046% of the expected profits from the noncompliant 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 x 200,000 – 0.4 x 250,000 = 20,000

This investment violates risk policy (the loss amount of $250,000 is more than the specified limit of $200,000). [IP/IN/IR: 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.]

Work Environment

[IP/FP: In your workplace compliance with risk policy seems to have a low priority compared with meeting **profit** targets. Noncompliance 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**.]

[IN/FN: In your workplace noncompliance 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: **[IP/IR/FP:21] [IN/FN:20] minutes**

Number of deals: **Up to 60**

Risk Policy/Limit: **Loss amount must be less than $200,000**

Penalty: **[IP/IN/IR:3x] [FP/FN:0.046%] expected profits for the noncompliant deal if caught**

Audit Rate: **20% of deals checked for compliance**

Payment: **[IP/IN/IR: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?

Appendix B. Survey Questions

	Items	Responses
Perception	**(1 item)**	
	In the experiment you just completed, a number of investments were outside of risk policy because the Loss Amount exceeded $200,000. In your opinion, what percentage of participants in the experiment would ALWAYS follow risk policy (i.e. not invest if outside the risk policy)? (Enter X %)	
Individual Risk Tolerance (Financial) DOSPERT scale	**(6 items)**	Provide a rating from Extremely Unlikely to Extremely Likely (7 point scale)
	1. Betting a day's income at the horse races	
	2. Investing 10% of your annual income in a moderate growth mutual fund	
	3. Betting a day's income at a high-stake poker game	
	4. Investing 5% of your annual income in a very speculative stock	
	5. Betting a day's income on the outcome of a sporting event	
Attitude to risk management and compliance	**(3 sliders)** For the three questions below, drag the slider to the point that best reflects your opinion about the financial services industry today	Slider 0 to 10

	1. Risk management is: An unnecessary impediment to doing business/ An enabler for doing business	
	2. The focus on risk management and compliance these days is: Excessive/ Should increase	
	3. Compliance is: An excessive drag on business/ Crucial for firm reputation and resilience	
Conscientiousness	**(4 items)**	Provide a rating from Strongly Disagree to Strongly Agree (5 point scale)
	1. I get chores done right away	
	2. I often forget to put things back in their proper place	
	3. I like order	
	4. I make a mess of things	
Avoidance	**(6 items)**	Provide a rating from Strongly Disagree to Strongly Agree (6 point scale)
	1. Senior leaders don't want to hear about bad news	
	2. Questions about risk and warning signals are sometimes ignored	
	3. Sometimes it is unclear where the boundaries of acceptable risk taking lie	
	4. The behaviour of those who breach risk policy is typically excused if they are a top performer	
	5. Breaches of risk policy often get "swept under the carpet" (hidden or ignored)	
	6. The importance of risk management frameworks, policies or processes are criticised or downplayed by staff	
Demographics	**(11 items)**	
	1. How old are you?	Less than 25yrs

			25-34
			35-44
			45-54
			55yrs or over
		2. Are you…?	Male/female
		3. How long have you worked in the financial services industry?	<6mts
			6mts to just less than 1 yr
			1yr to just less than 3yrs
			3yrs to just less 5yrs
			5 to 10 yrs
			10 to 15yrs
			15-20yrs
			20-25 yrs
			>25yrs
		4. At what level are you currently working?	Senior Management
			Report to Senior Management
			Middle Management
			Team Leader
			Professional Employee (but not a Manager)
			Team Member/Frontline Employee
		5. What best describes your role (also known as the Lines Of Defence model)?	1) Business (Line 1)
			2) Independent/Specialist Risk Manager, including Compliance (Line 2)
			3) Internal Audit/Assurance (Line 3)
			4) Don't know
		6. In which part of the financial services industry are you working?	Banking and Finance

		Superannuation
		Broking
		Financial Planning/Wealth Management
		Funds Management
		Consulting
		Professional Services
		Other
	7. What do you estimate your gross income will be from all sources this year (including the value of expected bonuses, allocations of shares and options, etc.)?	<$40,000
		$40,000 to $80,000
		$80,000 to $120,000
		$120,000 to $160,000
		$160,000 to $200,000
		$200,000 to $300,000
		$300,000 to $400,000
		>$400,000
		Decline to disclose
	8. Have you received any incentive payments relating to your work in the financial services industry in the past year?	Yes, in the form of cash
		Yes, in the form of shares or options
		Yes, in the form of both cash and shares or options
		No
		Decline to disclose
	9. What was the total value of these incentive	<$10,000

	payments?	$10,000 to $20,000
		$20,000 to $30,000
		$30,000 to $50,000
		$50,000 to $75,000
		$75,000 to $100,000
		>$100,000
		Decline to disclose
	10. What ethnic background do you most associate with?	Aboriginal and Torres Strait Islander
		Anglo/European
		Chinese and North Asian
		SE Asian
		South Asian
		Polynesian/Islander
		South American
		African
		Middle Eastern
		Other
	11. How long have you lived in Australia?	All my life
		20 yrs or more
		15-19 yrs
		10-to 14 yrs
		5 to 9yrs
		less than 5yrs