The influence of individual differences and decision domain on the consistency of risk preferences

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Thesis summary

The research presented in this thesis considers the question of whether individual-level risk preferences are consistent or inconsistent across decision domains. For example, do people make the same decisions with respect to work, health and finance? Some previous authors have suggested that risk preferences are inconsistent, e.g. Kahneman and Tversky (1979), while others have put forward the idea that people have generalised tendencies to take or avoid risks, e.g. Sitkin and Pablo (1992).

The work of Sitkin and Pablo was drawn upon to develop hypotheses concerning the conceptualisation and construction of risk propensity. Risk propensity was operationalised as the degree of consistency of cross-domain risk preferences. It was proposed that a propensity to take or avoid risks is associated with whether individuals have consistent tendencies across different decision domains, that personality will be a key predictor of risk propensity, and that inconsistent cross-domain risk preferences will be associated with risk domain-specific cognitive and emotional aspects of decision making.

A survey measure was developed to assess risk and decision preferences both across and within the domains of work, health and finance. Biographical and personality factors were also measured. The sample comprised 360 participants drawn from five sample groups chosen to capture a range of risk preferences.

The results showed that risk propensity can be conceptualised and measured in terms of the consistency of cross-domain risk preferences. People who were consistent in their risk preferences were characterised by the personality traits of emotional stability, low extroversion, low openness and high agreeableness. Additionally, consistent risk preferences were associated with relative consistency of attention to situational information and perceived risk. The majority of participants, however, had different risk preferences in different domains, and showed variability in their decision preferences. The implications of the research for understanding risk propensity and risk management are discussed.

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Chapter 1

Introduction

1.1 Chapter abstract

This thesis explores the factors that influence whether people are consistent or inconsistent in their risk preferences across decision domains.

The first section of the chapter discusses the context within which individual risk taking takes places. Two key elements of the risk problem that influenced the development of this research are presented. These elements are the need for further theoretical work into the concept of risk preferences and the factors that motivate individuals to take risk, and the need for an understanding of individual-level risk preferences that could assist the risk management process. The next section of the chapter discusses three different approaches to risk that have shaped much of the theoretical and empirical work in the risk field. The approaches are utility theory, prospect theory and the more psychological approach. The next section of the chapter discusses the key concepts used in this research. The chapter concludes with a summary of each of the following chapters.

1.2 The risk context

The research described in this thesis was developed in response to two aspects of the risk that are the focus of discussion. The first aspect is a theoretical issue. It has been suggested that there is a considerable volume of work that needs to be carried out in order to understand people's perceptions and responses to risk (Rosa, 1998). A key question that has been raised by a number of researchers is why some people are consistent in their preferences for taking or avoiding risk, and why some people are inconsistent. In many aspects of life an individual can make a choice about whether to avoid a risk or whether to accept a risk. If the individual makes the latter choice, to bear a risk, it could be because the person wishes to attain goals that can only be achieved by taking a risk. For example, City traders working in emerging markets know that they must take risks in order to gain rewards. The choices that people make about risk can be dependent upon many factors. It is frequently likely that situational variables have important influences on behaviour. However, theoretical and empirical research carried out in the psychological tradition have shown that there are important individual-level differences that affect people's choices about risk. Some people are more consistently willing to take risks than others. Some people are consistently unwilling to engage in risky activities. Some people choose to accept some risks, but not other risks. The research described in this thesis considers the relationship between individual difference characteristics, decision domain and risk preferences to assess why some people have consistent approaches to risk and some people do not.

One important concept that applies to the consistency of risk-related decision making and risk taking is risk propensity. Theoretical and empirical work into the concept of risk propensity is reviewed in the next chapter. It is concluded that while there are several theoretical models of risk behaviour that include the notion of risk propensity, and a number of studies that operationalise the construct, there are opportunities for further exploration and theoretical development of the concept. The research presented in this thesis seeks to contribute to the debate about the nature of risk preferences, key components of risk propensity (Sitkin & Pablo, 1992), and whether preferences are consistent and inconsistent across decision domains. The issue of consistency over time

is not measured in this research, although the implications of the results are discussed in relation to temporal consistency in Chapter 9.

A second issue that influenced the development of this work is the increased importance of risk management in organisations. High profile events over the last few years, such as the collapse of Barings bank, the illegal copper market trading in Daiwa bank and several railway disasters, have raised the issue of risk to the forefront of management practice. It could be that the key to effective risk management lies in the understanding of individual-level risk-related decision processes to complement the development of appropriate information, control and incentive systems. It is argued in this thesis that there are individual differences in risk preferences that influence whether people choose to take risks or avoid risks. These differences could have important implications of the management of individuals in high risk, safety-critical industries.

1.3 The nature of risk

The concept of risk has already been referred to a number of times in this chapter. This section discusses the approaches to individual-level risk that have been used in the risk literature and presents the approach to risk that has been used in this research.

1.3.1 Risk and utility

The concept of utility is a key component of several theories of risk. These theories propose that when people make decisions they seek to maximise utility, or output, by choosing the optimal combination of probability and the size of the potential gain. Hence the use of the term expected utility theory.

One of the most historically significant theories of risk was developed by Daniel Bernoulli. Bernoulli examined people's risk-related choices and published a paper on expected utility theory in 1738. This paper was to form one of the key tenets in classical finance theory, that investors are risk averse (Bodie, Kane & Marcus, 1996). Bernoulli

proposed that, when making choices, people seek to maximise expected utility rather than maximise expected returns. He suggested that behaviour could be characterised by a utility function that assigns a utility to any level of personal wealth. Bernoulli hypothesised that the utility function could be represented as a convex curve with utility on the vertical axis and wealth on the horizontal axis. The change in utility from any increase or decrease in wealth therefore depends on the existing wealth prior to the gain or loss. The shape of the utility curve means that the disutility from losing wealth is greater than the utility of gaining wealth. That is, people will be risk averse. Bernoulli proposed that risk aversion can be subject to individual differences, although he did not go into details about these differences, and can be calculated by asking an individual how much greater the winnings need to be than the stake in a fifty-fifty gamble. Individual risk behaviour is hypothesised to be determined by the asymmetry of the utility curve above and below an individual's current wealth.

There are two important corollaries of Bernoulli's work that are critical factors in modern finance. First, there is an assumption that people will require compensation to place their wealth in an investment that associates risk with return. This implies that the expected return on risk could be an important factor that motivates individual choice. Second, the aggregation of individual-level risk functions is a key factor in the operation of financial markets.

The development of Bernoulli's work has been of great importance in the finance field. Expected utility theory in this form has not been applied in the psychological field, although it has been developed to encompass subjective perceptions of risk. The subjective expected utility approach to risk was based upon the work of Savage (1954). Savage showed that the expected utility model could be generalised to include subjective measures of probability. The subjective expected utility model acknowledges that both probabilities and utilities are defined subjectively and individually.

The expected utility and subjective expected utility models of decision making have a significant place in the risk literature. The models have been particularly important in the risk and finance literature. These approaches have been a part of the debate about the rationality of decision making, and whether people should, or do, make decisions in the

way that these models predict (Neumann & Politser, 1992). The models also have relevance to the psychological literature. Expected utility models do not expand the debate about the psychological nature of risk and the individual factors that could influence decisions about risk. However, the expected utility approach does acknowledge that there is a subjective component of risk perception. The subjective nature of risk has been a key foundation to the development of psychological approaches to understanding risk (Broadbent, 1984). A model that has been a bridge between the more objective models of risk and the more subjective psychological models of risk is prospect theory (Kahneman & Tversky, 1979).

1.3.2 Prospect theory

Prospect theory was developed by Kahneman and Tversky (1979) to describe observations about decision making and risk taking that did not conform to expected utility models of decision making. The authors suggested that there were systematic inconsistencies between actual behaviour and the rational behaviour predicted by expected utility models. An example of observed decision behaviour was the under-weighting of probable outcomes compared with certain outcomes. Decision preferences were shown to be non-linear. That is, the authors suggested that people do not think in terms of objective probabilities. Rather, they use subjectively determined decision weights that deviate most from objective probabilities when the probability is either very high or very low. That is, very low probabilities tend to be over-weighted, very high probabilities tend to be under-weighted and certainty at either pole is weighted very highly. In addition, Kahneman and Tversky observed that people do not weigh equally shared aspects of different alternatives. Hence they are susceptible to the influences of framing, for example whether an outcome is framed as a loss or a gain. Prospect theory was developed to account for these observations.

The authors proposed that there is a relationship between objective and subjective losses and gains that can be described in terms of two curves, shaped like a tilted 'S' about a reference point which separates the domain of loss from the domain of gain. The curve is concave for losses and convex for gains. The curve is steeper in the domain of losses,

indicating that losses are more significant to an individual than the equivalent gains. The theory predicts that behaviour will be risk averse in the domain of gains, because people focus on what they have that they could lose, and risk seeking in the domain of losses because, once people have already experienced loss, the value of subsequent losses is deemed to have decreased relative to the value of removing loss altogether. Prospect theory is an important part of the risk literature for several reasons. First, an implication of the theory is that risk behaviour varies on a situational basis. Second, the theory proposes that perceptions of loss and gain are key determinants of behaviour. Third, there has been a considerable volume of empirical work that has been founded upon the principles of prospect theory. Prospect theory is referred to at several points throughout this thesis, due to its prominence in the risk literature, and is discussed in more detail in Chapter 3.

The research that has been founded on prospect theory has tended to use an experimental research method. This method enables the examination of whether framing choices as losses or gains affects decision making, for example by presenting one sample group with a positively framed choice and another group with a negatively framed choice. The effects of other factors, such as environment, that might influence choice can be controlled. The measures used in this type of research have tended to be standardised scenarios. One of the scenarios used by Kahneman and Tversky in their research, and cited frequently by other authors, is shown and discussed in Chapter 3. The approach to risk used in the research presented in this thesis has been influenced by prospect theory and its predictions of the influence of loss and gain on risk taking. The second key influence on the research discussed in this thesis is the psychological approach to risk.

1.3.3 Psychological models of risk

The prospect theory approach to risk and the more psychologically-oriented approaches to risk are presented in separate sections due to the degree of importance attributed to individual difference and psychological characteristics. Prospect theory presents a method for describing risk seeking and risk aversion in relation to the domains of loss and gain. The more psychologically focused approaches to risk give greater attention to

variation in individual level factors that could influence risk preferences, for example personality characteristics.

Within the psychological field, however, there is a range of different ways of understanding risk. One issue concerns the definition of risk. The approaches to risk outlined in the sections above have a shared, key assumption about risk at their core: that risk is associated with loss. A summary of the components of risk by Yates and Stone (1992) proposed that the three essential, subjective, interactive elements of risk are losses, the significance of losses and uncertainty associated with losses, that is, uncertainty about the nature and scope of losses. These authors suggested that losses can take a number of forms including financial loss, performance loss, physical loss, psychological loss and time loss. Yates and Stone hypothesised that loss is compared with an internal reference point. This notion of the reference point is somewhat more complex than the reference point in Kahneman and Tversky's prospect theory (1979) that divided the domains of loss and gain. Yates' reference points include personal average references, that are related to the past history of outcomes; social expectation references, concerned with expectations of social contexts; target references, that is the situation that a person aspires to be within. In sum, Yates and Stone suggested that when making decisions about risk, people consider what they think they will lose and in which areas of their life they would be worse off.

An alternative perspective of risk, and one that is adopted in this research, is the notion that risk involves gain. The relationship between risk and gain is at least implicit in a number of models of risk. For example, although the expected utility approach to risk focused on loss and loss aversion, this approach did acknowledge that a key component of risk, and a reason why people will engage in risky investments, is the association of risk with return. In the financial markets environment, and many other environments alike, it can be that the biggest risks yield the biggest rewards. The notion of gain is also included in the work of Sitkin and Pablo (1992). Their approach encompasses a number of features of risk including the possibility of gain and the importance of goal-directed behaviour. That is, risk might be taken in order to meet certain expectations or to achieve particular goals. This approach provides a piece of information about why people engage in risky behaviour, and why some people might be inconsistent in whether they

prefer to take or avoid risks than others that is important in this research: people are motivated to achieve their goals and are willing to take risk, or accept risk, to attain desired outcomes. An important issue raised by this statement concerns the nature of goals. The risk literature suggests that there can be two types of goals of risk behaviour. The first type of goal concerns the relationship between risk and rewards. In some contexts, such as financial markets, there is a positive relationship between risk and reward. People willing to take risk are likely to benefit financially, as discussed above in relation to expected utility theory. The second type of goal concerns the more intrinsic reward that is the sensation that could be associated with risk taking. The work of Zuckerman into the concept of sensation seeking began with a paper by Zuckerman, Kolin, Price and Zoob (1964). Zuckerman has shown in numerous empirical and theoretical papers that sensation seeking involves the pursuit and enjoyment of novel, varied, complex and intense experiences. An important element of sensation seeking behaviour is that sensation itself is a goal of behaviour (Zuckerman, 1969). Hence, people might engage in risk behaviours because of the pleasure in doing so.

In sum, there is some evidence that risk behaviour can be motivated because of the rewards that might be associated with risk, or with the sensations of risk taking itself. The two goals of risk behaviour have important implications for the way that risk behaviour and risk preferences are understood. Behaviour directed at the first type of goal could, as Kahneman and Tversky (1979) and Sitkin and Pablo (1992) suggested, be influenced by perceptions of loss and gain, reference points, risk preferences and evaluations of potential outcomes. The second type of goal behaviour is influenced by personality since sensation seeking has been shown to be a component of the extroversion dimension of personality (Costa & McCrae, 1985). It might be that, for many people, behaviour is motivated by a mixture of both reward seeking and sensation seeking. The combination of factors could vary on an individual-level basis and be determined by the strength of personality characteristics and psychological decision preference variables. This raises interesting questions about the consistency of risk preferences and risk behaviour which have been little addressed in the psychological literature and which are the focus of this thesis. These issues are discussed at length in Chapters 2 and 3. In short, it could be proposed that, if risk preferences are shaped by personality, they are more likely to lead to approaches to risk that are consistent across

different decision domains. If risk preferences are shaped by decision characteristics, such as position of loss and gain in relation to a reference point, then risk behaviour is more likely to be situationally variable and inconsistent. These propositions lead to the development of three key aims of this research.

1.4 Summary of the research aims

The research had three aims. These aims were developed from the risk literature, and shaped the research method and hypotheses.

- To examine whether risk preferences are consistent across different decision domains.
- To assess the influence of biographical variables, personality factors, and cognitive and emotional decision preference variables on both the consistency of cross-domain risk preferences, and on domain-specific risk preferences.
- To consider the implications for the relationship between cross-domain and within-domain risk preferences.

1.5 Summary of key concepts discussed in this thesis

This section presents a review of the five key concepts that are discussed in this research.

Risk

The term risk has been defined and used in numerous ways. A key element of risk is the notion of probability. One approach to risk was summarised by Knight (1921, 1965). Knight proposed that risk could be defined as events that can be represented meaningfully by numerical probabilities. Risk was considered by Knight to be distinct from uncertainty, where events have no specific, rational probability distribution. The emphasis on the relationship between risk and probability of outcomes is commonly the

core of approaches to economic theories of risk. Psychological approaches to risk have tended to take a different approach. Psychologists have suggested that people do not commonly think in terms of probabilities, and indeed are often not able to, given the difficulty in calculating probabilities in most decisions. This is particularly true when the possible range of outcomes is not known. The psychological approach to risk has tended to use the term risk while acknowledging that risk includes uncertainty. This is the approach taken in this thesis.

Risk propensity

Sitkin and Pablo (1992) suggested that risk propensity is a tendency or take or avoid risks. A number of other authors have used similar definitions. Theoretical and empirical work into the concept is discussed in detail in Chapter 2. There has been some variance, however, with respect to the operationalisation of the concept. Some empirical studies have measured risk preferences, or risk taking, in finance or business contexts and have suggested that they have assessed an individual's risk propensity. Several studies are reviewed in Chapter 2. It is argued in this thesis that, if there is such as construct as risk propensity, it should be associated with consistent preferences for taking or avoiding risks across several aspects of decision making. In addition, if the construct of risk propensity can be conceptualised and measured effectively, it could provide important insights into understanding individual-level risk behaviour, for example why people take more risks than others and why some take risks in one area of their life but not other areas. Furthermore, this understanding could lead to the development of effective risk management strategies in organisations.

Risk preferences and risk taking

The terms risk preferences and risk taking are used frequently in the risk literature. Risk preference is generally considered to be a psychological construct, whereas risk taking is usually defined and measured in terms of actual behaviour. In this thesis, risk preferences are considered to be psychological constructions that influence whether people take or avoid risks. Preferences rather than behaviour are assessed for three reasons. First, the aim of this research is to examine psychological tendencies to take or avoid risk in

several types of decision. Hence a psychological concept seemed to be the most relevant operationalisation of this aim. Second, this thesis concerns the nature of risk taking in uncontrolled settings, i.e. not in the lab. A point of interest in this research concerned decisions that people make in their day to day life rather than considering standardised, hypothetical choices. Third, in some situations it is not possible to act in accordance with preferences. For example, in a highly controlled work environment risk taking might be bounded by clear regulations. These could prevent a person from taking a risk, however, there could still be a psychological motivation to take risks, such as the associated sensation of excitement, which are another issue relevant to the concept of risk propensity. In sum, the measurement of a psychological preference for taking or avoiding risks seemed to be an appropriate way to assess the relationships between personality, decision making and the consistency of risk preferences in different decision domains.

Risk perception

Risk perception is a concept that features in a number of theories of risk taking, including the work of Sitkin and Pablo (1992) that has influenced significantly the development of this research. Risk perception has been characterised in several ways. For example Sitkin and Pablo suggest that it is a broad term that represents the degree of risk perceived in any given situation. There are a number of other approaches to risk perception. As Slovic notes in his book 'The Perception of Risk' (2000), risk perception is highly subjective. Slovic and his colleagues have suggested that risk perception is associated systematically with two key hazard features – whether a hazard is believed to be controllable or not, and whether a hazard is perceived to have dread, or catastrophic, risk (Slovic, Fischhoff & Lichtenstein, 1980).

In this thesis, risk perception is conceptualised similarly to the work of Sitkin and Pablo. First, their general definition is used. It is acknowledged that a range of individual difference and situation-related variables is likely to influence risk perception. These variables are not measured, however, two assumptions following the work of Sitkin and Pablo are, first, that the level of perceived risk in a situation is a summary of the range of input factors. Second, that risk perception is considered to be an important variable that could be related to risk propensity.

Domains

Two types of domains are discussed in this thesis. One use of the term domain relates to the work of Kahneman and Tversky (1979). These authors proposed that two key influences on risk behaviour are the domains of loss and gain. For example, if people have had a positive experience, such as an unexpected financial bonus, they are suggested to be in the domain of gain. Conversely, if someone has spent more money than they had budgeted for having their car fixed, they are in the domain of loss. This conceptualisation has had a significant impact on the development of many theoretical and empirical works concerning the nature of risk and the factors that shape risk taking. The work of Kahneman and Tversky has been outlined in this chapter and is discussed in more detail in Chapter 3.

The second type of domain discussed in this thesis is the concept of decision domain. Here, a domain is taken to be an area of decision making, such as work-related decisions, or finance-related decisions. The notion that there are different decision domains, and that different domains could have particular characteristics that shape choices about risk, is a central part of the discussion around the nature of risk propensity.

1.6 Chapter summaries

This section presents an overview of each of the subsequent chapters.

1.6.1 Overview of Chapter 2

Chapter 2 discusses in detail the Sitkin and Pablo (1992) model of risk taking which includes the concept of risk propensity. This model is used to form the basis of the research that is described in this thesis and was chosen because it is the best developed and most tested model involving risk propensity. Published empirical work that has cited the work of Sitkin and Pablo is discussed. It is concluded that, while the Sitkin and Pablo (1992) model of risk propensity is a useful conceptualisation and has led to some

interesting empirical work, there are opportunities for the further development of the understanding of risk propensity. The research in this thesis aims to contribute to that development.

1.6.2 Overview of Chapter 3

Chapter 3 reviews the literature concerning individual-level influences on risk-related decision making. Previous theoretical and empirical work has shown that there are three key individual difference factors that affect choice: personality; perceptions of loss and gain; emotions. It is suggested that people can be categorised in terms of those who are largely consistent in their risk-related decision making and those who are generally inconsistent in their risk-related decision making. The former group is more likely to have strong disposition-based approaches to their risk-related decision making. The latter group, characterised by a different type of personality profile, is likely to be more susceptible to the influence of situational characteristics such as perception of loss and gain.

1.6.3 Overview of Chapter 4

Chapter 4 discusses the research design and the method. The research design was developed to enable between-participants comparisons with respect to risk preferences both within-domain and across-domain. A survey method was used to gather standardised, equivalent data in three different decision domains, work, health and finance. Biographical and personality data were also measured. The sampling strategy was developed to try to capture a range of orientations to risk, and to ensure that there was variance on all items.

1.6.4 Overview of Chapter 5

Chapter 5 discusses the data screening and describes the data in terms of the distributions of variables, both within sample groups and across the whole sample. The sampling strategy was found to have achieved its goal of variance in terms of risk preferences and decision processes. The individual-level data were found to vary both within and across sample groups.

1.6.5 Overview of Chapter 6

Chapter 6 considers the relationships between the variables measured in the questionnaire using correlation analyses. Patterns of relationships were considered between the variables within each decision domain, across the domains, and between the decision preference variables, biographical factors and personality factors.

1.6.6 Overview of Chapter 7

Chapter 7 considers the consistency of cross-domain risk preferences, and the factors that influence whether people have consistent or inconsistent risk preferences. T-test and regression analyses are used to examine the factors that are associated with consistent and inconsistent cross-domain risk preferences. Within-domain risk preferences are also examined. It was found that some people had consistent cross-domain risk preferences, while the majority had domain-specific risk preferences. The hypotheses were confirmed.

1.6.7 Overview of Chapter 8

Chapter 8 presents and discusses qualitative data. Analysis of comments revealed that there are a number of important differences associated with risks in different domains. The combination of these differences with individual choices about risk bearing and the

attainment of goals that entail risk is likely to be an important factor that influences domain-specific risk preferences.

1.6.8 Overview of Chapter 9

The final chapter discusses the conclusions and implications of the research. It is suggested that the consideration of individual-level cross-domain and domain-specific risk preferences provides useful insights into both risk behaviour and risk management. The limitations of this research are discussed. Directions for future work into the conceptualisation and construction of within-domain and across-domain risk preferences are suggested.

1.7 Chapter summary

This research aims to examine the concept of risk propensity, and to consider the factors that lead to consistent or inconsistent individual-level approaches to risk. The first part of this chapter presented the main ideas that influenced the development of this thesis. The first issue is a theoretical debate about the nature of risk propensity. The second issue concerns the management of risk in business. The second section of this chapter reviewed the main ideas in the current risk literature to show both how this research coheres with other psychological studies of risk, and to demonstrate that there are opportunities for research in this field. It was suggested that the construct of risk propensity has important implications for the understanding of risk behaviour. A summary of the key concepts that formed the basis of the research is presented. The final section gives an overview of the chapters that follow.

Chapter 2

Risk propensity theory and research

2.1 Chapter abstract

This chapter reviews theory and empirical research concerning the concept of risk propensity. The key theme of the discussion of the relevant theoretical and empirical work is whether cross-domain risk behaviour is consistent or variable.

The first section of this chapter presents and critiques the Sitkin and Pablo (1992) risk propensity framework. The second section reviews empirical work into risk preferences and risk propensity. Theoretical work and research evidence suggest that a proportion of the population can be characterised as having consistent risk preferences in different decision domains. Risk preferences can be consistent in either direction, i.e. risk seeking or risk averse. Consistent preferences have been found to be associated with particular dispositional traits. The remainder of the population is likely to have inconsistent risk preferences, and will take risks in some decision domains and avoid risks in other domains.

2.2 The Sitkin and Pablo approach to risk propensity and risk taking

The key theme in this thesis is why some people are consistent in their risk-related decision making and other people show variance in their risky decision making. This thesis was influenced primarily by the model of Sitkin and Pablo (1992). The Sitkin and Pablo model was a significant factor in the development of this research because it is the most complete synthesis of the psychological and situational antecedents of risk and has been the basis of several published empirical studies. This section discusses the model in detail.

Sitkin and Pablo's 1992 paper, "Reconceptualising the Determinants of Risk Behaviour", discussed theoretical and empirical work concerning the conceptualisation of individual-level risk-related behaviour. The paper developed a series of propositions that are derived from previous theory and research. The authors constructed a model that brings together contrasting approaches to risk taking in organisations. This model was chosen as the basis for this research for several reasons. First, the model focused on individual differences in risk preferences and risk behaviour. These factors relate to the aims of the research, namely to examine whether there are differences between people who have consistent approaches to risk and people who are inconsistent in their approaches to risk. Second, the Sitkin and Pablo approach acknowledged that risk is associated with loss and gain. This approach is different from some theoretical conceptualisations of risk that focus on the association between risk and loss. The difference between the focus on both loss and gain compared with loss alone has important implications for the understanding of the factors that motivate people to take risks, as noted in Chapter 1. Third, there is increasing empirical evidence that the Sitkin and Pablo approach to risk preferences and risk propensity represents an important method of conceptualising and understanding risk preferences, and why preferences might vary on an individual basis. Relevant empirical studies are reviewed after the discussion of theoretical work of Sitkin and Pablo. Fourth, although the Sitkin and Pablo approach to risk preferences and risk taking has been an important development in this risk literature, there are opportunities for the extension of their work. This research aims to contribute to the literature by demonstrating an alternative approach to the conceptualisation and measurement of risk propensity through risk preferences.

Sitkin and Pablo defined risk as defined "the extent to which there is uncertainty about whether potentially significant and/or disappointing outcomes of decisions will be realised" (p10). Risk behaviour was defined as the "degree of risk associated with the decisions made" (p11). Risk is related to outcomes. Sitkin and Pablo suggested that there are three characteristics of outcomes that influence the riskiness of decisions. First is outcome uncertainty. This is usually considered in terms of the variability of outcomes (Libby & Fishburn, 1977). High variability is generally considered to be more risky than low variability. For high variability to be considered positively, there need to be significantly higher returns associated with it (e.g. Bowman, 1980; MacCrimmon & Wehrung, 1986). Outcome uncertainty can also be associated with lack of knowledge of the distribution of potential outcomes, either in terms of what the outcomes actually are or what their relative likelihoods are (March, 1978) and the uncontrollability of outcome attainment (Vlek & Stallen, 1980). The more uncontrollable an outcome is, the more risky it is considered to be.

Second are outcome expectations. These concern the range of positive and negative outcomes of the risk. Sitkin and Pablo drew on the work of Kahneman and Tversky (1979) to suggest that there can be subjectivity concerning whether an outcome is positive or negative. The risk in a choice might not be in the decision or the outcome per se, but in the relationship between the outcome and the decision maker's expectations. For example, if there is a possibility that an outcome will fall well below expectation, then the decision can be considered to be more risky than if the discrepancy between expectations and potential outcomes is smaller.

Third is outcome potential. This is concerned with extreme outcomes; the best and worst case scenarios. Sitkin and Pablo cited evidence that people tend to overweight very unlikely outcomes, for example the likelihood of winning a lottery (Kahneman & Tversky, 1979). The perceived probability of outcomes is thus a non-linear function. Sitkin and Pablo proposed that outcomes might not perceived to be on a continuum, rather, there might be a threshold, or step function which separates one range of outcomes from another, as other researchers have proposed (e.g. Dutton & Jackson, 1987; Jackson & Dutton, 1988; Mintzberg, Raisinghani & Theoret, 1976).

Overall, Sitkin and Pablo proposed that decisions can be considered to be riskier when their expected outcomes are more uncertain, decision goals are more difficult to achieve, or the potential outcome set includes some extreme consequences than when there is less uncertainty, difficulty and extremity of outcomes. Within this framework, risk propensity is one the key factors influencing choice behaviour.

Risk propensity is defined as "the tendency of the decision maker to either take or avoid risks" (p12). Sitkin and Pablo proposed that risk propensity influences how a decision-maker evaluates risk and decides what risks are acceptable. Risk propensity is reflected in either an individual's range of risk related activities within and across decision arenas, or their expressed preferences for risk seeking or risk avoidance, or both. Sitkin and Pablo suggested that their definition of risk propensity enables the determination of an overall likelihood that a person will take or avoid risks, but does not enable specific predictions of risk behaviours. The authors have noted that situational factors might influence risk behaviour, and they suggested that risk behaviour can show some cross-situational variability. Sitkin and Pablo proposed that risk preferences that underlie risk propensity are relatively stable over time.

The second key concept that Sitkin and Pablo proposed shapes risk behaviour is risk perception, defined as "the perceived risk inherent in a situation" (p12). The approach to risk perception is concerned with the individual and their internal representations of, and responses to, risk situations. The risk environment is not discussed in detail, but the interaction between internal representations and the external world is central to the model. This is reflected in the authors' discussion of the nature of risk propensity, in which it is suggested that risk propensity is not an innate predisposition nor is it completely stable and constant. Risk propensity is proposed to develop slowly over time, in part as a result of experience. It is suggested that risk-related behaviour can adapt, developing with the assimilation of outcomes and experiences over time, but tends to form a robust approach to risk, either risk seeking or risk aversion, which is largely consistent across different risk domains.

The model was largely derived from dissatisfaction with previous theories, in particular, theories which have proposed that behaviour is dependent purely upon situational

variables. Sitkin and Pablo suggested that the key factor, missing in much previous research, is risk propensity. That is, an individual difference variable that interacts with the risk environment to shape behaviour. The authors present three sets of evidence in support of the proposition that risk behaviour across situations can be relatively consistent. First, Sitkin and Pablo draw upon the threat rigidity hypothesis of Staw, Sandelands and Dutton (1981) which suggested that people are consistently risk averse under conditions of threat.

Second, Sitkin and Pablo claimed that results of empirical studies into risk preferences and risk taking have been shaped by research methods. Sampling is suggested to be a cause of observed inconsistencies in risk behaviour. The authors considered the context of previous research studies in terms of their risk propensity framework. They proposed that where low risk behaviour is studied, the contexts have tended to be bureaucratic, risk averse organisations and where high risk behaviour is studied, the settings tend to be more entrepreneurial. The risk propensities of the individuals involved could be expected to differ between settings because of selection processes that favour risk seeking or risk averse behaviour from employees. The authors proposed that their meta-framework highlights the importance of the absent variable of risk propensity.

Third, Sitkin and Pablo proposed that previous studies have not only excluded risk propensity, which is important to the explanation of risk behaviour, but also that they have modelled risk behaviour incorrectly. Specifically, the authors noted that risk perception is hypothesised commonly to the key determinant of risk behaviour, however the relationship between psychological factors and risk perception is not discussed in the literature. Sitkin and Pablo attempted to develop a new model of risk behaviour that could take into account the effects of both dispositions and situations, be suitable for application in the work environment and fulfil the identified need for such a model (Davis-Blake & Pfeffer, 1989).

Sitkin and Pablo supported their framework by selecting previous theoretical and empirical work. They proposed the following categorisation (p27), shown on the next page.

Figure 2.3: Summary of theoretical and empirical work that contributed to the Sitkin and Pablo model of risk taking (1992)

		Situational characteristics (objective or perceived)	
		Positive	Negative
Risk propensity	Risk averse	Prospect theory – conservation of prior gains (Kahneman & Tversky, 1979) Loss prevention bias (Jackson & Dutton, 1988) Prediction: low risk behaviour	Threat rigidity (Staw, Sandelands & Dutton, 1981) Hypervigilance (Janis & Mann, 1977) Prediction: low risk behaviour
	Risk seeking	Attention to opportunities (March & Shapira, 1987) Prediction: high risk behaviour	Prospect theory – going for broke (Kahneman & Tversky, 1979; Singh, 1986) Prediction: high risk behaviour

Sitkin and Pablo suggested that the use of two key factors, risk propensity and risk perception, as mediators between influences on risk behaviour and risk behaviour distinguishes their model from previous models and increases the model's effectiveness. The factors that shape risk propensity and risk perception are discussed below. The authors suggested that risk propensity is concerned with the characteristics of the individual decision maker and is composed of three factors.

1. Risk propensity

1a. Risk preferences

Risk preferences are conceptualised as being a general, individual level attitude towards risk. Preferences influence whether people seek or avoid risk. Sitkin and Pablo base their propositions on the work of Douglas and Wildavsky (1982), Kogan and Wallach (1964), McClelland (1961) and Slovic (1972). Individual orientations to risk, derived from the interaction between psychological factors and the environment, are a critical element of the Sitkin and Pablo model. The notion that behaviour is directed purely by

organisational factors (e.g. Davis-Blake & Pfeffer, 1989; Salancik & Pfeffer, 1978) was not accepted.

1b. Inertia

The concept of inertia is related to the concept of risk preferences. Sitkin and Pablo suggested that once people have formed attitudes or preferences towards risk, for example whether risks are sought or avoided, these preferences tend to be relatively stable. (Kogan & Wallach, 1964; Rowe, 1977; Slovic, 1972). Sitkin and Pablo proposed that stability can be considered as a form of inertia and that inertia, or habit, can be a more important influence on risk behaviour that situational risk factors.

1c. Outcome history

Sitkin and Pablo suggested that theories that do not consider history of loss and gain, for example Kahneman & Tversky's prospect theory (1979), have omitted an important influence on behaviour. The authors cited research that has shown that people who have had positive outcomes from risk behaviour are likely to continue taking risks (Osborn & Jackson, 1988; Thaler & Johnson, 1990). Similarly, people who have had experiences of loss are risk averse in subsequent choices (Osborn & Jackson, 1988). Sitkin and Pablo proposed that people's preferences could become more extreme as a result of historical effects of loss and gain. People who prefer to take risks become more risk seeking and people who prefer to avoid risks become more risk averse. That is, people demonstrate escalating commitment to particular courses of action (Staw & Ross, 1987) with respect to risk behaviours as with other behaviours. Sitkin and Pablo proposed that people who seek to gain from risk taking, but are unsuccessful, are more likely to vary their approaches to risk in an attempt to find an optimal risk strategy. They suggested that this is the cause of variable risk behaviour. The authors likened this hypothesis to the observation that organisations that are successful tend to adhere to strategies that have been successful in the past, while organisations that are not successful tend to vary their strategies (Lave & March, 1975; March, 1988).

2. Risk perception

Sitkin and Pablo proposed that risk perception is concerned with the situation within which the decision is being made, and is influenced by six factors.

2a. Risk propensity

The factors that shape risk propensity have been discussed above. Sitkin and Pablo proposed that risk propensity is a direct influence on risk perception. Someone who is risk averse is likely to perceive risks to be greater than someone who is risk seeking.

2b. Problem framing

Research by Kahneman and Tversky (1979), and numerous subsequent authors, has demonstrated that risk behaviour can be influenced by whether a problem is presented in terms of associated gains or associated losses. Sitkin and Pablo suggested that perceptions and framing interact. They proposed that positively framed situations are perceived as entailing greater risk than is objectively appropriate because people in situations of gain have been shown to be risk averse (Kahneman & Tversky, 1979). The reverse holds for negatively framed situations, which are perceived to involve less risk than is appropriate. In addition, the positive framing of situations encourages a focus on the opportunities associated with risk taking rather than the costs (March & Shapira, 1987).

2c. Top management team homogeneity

Research into the influence of groups on decision making has indicated that there are significant interactions between group properties and the nature of decisions. Groupthink (Janis, 1972) is considered by Sitkin and Pablo to be a salient issue. Groupthink is a process associated with homogeneous groups whereby group norms reduce the range of decision outcomes. Decisions tend to be more polarised in this type of group than would be observed among individuals. Sitkin and Pablo proposed that homogenous top management teams are associated with homogeneity of team member perceptions, and a greater likelihood of strong risk aversion or risk seeking.

2d. Social influence

In the above discussion concerned with inertia it was noted that individual factors are important influences on behaviour and that organisational factors alone are insufficient to explain behaviour. Sitkin and Pablo do acknowledge, however, that the organisational social context is an important, but not exclusive, influence on risk perception. The organisational context has been termed a 'strong' situation (Mischel, 1977). That is, organisational culture, reward and control systems exert powerful constraints on behaviour (Davis-Blake & Pfeffer, 1989; Snyder & Ickes, 1985). People often have to behave in accordance with organisational expectations, explicit or implicit, rather than in accordance with their own preferences. Organisational cultures can be discriminated in terms of risk orientation (e.g. Deal & Kennedy, 1982). Sitkin and Pablo proposed that individual level perceptions would be consistent with managers' perceptions. In addition, people within organisations that have a moderate risk orientation will be more slow to perceive risks, but more accurate.

2e. Problem domain familiarity

Sitkin and Pablo suggested that the more familiar decision makers are with the decision domain, the more likely they are to apply their knowledge and experiences to new decision problems (Cohen, March & Olsen, 1972; Dearborn & Simon, 1958). Their range of responses can thus become limited. In addition, the authors noted evidence that when responses are shaped by past experiences rather than current situations, people can be overconfident and underestimate risks (Jemison & Sitkin, 1986; March & Shapira, 1987). Lack of familiarity can also relate to sub-optimal risk judgements. Jemison and Sitkin (1986) found that people who are inexperienced in organisations could adhere to inappropriate, standard procedures or make sub-optimal judgements based on incomplete information. Sitkin and Pablo proposed that people with moderate domain familiarity would have more appropriate levels of confidence and accurate perceptions of risk than people with high or low familiarity. They also proposed that low levels of familiarity are associated with greater variance in perception.

6. Organisational control systems

Control systems can be important determinants of risk behaviour because of the rewards and punishments associated with behaviour. Sitkin and Pablo highlighted, in particular,

the work of Ouchi (1977) that categorised control systems into two groups. First, reward systems can focus on the decision making process. Second, reward systems can focus on decision outcomes. Sitkin and Pablo proposed that systems which focus on process issues decrease perceptions of risk, because there is less risk for the individual if the outcome is poor, and that systems which focus on outcome issues increase perceptions of risk.

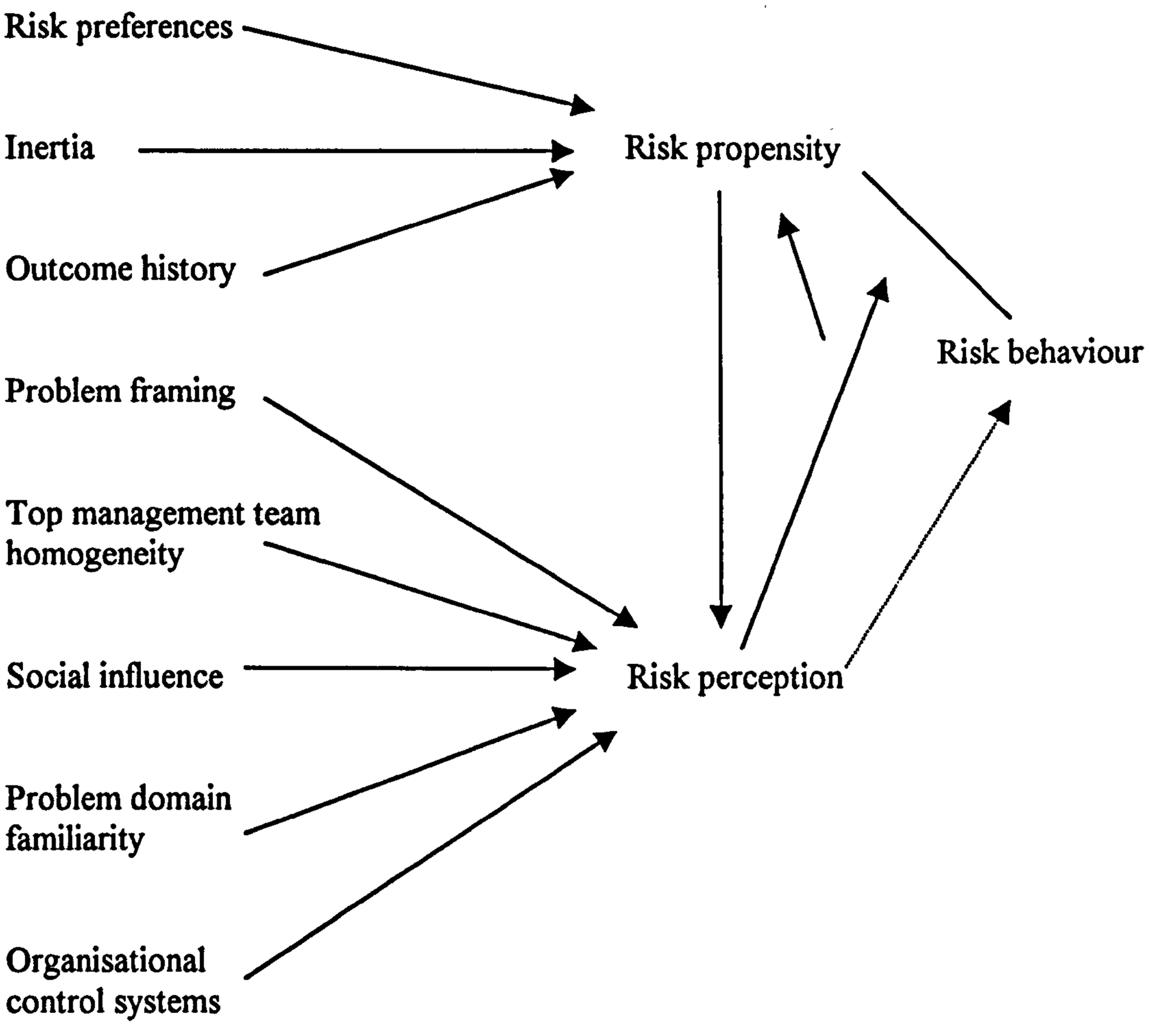
In sum, Sitkin and Pablo made several hypothesises based upon their approach to risk propensity and the work of previous authors. Their hypotheses included the following predictions that are concerned with risk propensity.

- The nature of the relationship between risk propensity and risk perception changes according to the situation and becomes stronger when perceived risk is greater. Risk averse individuals perceiving greater risk will take increasingly fewer risks and risk seeking individuals perceiving less risk will take greater risks.
- The shift in the relationship between perception, propensity and behaviour is dependent upon individual thresholds that are related to risk preferences, inertia, the barriers to overcoming inertia and the outcomes of past risk taking behaviour. Hence, individual level variations in risk behaviour are explained by the relationship between risk propensity, risk perception and behaviour.
- Perceptions are moderated by propensity rather than being a direct influence on behaviour. Perceptions can be influenced by the risk environment and are thus subject to fluctuation.
- Variance in behaviour is within the bounds of individual risk propensity.

Sitkin and Pablo summarised three theoretical contributions of their research. First, drawing together previously unrelated research streams. Second, a critical reappraisal of the roles of risk perceptions and risk propensity. Third, the identification of determinants of risk behaviour not previously recognised in the literature.

The Sitkin and Pablo model is illustrated on the next page.

Figure 2.4: The Sitkin and Pablo model (1992) illustrated



Sitkin and Pablo noted that, in addition to their theoretical contributions, there are also a number of empirical implications of their research, including the opening of the possibility of further work on organisational level factors and research into the interactions between the components of the model.

Overall, the Sitkin and Pablo model is useful to this research for several reasons in addition to the reasons outlined prior to the full discussion of the model. First, the model suggests that there is likely to be a risk propensity factor that underpins behaviour and that can show individual level variation in the degree of consistency across decision domains. Second, the model is an attempt to bring together different approaches to risk propensity: those which suggest that risk propensity is a characteristic of the individual

and can be stable over time, and those which suggest that risk propensity is a product of environmental factors. Third, the Sitkin and Pablo model is the best developed and discussed model of risk propensity. Fourth, the key principles concerning the central role of risk propensity and the relationship between propensity, perception and behaviour can be applied to settings other than the workplace.

However, there are a number of theoretical and empirical difficulties with the model. First, the conceptualisation of risk propensity as being a variable that is able to change over time yet tends to be relatively stable, is problematic. This presentation of risk propensity appears to be due to the desire to fit in with previous research. Sitkin and Pablo refer to risk propensity in terms of it being a disposition, yet make no mention of dispositions in terms of personality. This is a striking omission given the importance of personality in determining behaviour, including risk behaviour. Personality and its relationships with risk preferences and risk behaviour are discussed in the next chapter.

A second issue is the choice of the three components of risk propensity (risk preferences, inertia, outcome history). The risk preference variable is most closely linked to a disposition approach to modelling the antecedents of risk behaviour, however the other two variables, inertia and outcome history, are both related to past behaviours and habits formed partly on the basis of past behaviours. This is problematic for two reasons. First, the distinction between inertia and preferences formed over time is not clear. Second, the outcomes of behaviours are subject to interpretation which is likely to be influenced by risk perception, within the perception/ propensity framework of the individual. These variables might not be independent of risk perception.

The construction of risk perception is also problematic. The variables range from the very general, such as social influence, to the highly specific, such as top management team homogeneity. The effects of each of the variables on risk perception and risk behaviour are not explained. Nor is it explained why these variables are included, while other variables that have been also demonstrated to have effects on risk perception, such as emotions which are discussed in the next chapter, are excluded.

Third, there is some degree of tautology in the development of model and the development of predictions from the model. Sitkin and Pablo used the results of numerous different strands of research to make propositions about the influences on risk behaviour and nature of the relationships between indirect and direct influences on risk behaviour. The authors then applied the model to findings of previous research to demonstrate its fit. This seems to be an essentially circular approach that cannot prove independently the model's effectiveness.

Fourth, there is some empirical support for the model. This is discussed in the next section of this chapter. However, the variables used in research have not always been operationalised as the Sitkin and Pablo model would suggest. All the studies have only tested parts of the model. A full test of the model has yet to be published.

In sum, the Sitkin and Pablo model of risk taking and risk propensity, despite a number of conceptual and empirical problems, comprises an interesting synthesis of the literature worthy of further development. The research described in this thesis was, in part, based upon the work of Sitkin and Pablo and sought to examine some of the issues raised by the authors, in particular the issue of whether risk preferences are consistent across domains. The reasons why the Sitkin and Pablo framework was selected for use in this thesis have been outlined above. In addition, there are three further issues that make this framework relevant. First, there are interesting theoretical implications for the development of an understanding of risk propensity. Second, a consideration of the number of other models of risk propensity suggests that the Sitkin and Pablo model is the optimum basis for this research due to it being better developed and supported than the alternatives. Four published models of risk propensity are portfolio theory (Coombs, 1969, 1975; Coombs & Meyer, 1969; Coombs & Huang, 1970a); zero risk theory (Naatanen & Summala, 1974); risk homeostasis theory (Wilde, 1982); the risk thermostat model (Adams, 1985, 1988). A fifth model is the threat-rigidity hypothesis (Staw, Sandelands and Dutton, 1981). This model does not consider the concept of risk propensity, however, it does hypothesise that risk taking will be consistent in the direction of risk aversion when people are faced with threats. It has thus contributed to the debate about the consistency of risk preferences and risk behaviour. These models involving risk propensity show a considerable degree of variance in terms of their content

and structure. For example, the threat rigidity hypothesis focuses on psychological and physiological factors that lead to risk aversion in situations of threat. The Adams model proposes that the interaction between risk propensity, perceptions of societal risk, perceived danger, positive and negative outcomes influences risk behaviour such that people will adjust their behaviour to be more or less risky, as appropriate for their preferences and their situation. In general, there has been little published work that tests models either by the models' authors, or subsequent researchers. Hence, although these models are acknowledged as being components of the psychological risk literature, the models are not explored further in this thesis. Rather, the most significant influence on the research described in this thesis is the work of Sitkin and Pablo, discussed above. The third reason for using the Sitkin and Pablo model is that research based upon the model has shown some support for the ideas central to their framework of risk propensity. Empirical studies are reviewed below.

2.3 Empirical work into the concept of risk propensity

This section reviews empirical work concerned with the concept of risk propensity. The empirical work illustrates a number of approaches to the conceptualisation and measurement of risk propensity that were important influences on the development of the research described in this thesis.

The first subsection discusses research based upon the work of Sitkin and Pablo. The second section discusses the correlation approach to the study of risk propensity.

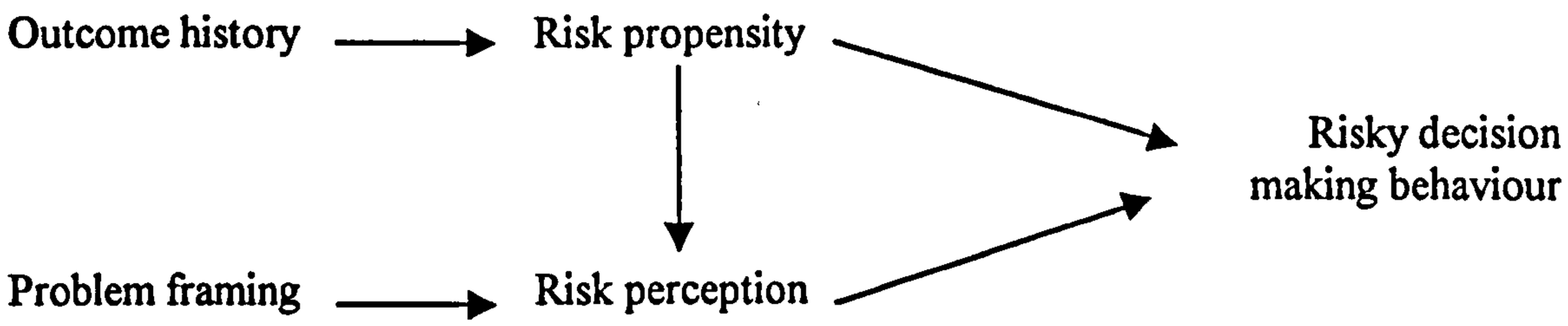
2.3.1 Research influenced by the Sitkin and Pablo model (1992)

Several research studies have been carried out. The Sitkin and Pablo model was first tested by Sitkin and Weingart (1995). The Sitkin and Weingart studies focused on four variables and their relationship with risk behaviour. Specifically, the authors considered whether the effects of problem framing and outcome history on risk behaviour were mediated by risk propensity and risk perception, respectively. In accordance with the

Sitkin and Pablo model (1992), outcome history was proposed to be a determinant of risk propensity and problem framing was proposed to be a determinant of risk perception. Propensity and perception were suggested to influence risky decision making behaviour directly. Outcome history was chosen above the other factors comprising risk propensity because the authors argued that in previous research risk propensity either has not been considered, or the research method has confounded risk propensity and risk perception. Problem framing was included in the research because of previous research findings which have shown risk behaviour to be inconsistent and situationally variable depending upon the way a decision problem is framed, i.e. as positive or negative (Kahneman & Tversky, 1979).

The model that Sitkin and Weingart tested is shown below.

Figure 2.5: Model of risk behaviour tested by Sitkin and Weingart (1995)



The authors proposed four hypothesises concerning the relationships between the variables.

- Outcome history is positively related to risk propensity. Positive experiences of risk lead to risk seeking, negative experiences of risk lead to risk aversion.
- Risk propensity is positively related to risk behaviour. Propensity to seek risk leads to risk behaviour and the reverse for propensity to avoid risk.
- Problem framing is positively related to risk perception. That is, a problem presented in a way that focuses on opportunities will lead to risk seeking, and threat-framed problems lead to risk aversion.
- There is a negative relationship between risk propensity and risk perception, that is propensity to seek risks is related to perceptions of low risk and vice versa. The same holds for the relationship between risk perception and risk behaviour.

Sitkin and Weingart conducted two studies to test this model. In both studies participants were given a scenario concerning the decisions faced by a motor racing team manager and asked a series of questions about decisions and judgements. Participants were students. The measure of outcome history was the positive or negative outcome of the scenario. A manipulation check was used to ensure that participants' choices were influenced by the outcome history. Decision making behaviour and risk propensity were measured using a scale developed by the authors. The Cronbach's alpha of the decision making scale was .72. The Cronbach's alpha of the risk propensity scale was .86. Risk perception was measure using a scale adapted from MacCrimmon and Wehrung (1985, 1986a, 1986b). The Cronbach's alpha of the risk perception scale was .75.

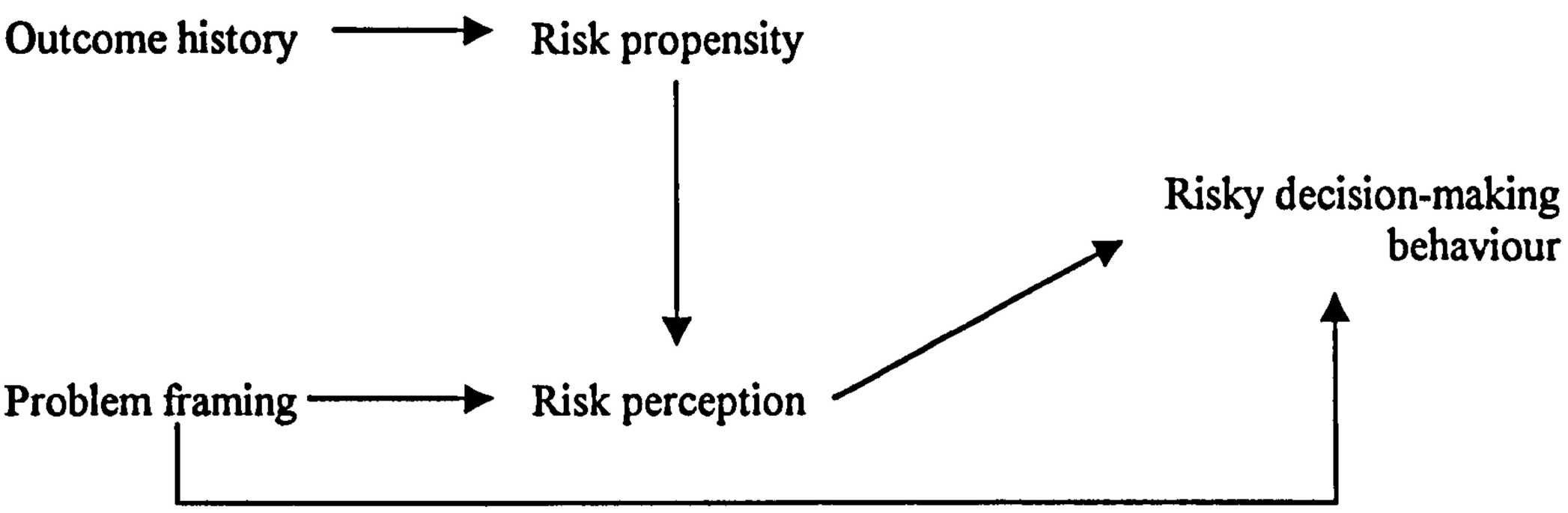
The first study examined the influence of outcome history on risk propensity, risk perception and risky decision making behaviour. In order to test for the effects of outcome history, two versions of the scenario were developed. The versions differed with respect to whether the outcome history was successful or not. T-tests and regression analyses were used to examine the data. Results showed that there were significant differences between ratings of risk decision making ($t = -2.06$, $p < .05$), risk propensity ($t = -2.15$, $p < .05$) and risk perception ($t = 2.38$, $p < .05$) for the positive and negative outcome history conditions ($df = 36$). As hypothesised, risk perception was lower when risky decision making and risk propensity were greater. Second, hierarchical regression was used to test for mediation effects. Risk propensity was found to mediate the relationship between outcome history and risky decision making, and between outcome history and risk perception. Risk perception fully mediated between risk propensity and risky decision making.

The second study examined the influence of problem framing on behaviour. Two versions of the racing scenario presented different problem frames, one negative and one positive. There were significant differences between risky decision making ($t = 3.44$, $p < .01$) and risk perception ($t = -2.99$, $p < .01$) for the positive and negative conditions ($df = 61$). The direction of relationships was as hypothesised. There were significant relationships between the framing of the problem and the perception of the problem. Risky decision making and risk perception were negatively related. Regression analysis

showed that risk perception partially mediated the relationship between problem framing and risky decision making.

Sitkin and Weingart suggested that, although risk propensity did not influence behaviour directly, it was shown nevertheless to be an important factor in the decision making process. The revised model, below, takes these observations into account.

Figure 2.6: Revised model of risk behaviour from the research of Sitkin and Weingart (1995)



The work of Sitkin and Weingart demonstrates some of the propositions made by Sitkin and Pablo (1992). There are, however, some problems with this piece of research. First, it is not clear that the research is a test of risk propensity. The measure of risk propensity seemed to be more concerned with the effects of scenario framing (positive or negative) than with risk propensity as defined by Sitkin and Pablo (1992). Sitkin and Pablo suggested framing to be an influence on risk perception. Yet, in the model that Sitkin and Weingart test, outcome history is purported to influence risk propensity. Hence the findings could be a result of the method. Second, it is only a partial test of the Sitkin and Pablo model. It is not fully clear why the other variables in the model are excluded from the research. There have been several studies by other authors that have based their work upon the Sitkin and Pablo model. These studies are reviewed below.

Smith and Friedland (1998) examined the influenced of education and personality on risk propensity of nurse managers. The authors noted that appropriate risk taking is an increasingly important aspect of the role of nurse managers. Previous research has shown that the risk propensity of nurses is related to both level of education and the risk situation (Grier & Schnitzler, 1979). Nurses with higher levels of education were prepared to take and accept more risk than those with lower educational attainment. However, research by Masters and Masters (1989) found that there were no differences in risk propensity that related to level of education. Smith and Friedland addressed these discrepancies using a framework based upon the work of Sitkin and Pablo (1992). Three components of the Sitkin and Pablo model were considered: risk preferences, outcome history and inertia, i.e. the factors that constitute risk propensity. Smith and Friedland operationalised risk preferences in terms of self-esteem and locus of causality. Higher self esteem was proposed to lead to greater risk taking due to increased confidence (Lancaster & Lancaster, 1981). Self esteem was measured using the Rosenberg self esteem scale (1965). Causality orientations have been defined as 'general motivational frameworks that shape how individuals see the world' (p23). There are three types of orientation: autonomy (the self is in control), control (the environment is in control) and impersonal (behaviour is beyond the individual's intentional control) (Deci & Ryan, 1985). Causality orientation was measured using the Causality Orientations at Work Scale (Deci & Ryan, 1985). Inertia was operationalised in terms of tenure, which was proposed to be a proxy for the development of habits over time. Outcome history was operationalised as level of education. It was suggested that nurses with less than a bachelors degree would have been taught to minimise risks. The authors hypothesised that high self esteem and higher levels of education (minimum bachelors degree) would be associated with high risk propensity. Control or impersonal causality orientations and longer tenure were proposed to be associated with low risk propensity.

All the participants in the Smith and Friedland study were women. The mean level of experience was 20.17 years. Risk propensity was measured using four scenarios developed from the Kogan and Wallach choice dilemmas questionnaire (1964). The scenarios were adapted by experts to address decision making in nursing situations. Participants were asked to advise how much risk a nurse manager should take in each scenario. Participants were then asked to choose between a high risk and low risk option

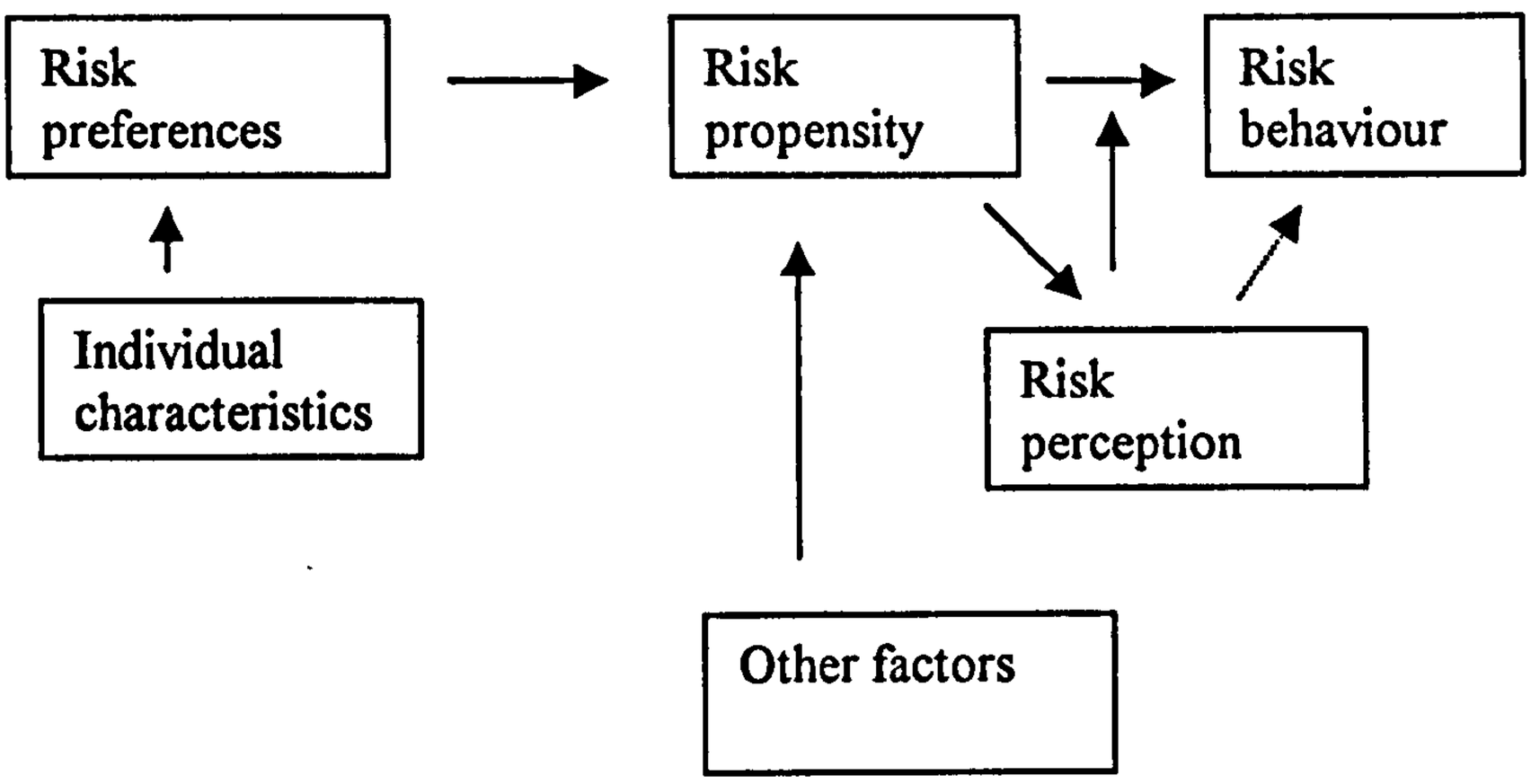
and to note the probability of success that they would require to take a high risk decision. Multiple regression was used to assess the impact of the predictor variables on risk propensity. Results showed that strong autonomy orientations were found to be associated with higher risk propensity ($p < .05$). Higher educational attainment was found to be associated with greater risk propensity ($p < .01$). Self esteem and tenure had no effect.

Smith and Friedland's research is an interesting attempt to test part of the Sitkin and Pablo model. It was demonstrated that there were differences in the risks that nurses with different qualifications and experience would take. The results suggested that nurses' decision making is subjective. The implications for managing decision making and risk could be important. However, the research method does not seem to be a true test of Sitkin and Pablo for several reasons. First, Smith and Friedland note that risk preferences might be related to personality. Although this seems likely to be true, they have diverged from the approach of Sitkin and Pablo who do not discuss preferences in terms of personality. Second, Smith and Friedland's operationalisation of personality in terms of self esteem and locus of causality is problematic. It is not clear why these aspects of personality are chosen rather than a generic model of personality, such as the Five Factor model of personality. The Five Factor model of personality and its relationship with risk taking are discussed in more detail in the next chapter. Third, Sitkin and Pablo's definition of outcome history indicates that some measurement of previous risks and their outcomes is required. Level of educational attainment does not seem to be a satisfactory proxy for history of risk taking. Rather, education might be more likely to relate to cognitions or perceptions related to risk. Fourth, the scenarios used to measure risk propensity were related only to four different risk scenarios, each focused on work. It is possible that risk preferences with respect to work were measured effectively. It is also possible that the assessed risk preferences apply only to the work context, and therefore should be considered as work-related risk preferences rather than a generalised assessment of risk propensity.

A third piece of research that draws upon the work of Sitkin and Pablo was carried out by Williams and Narendran (1999). These authors examined the impact of a range of biographical factors, risk propensity and risk perception on risk behaviour. The aim of

the study was to test the extent to which risk preferences influence managerial risk propensity and the extent to which individual characteristics influence risk preferences. Participants were 196 Indian managers working in India and 89 Indian managers working in Singapore (total n = 285). Williams and Narendran proposed the following model of risk behaviour.

Figure 2.7: Williams and Narendran model of risk behaviour (1999)



Risk preference was measured using a single item developed from MacCrimmon and Wehrung (1986). Participants were asked to rate their willingness to take risks compared with their colleagues. These authors' operationalisation of risk propensity was a scale formed by responses to ten business scenarios. Each scenario was followed by a choice between a risky option of a safe option and an assessment of the riskiness of the choice made, ranging from very safe to very risky. A manipulation check was carried out to examine the relationship between choice of the safe versus risky option and perceived riskiness of choice. Perceptions of greater risk were associated with risky choice. This finding is contrary to the hypothesis of Sitkin and Pablo (1992) that perception and risk taking are associated negatively. A check on the pattern of responses showed that there were some participants who responded almost consistently with respect to risk seeking or risk aversion across the business scenarios. 92 respondents selected the risky option in at least 7 out of 10 scenarios. 75 participants chose the safer option in at least 7 out of

10 scenarios. These results support the notion that people can have risk preferences that are consistent across situations.

Personality was measured in terms of the Achievement Motivation Scale results (Jackson, 1965), Rotter's Locus of Control measure (1971) and Type A behaviour measured using items from the Jenkins Activity Survey (Krantz, Glass & Snyder, 1974; Schaubroek & Williams, 1993). Cultural orientation was operationalised in terms of traditional versus modern perspectives. Items were derived from the work of Nedd and Marsh (Nedd and Marsh, 1979; Nedd, 1992). Data were also gathered concerning organisational characteristics and individual variables such as age, seniority and tenure.

Analysis of variables influencing risk behaviour was carried out using stepwise regression. Variables were clustered in accordance with the authors' model of risk behaviour. A preference for taking risks was associated with lower age, being male, higher levels of education, a modern cultural perspective, working in India, increased length of employment, seniority, non-governmental control of organisation, need for achievement, internal locus of control, ambiguity intolerance and Type A personality.

Results showed that willingness to take risks was unrelated to tendencies to take or avoid risks. Higher willingness to take risks was, however, associated with belief that the course of action selected was risky. That is, reported willingness to take risk was more strongly related to perceptions of risk than risky choice behaviour. The authors proposed that these results could be due the subconscious influence of preferences on propensity, or due to the influence of organisational factors on behaviour. There was a relationship between perceptions of organisational willingness to take risks and risk preferences. It could be that organisations influence risk preferences to some extent, or that there might be self-selection of individuals into organisations that match their risk preferences. The latter proposition could be a factor that accounts for the positive relationship between risk perception and risky choice.

The Williams and Narendran study provided evidence that willingness to take risks is the sum of a number of psychological, biographical and organisational factors. It demonstrated that risk perception has a significant relationship with risk behaviour. The

operationalisation of risk propensity in terms of responses to business scenarios, however, suggests that the results might concern risk propensity at work and not a more generalised measure of risk propensity. In addition, the summing of responses to the risk propensity items does not allow for people to be distinguished on the basis of whether they are consistently risk averse or risk seeking, or inconsistent. Given that these groups were identified with respect to the manipulation check, further examination of these groups to test for differences, for example in terms of personality or risk preferences, might have revealed differences between people who were consistent in their risk preferences and people who were inconsistent.

Another author to carry out research into risk propensity based upon the work Sitkin and Pablo was Kärhä (1998). Kärhä's research focused on the forestry industry in Finland. It assessed the key influences on risk preferences and considered whether attitudes to risk differed across individuals in the industry.

Kärhä developed a questionnaire was used to gather data. The variables were a range of personality characteristics, age, work experience, seniority, the size of the organisational unit, the influence of co-workers, questions about decision situations, success of previous decisions and decision support systems. Kärhä's method of measuring risk propensity was by asking participants to rate themselves on a scale of 1 - 20 with two poles: I avoid risks and I seek risks. Each pole was described further to enable participants to improve their self-rating. The scale referred to daily decision making situations. Two control statements were used in addition to the self-rating: I don't enjoy taking risks and I take only manageable risks. Participants were 140 managers from four of the main timber organisations in Finland.

Data from the risk propensity measure were used to categorise people into one of three groups: risk seekers (response range 16 – 20, n = 23), risk neutrals (response range 6 – 15, n = 89) and risk averters (n = 28, response range 1 - 5). Although the largest group is the risk neutrals, the distribution of responses on the scale showed that few people rated themselves the midpoint of the scale. The modal response was 12. The results of the control statements verified the categorisation and between group scores were significantly different, although at the individual level some responses were not

consistent. There were no significant differences between the risk propensities of participants from different hierarchical levels.

The risk preference groups were compared in terms of their personal characteristics. It was found that the risk seekers rated themselves as more outgoing, dominant, happy-go-lucky, expedient, adventurous, tough-minded, trusting, imaginative, self-confidence and unprejudiced than the other two groups. These results are similar to previous research (e.g. Keinan, Meir & Gome–Nemirovsky, 1984; Shapira, 1995). The results for the risk neutral people showed their self-ratings to fall between the scores for the risk seekers and risk averters. There were also differences between the groups with respect to decision making situations. The risk averters considered themselves to have more certainty in decision situations and to have fewer risky situations in their daily work than either of the other two groups. It was suggested that people who preferred to avoid risk structured their work to fit in with their preferences, as has been shown by other authors (Keinan, Meir & Gome–Nemirovsky, 1984; MacCrimmon & Wehrung, 1986).

In sum, Kärhä's research provides further evidence for the existence of individual-level risk preferences that can be used to categorise people. Differences in risk preference showed relationships with differences in a range of other individual difference factors, including personality. These results were clear even with a relatively simple measure of risk preference and a questionnaire that was not a well-established measure of personality. The study indicates that the inclusion of personality provides useful insight into the construction of risk preferences.

Tabak and Barr published a similar type of study (1999). These authors examined the propensity on hospital managers to adopt radical technological innovations. Risk propensity was conceptualised in the way defined by Sitkin and Pablo (1992). It was proposed that personal characteristics (risk propensity, self-efficacy, cognitive complexity, education level, age, past experience) and the organisational context (perceived strategy, perceived information processing capacity, perceived resource availability, specialisation) would influence the intention to adopt innovations.

Participants in the research were 998 executives from American community hospitals. The three innovations that respondents considered were developed using a panel of health care experts. The likelihood of adoption of the innovation was operationalised as the intent to adopt. Participants rated their intent on a scale of 0% probability – 100% probability. Risk propensity was measured using a revised version (Sexton & Bowman, 1985) of the risk sub-scale of the Jackson Personality Inventory (Jackson, 1976). The Jackson measure of risk taking assesses general tendencies to enjoy gambling, danger and adventure, and to choose to be in situations with uncertain outcomes. The other constructs were measured using survey-format items. Self-efficacy was measured using the Sherer et al scale (1982). Cognitive complexity was the degree to which respondents liked abstract versus concrete thinking (O'Conner, 1972). Strategy and information processing capacity were measured using Likert scales (Thomas & McDaniel, 1990). The scales were based on the work of Miles (1982) who suggested that organisational strategies can be assessed in terms of the type and extent of product or service, market competition, customer profiles and innovative services or products. The information processing capacity scale measured the range of formality, interaction and participation in decision making (from Thomas, Clark & Gioia, 1993). Availability of resources was measured using ratings concerning ten hospital-specific resources, e.g. labour (adapted from Miller & Freisen, 1982).

Regression analysis was used to assess the influence of individual and organisational characteristics on the dependent variable, intention to adopt innovations. Three models were used. First, the individual-level variables only were put into the analysis. Self-efficacy ($p < .001$), risk propensity ($p < .001$) and past experience ($p < .01$) were all shown to influence intentions significantly. The second analysis considered the organisational variables alone. Organisational strategy and perceived resource availability were all positively related to decision to adopt the innovation ($p < .001$). Information processing capacity was related negatively to intent ($p < .01$). A similar pattern of results emerged when all the variables were entered into the regression equation. Significance levels were at least $p < .01$, with the exception of past experience, which ceased to have a significant impact.

The authors suggested that these results confirm that a range of factors impacted upon the decision processes influencing intention to adopt radical innovation. Although they noted that intention to adopt might not in all cases lead to adoption, they proposed that these results are significant nonetheless. As with the studies discussed above, risk propensity was found to be one of the key factors in the decision process.

In sum, a number of studies have been carried out which have used the concept of risk propensity as Sitkin and Pablo have defined it. Although the operationalisation of the construct of risk propensity has varied across studies, research has demonstrated three important findings. First, risk propensity has been shown to be a significant influence on the decision making process. Second, risk propensity can be used as the basis for categorising individuals into groups according to differences in their risk preferences. Third, differences in risk propensity tend to be associated with a number of other individual-level characteristics and dispositions. These findings have influenced the development of the research discussed in this thesis.

A study that has made a significant contribution to the development of the understanding of the concept of risk propensity was the work of Weber and Milliman (1997). This paper is reviewed in detail because it demonstrates important differences between methods for conceptualising and measuring risk preferences. Weber and Milliman's paper examined individual-level consistency of risk-related decision making from three different perspectives. The aim of the research was to assess whether different theoretical approaches to decision making, including a definition of risk preference that is similar to that of Sitkin and Pablo (1992), led to different results. It was concluded that different operationalisations of consistent and inconsistent decisions did indeed lead to differences in the revealed patterns of behaviour.

Weber and Milliman reviewed the literature concerning decision making under conditions of loss and gain. They suggested that although people's choices might change under different domains, the change might be due to shifts in perception not changes in preference. They proposed that this distinction is of critical importance if risk behaviour is to be influenced by situations. Further, if behaviour is driven by risk perceptions, then

cognitive processes need to be targeted by managers to effect change. Alternatively, if behaviour is driven by preferences, then emotional responses must be targeted.

The authors defined risk preference in three ways.

1. Traditional risk attitudes derived from people's choices, i.e. the utility framework approach.
2. Relative risk attitudes based on the work of Dyer and Sarin (1982). This approach separates the marginal value for outcomes from attitudes towards uncertainty. The authors suggested that differences in choices under conditions of loss and gain as modelled in the expected utility framework might be the result of differences in marginal values in the domains. The relative risk attitude, however, might be stable and could be a personality trait.
3. Perceived risk attitude concerned with reported tendency to be attracted or repelled by risk. This is similar to the conceptualisation of Sitkin and Pablo.

The three concepts were compared in two experiments. Experiment 1 assessed hypothetical commuting choices of 54 University of Chicago participants. Items were presented in three sections of a questionnaire. First, participants were told to assume a certain journey time (60 minutes) for a fixed price ($3). They were asked how much they would pay for trains that were faster or slower by six fixed intervals. Second, participants' utility function was calculated by asking them to state the probability that would make them indifferent between an arrival time that was 40 minutes faster or slower than the original time of 60 minutes, and a connection that was 5, 10, 15, 20 or 30 minutes faster or slower with a probability of .80. Third, perceived risk attitudes were assessed using two sets of pairwise comparisons with respect to risk. The first set of items assessed preferences. The second set of items concerned arrival times of trains that were faster or equal (gain domain) and slower or equal (loss domain) than the current time of 60 minutes with varying associated probabilities, operationalised in terms of the probability of catching a connection.

Participants were classified into four groups: risk seeking, risk averse, neutral and mixed. The classification process was repeated three times, once for each conceptualisation of

risk-related decision making. Next, the number of people who showed consistency of group membership across the loss and gain domain was summed. The pattern of results is striking. The percentage of people who were consistent under the EU risk attitude categorisation was 22%. The percentage of people who were consistent under the relative risk attitude categorisation was 37%. Under the perceived risk attitude categorisation, 76% of people were consistent in their responses.

The authors suggested that the differences in conceptualisation and operationalisation of risk-related decision making led to different results concerning consistency across the domains of loss and gain. Further analysis of perceived risk attitudes was carried out with respect to pairwise comparisons of trains. Participants were asked to make a choice between two trains presented together, one train being more risky than the other in terms of variance for both gain and loss domains. High variance was associated with high risk. If preference alone was considered, the results showed that in the loss domain 62% of participants chose the less risky train and in the gain domain 61% chose the more risky train (higher variance). However, when participants' perception of which train was the more risky (the higher variance or lower variance train), a different pattern emerged. In the loss domain the high variance train was considered to be riskier in 85% of judgements. In the gain domain, 34% responses rated the low variance train as the most risky. It seemed that, when in the domain of gain, the degree of variance of arrival time was not a key concern and the focus was on the potential for larger time savings. In the loss domain, greater variance was considered to be problematic. Perceived risk attitudes showed a different pattern of results. People were classified as risk averse if they preferred the choice in the pair that was judged to be less risky and risk seeking when they preferred the option that was judged to be more risky. Using this categorisation, 57% of participants were risk averse in both loss and gain domains. When losses were considered people almost always perceived the low variance train to be less risky. In the gain domain choices were more divided between the high and low variance train with the biggest shift towards the high variance train.

In sum, the majority preference in the loss domain was for the low risk, low variance choice. This result seems to be contrary to prospect theory. The authors suggest this could be due to differences between choices concerned with money and choices in the

time domain. Of greatest interest to Weber and Milliman was the observed change in perceptions. They proposed that people did not see themselves as making more or less risky choices in loss and gain domains, that is, their underlying preferences might have remained stable. Rather, perceptions of what was risky changed. For example, in the gain domain the train that had no chance of saving a lot of time (low variance) was perceived to be the more risky train. The high variance train was seen to be less risky. An expected utility perspective, in contrast, would have classified this choice as risk seeking.

At the individual level the differences in operationalisation of the three conceptualisations of risk led to large differences. People were classified as risk seeking, risk averse or risk neutral according to their risk choices between 12 item pairs. The number of people classified as belonging to the same group for both gain and loss domains was 22% using the EU risk preference approach, 37% using the relative risk preference approach yet 76% when the perceived risk attitude approach was used. The authors concluded from this study that it is theoretically possible for risk perceptions to change across situations while underlying risk preferences, that could be associated with personality, remain stable.

The second study reported in Weber and Milliman's paper was concerned with repeated financial decisions. The choice to study repeated decisions was made to enable examination of the effects of prior losses and gains. The task involved a combination of skills and chance to increase the salience of previous success or failure. The measure was a computer-based investment task. Participants were 24 graduate students at the University of Chicago. The participants were asked to select one stock based upon a range of information in each of ten sessions, during which positive or negative feedback concerning the selected stock was given. The stocks varied in terms of the risks they represented. For example some stocks were similar to blue chip companies whereas others resembled small new organisations. Stock price varied across investment sessions so that each participant experienced loss and gain. There was an additional option to put money into endowment.

Results showed that in the gain domain participants stayed with the same stock 55% of the time. In the loss domain, participants chose the same option only 30% of the time. At

the individual level the same pattern was observed. Each participant showed greater variance in the loss domain. The participants were categorised as risk seeking (n = 5) or risk averse (n = 15). These two groups differed significantly with respect to the amount of money that they chose to put into endowment rather than into stocks ($p < .01$). The former group invested more in stocks. There was considerable individual level variation in perceptions of risk associated with each organisation's stock. When asked about changes in risk judgements over the investment period, participants tended to report that they had updated their information on the basis of the trends that were the result of the loss or gain outcome manipulation in the research design.

Perceived risk attitudes were analysed using participants' risk judgements of a stock and whether or not the stock was chosen. Correlations were used to assess the relationship between judgement and choice for each individual over four points in time. Two methods of classification were used to categorise people as risk seeking or risk averse. The first method categorised people for whom the correlations were significant at the $p < .05$ level. The second method categorised people on the basis of a negative (risk averse) or positive (risk seeking) correlation. The number of people categorised as risk seeking, risk neutral (people who fell between the critical values for method 1) or risk averse for both loss and gain domains was summed. A total of 79% showed the same risk preference under method 1. A total of 83% showed unchanged preferences under method 2.

Overall, the work of Weber and Milliman is important to the research discussed in this thesis, and to the general development of the understanding of risk preferences. Weber and Milliman proposed that there is support for the notion of a consistent, personality-based concept of risk preference. Factors such as loss or gain might change perceptions while leaving underlying risk preferences unchanged. They suggested that their data supported the work of Sitkin and Weingart (1995). The authors do not claim to have assessed causal relationships between key variables, nor do they claim that any of the three approaches to risk preference is superior.

In sum, there have been a number of studies that have examined the concepts of risk propensity and risk preferences. Some of these studies have been inspired by the work of Sitkin and Pablo. There is, however, some degree of variance with respect to the

conceptualisation and measurement of risk propensity. While some authors have used considered risk propensity in terms of the degree of risk that people say they prefer to take or avoid, or have assessed choice behaviour, a common approach has been to assess risk preferences in one domain only. In particular, the work domain has been the focus of attention. Some authors have supported the notion of consistent risk preferences for at least a portion of the sample population. The work of Weber and Milliman showed that whether people can be shown to have consistent risk preferences or not depends upon the way that risk preferences are conceptualised and measured. These authors suggested that there are individual level risk preferences that are likely to be anchored in personality and consistent across situations. The work reviewed in this section has been an important component in the development of the research that is described in this thesis, and in the analytical strategy that is discussed in the chapters that follow. Another area of research that has informed this study is a part of the literature that has taken a different approach to the concept of risk propensity. The next section discusses the correlation-based method of study.

2.3.2 The correlation-based approach to risk propensity

The following discussion reviews some key research studies that are relevant to the conceptualisation and understanding of risk propensity. A research framework and method that has been adopted by several researchers, whose work is reviewed below, has examined the concept of risk propensity in terms of the number and strength of correlation-based relationships between a number of different measures of risk taking. The correlation method for research was an influence on the analysis of the data gathered in this research. Correlations between questionnaire items are discussed in Chapter 6.

One study was carried out by Slovic (1962). Slovic considered relationships between different types of risk. Slovic's measures were: response set measures comprising speed/accuracy tasks, a test for tendency to include items in an ambiguous, stated category (the inclusion task) and a multiple choice test where wrong answers are penalised; the Torrance-Ziller Inventory that assesses preferences with respect to physical sensations, financial situations and life experiences; the job preference inventory

that associates preferences for jobs with independence, responsibility and high variance outcomes with risk taking; an assessment of betting behaviour; risk taking with respect to betting on vocabulary questions. In addition, participants were rated by fraternity colleagues on descriptive statements concerning risk taking. Correlations between the variables showed that there were few strong relationships between measures of risk taking. At the level of $p < .01$ there were three significant correlations. Taking chances on the games was significantly, positively associated with risk taking in the speed and accuracy task, i.e. sacrificing accuracy for the sake of speed. Risk taking on the inclusion task was related to scores on the Torrance Ziller measure (Torrance & Ziller, 1957). The Torrance Ziller measure was also associated with peer ratings of risk taking. There were six correlations significant at the $p < .05$ level: risk taking on the skill task with the inclusion task and gambling (negative relationship). Gambling was also associated negatively with peer risk ratings. One of the chance tasks was positively related to the Torrance Ziller measure. The other chance task was negatively related to job preference scores and associated positively with peer risk rating.

Slovic concluded that risk taking is both subjective and multidimensional. He proposed that the pattern of correlations does seem to suggest that situational factors are more significant than individual factors in determining risk behaviour. However, it is not clear that the conceptualisation of what constitutes risk is equivalent across the measures. It would be interesting to see whether a different type of analysis could be carried out on data such as these. For example, it could be that the majority of people were inconsistent, but that there was a minority group of people who are more consistent across tasks. Categorisation of individuals, as carried out by authors such as Weber and Milliman, might have revealed that some people responded consistently to a range of different measures of risk.

Kogan and Wallach (1964) carried out research using a similar method. These authors assessed participants on a range of measures: response set measures, as described in the above summary of Slovic's research; personality measures, such as impulsiveness; aptitude tests; the authors' Choice Dilemma Questionnaire (which has since been used in numerous research studies); measures of betting. As with the work of Slovic, correlations between the measures were in general low. Only 17 out of 196 correlations

were statistically significant. It was concluded that risk taking is situation-dependent and variable. However, individual level response patterns were found to vary. Participants who scored highly on defensiveness, measured using Crowne and Marlowe's (1960) scale of need for social approval, and anxiety, assessed using Alpert and Haber's (1960) scale, were relatively consistent in their approaches to risk. It can be hypothesised that their consistency was in part due to their disposition based orientations to risk. Women were found to be more consistent than men. The results suggested that there is some evidence for consistent preferences, at least for a subset of the sample.

The work of Kogan and Wallach was used by Weinstein and Martin (1969) who considered correlations between scores on the Kogan and Wallach choice bets measure (1964). Participants were students. Their task was to choose between bets that varied with respect to size, stake and probability of winning. Responses were categorised in terms of five strategies: maximisation of gain; minimisation of loss; long shot; minimisation of deviation from a half (choice of the alternative with the probability of winning that is closer to half); maximisation of variance. Results showed that 6 out of 20 correlations between scores were significant. Correlations tended to be stronger for men than women, although the overall pattern was the same. Relationships were strongest between maximisation of gain, minimisation of loss and maximisation of variance. Extroversion (Eysenck's 1964 measure) and Machiavellianism (Christie & Merton, 1958) were associated with risk taking. The authors suggested that there is some evidence that material risk taking has some relationships with interpersonal risk taking. They proposed that interpersonal risk taking might, however, be strongly influenced by situational factors. The Weinstein and Martin study raises the issue that risk taking in one decision domain could be associated with risk taking in other domains, although they do not pursue this line of enquiry.

Another correlation-based piece of research into risk propensity was published by Salminen and Heiskanen (1997). These authors examined correlations between reports of accidents in traffic, at work, at home, sports accidents and leisure time accidents. The research drew upon the concepts of accident proneness and risk compensation, both of which assume relationships between different types of accidents. Data were gathered using telephone interviews carried out by professional interviewers. There were three

data sets. The number of people in each data set that were interviewed was 9598 (1980), 13762 (1988) and 4275 (1993). In each data, participants were asked to report all the accidents that they have been involved in over the previous 12 months. The results of the 1980 study showed that there were strong correlations between home accidents and sport-related accidents and between home accidents and work accidents (both $p < .001$). There were also significant relationships between traffic accidents with work accidents and home accidents ($p < .01$). The 1988 study revealed three significant relationships. Sports accidents were associated with traffic accidents and occupational accidents ($p < .001$). Occupational and traffic accidents were also correlated at the same level of significance. The large sample size enabled the authors to analyse data separately for men and women. When divided into categories by age, particular accidents were highlighted as being significant for different age categories. Risk taking was greatest among young males. The results suggested a portion of the sample were relatively consistent in their risk taking.

Salminen and Heiskanen acknowledged that the study has several drawbacks. First, they cited research that suggests that people forget up to 30% of their accidents in a year (Elander, West & French, 1993), yet noted that accident proneness could be revealed better over a five year period than a one year period. Second, the people that refused to participate in the study tended to be young, city dwelling men (Heiskanen, Aromaa, Niemi, Ruusinen & Sirén 1991) who might have experienced many accidents compared with people with different demographic characteristics. Third, accident involvement was not distributed normally which might have influenced the correlation results. Nevertheless, there tended to be strong relationships between traffic accidents, accidents at work and sports injuries. It is likely that these relationships are due to the behaviour of young men that increases the probability of these types of accidents (Central Organisation for Traffic Safety in Finland, 1992; Ministry of Labour, 1993; Sandelin, 1988). The research is interesting in that it identifies two key factors, youth and being male, that were associated with accident involvement that was consistent across domains, if not over time. However, further exploration of the psychological correlates of decisions about risk could have been interesting.

A piece of research that has been much cited subsequently was carried out by MacCrimmon and Wehrung in 1986. These authors examined the risk propensity of managers. Risk propensity was defined in terms of risk seeking or risk averse choice behaviour. A large volume of studies and analyses was produced. Selected, relevant results and their implications are discussed.

MacCrimmon and Wehrung hypothesised that individual-level approaches to risk can be consistent, and proposed that people can be characterised as risk seekers or risk averters. These characteristics are operationalised in terms of preferences and behaviours, although the psychological variables influencing these characteristics are not discussed. This hypothesis was tested. The results showed that, when standardised choice situations were considered, there was a small group of people who were consistently more risk seeking than chance would predict. Similarly, there was a small group of people who were consistently risk averse. When the results of naturalistic decision measures were examined, the results showed that there was a consistently risk averse group, but not a consistently risk seeking group.

Age was found to be strongly associated with risk aversion. Postgraduate level of education and higher income were associated with greater risk taking. CEOs were found to take greater risks than managers at lower levels within the organisation. However there were no significant differences between the risk seekers and the risk averters on the biographical characteristics. There were no clear relationships between biographical data and risk propensity.

In sum, although risk seeking and risk aversion were influenced by situational characteristics, for example greater risk aversion was observed in decisions concerning the individual's money than when company money was involved, a proportion of the sample were found to be consistent in their approach to risk. The authors suggested that there are two key individual level approaches to risk: consistent risk seeking or consistent risk aversion and variable risk behaviour. Further, the authors suggested that when situations are not standardised, the differences between people who are risk seekers and risk averters are more strongly apparent than when standardised situations are used to assess risk preferences.

A different approach to risk propensity was taken by Smidts (1997). This author used the concept of intrinsic risk attitude, rather than risk propensity or risk preferences. He considered some of the individual difference variables that might influence orientations to risk. He defined intrinsic risk attitude is the relationship between risk attitude, measured in terms of a utility function, and strength of preference, measured by a value function. The participants in Smidts' research were farmers. Risk attitudes and strength of preference were measured over a two-year time period. Questionnaire and interview data were gathered. Strength of preference and risk attitude concerned with the price of potatoes were assessed during interviews using a lottery technique and a midvalue splitting technique respectively.

Results showed that the average strength of risk preference was similar over the period of data collection. The test-retest Spearman correlation was .45 ($p < .001$, $n = 179$). This result supports the notion of risk propensity, albeit in one decision domain. Risk attitudes were found to move towards greater risk aversion over time. The change in risk attitudes was likely to have been related to expectations of lower prices and lower yield of potatoes. Risk attitude and strength of preference were positively and significantly correlated ($p < .001$, $n = 203$ in year 1; $p < .05$, $n = 53$ in year 2). The pattern of relationship between the two variables was not linear. Smidts suggested that, although there is some relationship between the variables, they could be regarded as measuring different constructs. Overall, the majority of participants were intrinsically risk seeking. This is in contrast to MacCrimmon and Wehrung (1986) who found that in naturalistic decision situations there were no consistently risk seeking participants. Smidts recommended the use of multiple procedures to test constructs like intrinsic risk attitude and reported his agreement with von Winterfeld and Edwards (1986) in this matter. Smidts acknowledged, however, that the indirect nature of the measurement of intrinsic risk attitude increases the likelihood of error and instability caused by error. He concluded that further research needs to be carried out into the psychological factors that influence intrinsic risk attitude and on the methods of analysis used to assess risk propensity.

The correlation-based method of research has led to two conclusions. The first conclusion is that there are no significant relationships between different measures of risk

taking (e.g. Slovic, 1962). Thus risk preferences are proposed to be inconsistent across situations. The second conclusion is that risk preferences and risk taking are likely to be consistent across situations for some people (e.g. MacCrimmon & Wehrung, 1986). As discussed in the previous section summary, the apparently conflicting results could be, in part, caused by the conceptualisation and measurement of risk preferences and by the sample groups. It could be that, as Weber and Milliman (1997) proposed, there are stable risk preferences but these preferences might not emerge as consistent measurable phenomena in standardised experimental settings. The results of some studies might also be influenced by sampling. If, as authors such as MacCrimmon and Wehrung have suggested, the number of people who are consistently risk seeking or risk averse is relatively small, it could be that sampling strategies have not captured enough variation to ensure that the groups of people with consistent responses are represented.

2.4 Summary of risk propensity research

There is empirical support for the concept of risk propensity defined in terms of consistent risk preferences or behaviours. The pattern of results that has emerged from a number of studies is that the population consists of two groups, with respect to risk preferences: people with consistent preferences (either risk seeking or risk averse) or inconsistent preferences. It could be expected that research sample groups vary in their composition in terms of consistent and inconsistent participants. Results concerning the consistency of risk behaviour have varied. Some researchers have supported the notion of consistent risk seeking and risk aversion for a part of the population. Where inconsistency has been observed it is possible that at least some of the results might be accounted for by the majority group, representing inconsistent individuals, masking the responses of a minority group of individuals with consistent approaches to risk. Overall, it is clear that the issue of decision domains is important to the concept of risk propensity. If people are not consistent across domains, they cannot be considered to have a particular propensity to take risks. Rather, they have domain-specific risk preferences that could be variable.

The research into risk propensity has also demonstrated that, in general, there is a lack of agreement among researchers concerning the definition of risk propensity. Different approaches to risk propensity have been adopted, and there is variance in the degree to which risk propensity has been ascribed to individual or situational factors. There is also variance in the research method. Some studies have considered risk propensity in terms of responses or behaviours across a number of different risk situations. Other researchers have measured responses to a small number of items in one decision domain and the response is deemed to be a measure of risk propensity. It seems that further development of the concept of risk propensity is required. The research discussed in this thesis aims to contribute to the clarification of the conceptualisation and construction of risk propensity.

2.5 Chapter summary

This chapter has discussed theoretical and empirical work surrounding the concept of risk propensity. The aim of this chapter has been to demonstrate that risk propensity is a valid concept that can be considered in terms of risk preferences, but that further clarification of the concept could add to the understanding of whether risk preferences are generalisable, and thus can be considered to form a directional propensity to take or avoid risks, or whether risk preferences are variable across situations and decision domains.

One model of risk propensity, the Sitkin and Pablo model (1992), has been reviewed and critiqued. This model was chosen for discussion, and to form the basis of the research described in this thesis, because it is the best developed model of risk propensity. The Sitkin and Pablo model proposed that a combination of individual and organisational variables shape risk behaviour. It was hypothesised that propensity is relatively stable across situations and time. Any variance in behaviour is within the bounds of an individual's propensity to seek or avoid risks.

Empirical work into the concept of risk propensity has shown varying degrees of support for the concept. A number of authors have found that subsections of their sample group

show consistent risk preferences, thus supporting the notion of consistent risk preferences. In contrast, a number of researchers have found little cross-situational consistency of risk behaviour. It could be that results are, to some extent, dependent on the research method. Analysis has not in each case been directed towards the identification of different groups of consistent or inconsistent individuals. Where there has been research into inconsistent decision making, the focus is not on individuals who might, in fact, be consistent. It could be that in many studies there are some people, perhaps in small numbers, who do not show changes across loss and gain domains.

In sum, it is proposed that risk propensity can usefully be interpreted in terms of consistent and inconsistent decision preferences and choices. It seems likely that individuals can be categorised in two ways: people who are consistent in their approaches to risk and people who are inconsistent in their approaches to risk. Research, such as the work of Weber and Milliman (1997), has proposed that the consistency of the former group is likely to be associated with particular psychological and disposition-based characteristics. In contrast, it is possible that people who are inconsistent in their approaches to risk do not have the same psychological profiles. Inconsistent preferences could be due to a combination of situational variables and psychological variables.

The next chapter considers the psychological and perceptual factors that might influence whether people are consistent in their approaches to risk-related decision making or whether people are inconsistent in their risk preferences.

Chapter 3

Personality, framing, emotions and risk

3.1 Chapter abstract

This chapter builds upon the discussion in the previous chapter. The chapter presents further theoretical and empirical evidence for psychological antecedents of risk-related decision making and behaviour. It is argued that the consistency of risk preferences is likely to be related to personality-based dispositions, cognitive processes and emotions.

The chapter comprises four sections. The first section reviews the literature concerning personality and risk preferences. The second section discusses the relationship between cognitive processes, risk perception and risk preferences. The third section introduces the concept of emotions and considers how emotions can influence risk behaviours. The fourth section presents the hypotheses that are tested in this research.

It is concluded that the presence of directional personality traits can lead to consistent cross-domain risk preferences. That absence of this type of personality profile is proposed to be associated with cross-domain variance in risk preferences, whereby the decision maker is more likely to be influenced by their perceptions, cognitive decision processes and emotions than by their dispositions.

3.1 Risk and Personality

This section discusses the conceptualisation and measurement of personality, and how dispositions can affect risk behaviour.

Personality is important to the study of risk and risk propensity for two key reasons. First, there are important theoretical reasons why personality could lead to consistent cross-domain risk behaviours. Second, there is empirical evidence to suggest that personality is associated strongly with risk behaviour.

3.1.1 Definition of personality

Personality has been defined recently as being "that set of non-physical and non-intellectual psychological qualities which make a person distinct from other people." (Adler, 1996, p419). This definition has been selected from a range of alternatives because it reflects the difficulty is summarising the numerous aspects of people's characteristics, habits, emotions, thoughts and behaviours with a few phrases. There have been a number of different approaches to the conceptualisation and measurement of personality over the last century. Over the last few years there has, however, been some convergence. One of the most important changes is the development of the concept of personality traits and the refinement of a cluster of five traits generalisable across individuals and nations. Traits are the "internal psychological structures or properties that relate to regularities in behaviour" (Adler, 1996, p420). There are different traits referring to different sets of cognitions, emotions or behaviour. Each trait is characterised by two poles situated at opposite ends of a continuum, for example introversion – extroversion.

3.1.2 The Five Factor model of personality

One the most significant developments of the conceptualisation and measurement of personality is the Five Factor model. The development and applications of the Five Factor trait model of personality are important to this research for several reasons. First, the Five Factor model is an empirically based model grounded in a significant body of research. Second, the trait approach to personality focuses on individual differences (Reber, 1985) which are the focus of this study. Third, there is general agreement that the Five Factor model is the optimal current model of personality. It is a model that supports the notion of cross-situational consistency of preferences, and in some cases behaviour, because once formed personality traits remain relatively stable throughout adulthood (Costa & McCrae, 1988b). This issue is discussed in more detail below. Fourth, there is gathering evidence that supports relationships between risk taking and the Five Factor model of personality. Although it is acknowledged that there are other models of personality, alternative approaches are not discussed in this thesis. This is because the strongest empirical evidence for a relationship between risk taking and personality has been based upon the Five Factor model.

The model is operationalised in several personality measures. One of the most widely used is based upon the NEO-PI which measures neuroticism, extroversion and openness to experience (McCrae and Costa, 1985, 1987). The authors have been described as "the world's most prolific and most influential proponents of the five factor model." (Goldberg, 1993 p30). This questionnaire was initially based on a three factor model supported by several other researchers (e.g. Eysenck, 1991; Peabody, 1968, 1985). McCrae and Costa revised their approach in the light of the repeated emergence and replicability of five factors. Two factors were therefore added to their model: agreeableness and conscientiousness. The personality inventory was revised to include these factors (Costa & McCrae, 1991). The NEO-PI R comprises 240 Likert scale items that measure six facets in each of the five factors. The authors have written numerous papers concerning the Five Factor model of personality (e.g. Costa & McCrae 1982, 1985, 1987, 1988a, 1988b, 1991, 1992a, 1992b, 1994, 1995a, 1995b, 2000; Herbst, Zonderman, McCrae & Costa, 2000; Kallasmaa, Allik, Realo & McCrae, 2000; McCrae & Costa 1982, 1983, 1984, 1985, 1987, 1988a, 1988b, 1989a, 1989b, 1989c, 1991a,

1991b, 1992, 1994a, 1994b, 1995a, 1995b, 1995c, 1997; Loehlin, McCrae, Costa & John, 1998; Yang, McCrae, Costa, Dai, Yao, Cai & Gao, 1999).

The following table shows summaries of the five personality factors. (Costa and McCrae, 1985).

Figure 3.1: Summary of the Five Factor model of personality (Costa & McCrae, 1985)

Characteristics of the high scorer	Trait scales	Characteristics of the low scorer
Worrying, nervous, emotional, insecure, inadequate, hypochondriacal	NEUROTICISM (N) Assesses adjustment vs. emotional instability. Identifies individuals prone to psychological distress, unrealistic ideas, excessive cravings or urges and maladaptive coping responses.	Calm, relaxed, unemotional, hardy, secure, self-satisfied
Sociable, active, talkative, person-oriented, optimistic, fun loving, affectionate	EXTROVERSION (E) Assesses quantity and intensity of interpersonal interaction; activity level; need for stimulation and capacity for joy.	Reserved, sober, unexuberant, aloof, task-oriented, retiring, quiet
Curious, broad, interests, creative, original, imaginative, untraditional	OPENNESS (O) Assesses proactive seeking and appreciation of experience for its own sake; toleration for and exploration of the unfamiliar.	Conventional, down-to-earth, narrow interests, unartistic, unanalytical
Soft hearted, good natured, trusting, helpful, forgiving, gullible, straight forward	AGREEABLENESS (A) Assesses the quality of one's interpersonal orientation along a continuum from compassion to antagonism in thoughts, feelings and actions.	Cynical, rude, suspicious, uncooperative, vengeful, ruthless, irritable, manipulative
Organised, reliable, hard working, self disciplined, punctual, scrupulous, neat, ambitious, persevering	CONSCIENTIOUSNESS (C) Assesses the individual's degree of organisation, persistence and motivation in goal-directed behaviour. Contrasts dependable, fastidious people with those who are lackadaisical and sloppy.	Aimless, unreliable, lazy, careless, lax, negligent, weak-willed, hedonistic

The work of McCrae and Costa has changed the opinions of a number of researchers who previously had held alternative views. Notable among these is Oliver John, who had initially taken the lexical approach to personality assessment which is concerned with the encoding of aspects of personality in language. McCrae and John (1992) claimed that the convergence upon a five factor model marked a turning point for personality psychology.

John went on to develop the Big Five Inventory. This personality measure is a 44-item questionnaire developed for research purposes. The measure is used in this research, and is described in more detail in the method chapter.

3.1.3 Critique of the Five Factor model

There have been a number of criticisms of the Five Factor model of personality. First is the issue of the derivation of the model. Block (1995) claimed that the use of factor analysis is problematic. Different approaches to factor analysis can yield different numbers of factors. The results then require psychological interpretation before they are meaningful. This interpretation is often subjective and does rely upon objective statistical criteria. Different researchers have come to different conclusions about the results of factor analysis and have labelled the factors differently and placed some facets in the domain of different factors. However, work by Costa and McCrae has demonstrated the reliability of the five factor structure through its consistent emergence in empirical research (e.g. Costa & McCrae, 1988b; Costa, McCrae & Dye, 1991; McCrae & Costa, 1983)

Second, Block claimed that the concept of traits is not fully agreed. It is not certain what a trait that can remain stable across situations should comprise. Whether traits are truly internal or are the product of actions and social construction has been an issue of debate (Hogan, 1991). In addition, the boundaries of traits are not agreed. For example traits include some unobservable behaviour, emotions, motives and attitudes (Buss, 1989; McCrae & Costa, 1990; McCrae & John, 1991), but do not include unconsciousness and individual identities (Pervin, 1993). Hence it was suggested that there is a lack of clarity whether traits describe or explain behaviour.

Third there has been considerable debate over whether personality is a cause of cross-situationally consistent behaviour. An important criticism of personality theory and the issue of consistency was published by Mischel in 1968. In this year, personality had been defined as "more or less stable factors that make one person's behaviour consistent from one time to another, and different from the behaviour other people would manifest in

similar situations" (Child, 1968, p83). Mischel, however, presented theoretical and empirical evidence that behaviour is not consistent across situations, that scores on personality measures were not strongly related to behaviour, and claimed that the construct of personality itself was invalid because it relies on the notion of consistency of behaviour. This criticism stimulated much debate in the field of personality theory and led to the development of behavioural models of personality, for example the social learning theory of Mischel (1973), and the notion that personality is shaped by internal factors interacting with the environment (e.g. Argyle, 1976; Bem, 1972). However Mischel's later work (1977) concerning the different effects that 'strong' and 'weak' situations exert on behaviour has contributed to the resolution of this debate. He suggested that in strong situations people are influenced more strongly by environmental constraints, and therefore the correlation between personality and behaviour is reduced. Conversely, in weak situations people are more free to act in accordance with their underlying dispositions. The conceptualisation of situations into strong and weak could have an influence the consistency of risk preferences. It could be that people with strong personality-based risk preferences are more likely to have risk preferences that are consistent across situations, however in situations that exert strong controls, their behaviour might not be consistent with their risk preferences. In experimental manipulations, behaviour might be observed to be inconsistent, however as Weber and Milliman (1997) suggested, underlying risk preferences could remain stable.

In sum, the Five Factor model of personality is the current optimal conceptualisation and guide to the measurement of personality. There is considerable empirical support for the model. It is regarded generally as the best approach available for the purposes of personality profiling and for researching relationships between personality and behaviour. In addition, the model seems likely to be an important set of factors that contribute to consistent risk-related choice behaviour. The Five Factor trait model is the most appropriate for use in this study.

3.1.4 Empirical research into personality and risk behaviour

A number of strong relationships between personality and behaviour have been demonstrated in research. Two studies are discussed in the first part of this section. These studies have been selected for discussion because of their direct relevance for the research described in this thesis. The second part of this section considers a specific aspect of personality: sensation seeking.

The research of Kowert and Hermann (1997) discusses many of the issues central to this thesis. Their work was directed at leadership and risk taking in foreign policy decision making. They considered risk propensity and personality to be key factors in understanding and predicting leader behaviour. Their work emphasised the centrality of personality to much risk-related decision making and revealed different personality profiles associated with different approaches to risk. Kowert and Hermann proposed that individual level understanding of people's approaches to risk could not be gained if primarily economic models of decision making, such as the much-cited prospect theory (Kahneman & Tversky, 1979), are applied. They cited evidence that prospect theory has not been found to apply equally well to individuals (e.g. Kahneman, Knetsch & Thaler, 1991; Quattrone & Tversky, 1988). Prospect theory is discussed in more detail in the next section of this chapter.

Kowert and Hermann's research focused on individual difference variables that might influence risk taking. Four measures were used: a modified version of the 1964 Kogan Wallach Choice Dilemmas Questionnaire comprising 13 real-life scenarios; the Personal Risk Inventory which asks participants about business, sports, financial and other lifestyle risks based upon the work of Kogan and Wallach; the NEO PI-R personality questionnaire and the Myers Briggs Type Indicator (MBTI), an alternative theoretically-based measure of personality. Participants were 126 political science undergraduates (50 men and 76 women).

The first stage of the analysis considered correlations between the measures. When personality was considered in terms of five factors, four factors showed significant correlations with the risk measures. There were two strong relationships. First, low

scores on the conscientiousness factor (C) were associated with risk taking. Second, high scores on the openness factor (O) were related to risk taking. The authors suggested that careful considerations of risk, likely to be associated with conscientiousness, would decrease risk taking whereas openness to experience is likely to increase risk taking. When the NEO PI-R facets were considered, several aspects of the O and C scales emerged again as significantly associated with risk taking. In particular, anxiety, self-consciousness and impulsiveness (all facets of the N scale) and altruism (a facet of the A scale) were highlighted. There were some significant relationships between the MBTI factors and risk scores. In sum, close associations were revealed between personality and scores relating to a number of different types of risk taking. Kowert and Hermann proposed, on the evidence of the patterns of relationships between personality and risk taking, that people can be grouped into three categories. First, people who seek risky experiences and have high scores in openness and excitement seeking. Second, people who take risks because they are impulsive and do not think through risky situations, or are not aware of risks. Third, people who are agreeable and try to avoid risk because of the potentially negative implications for others.

The second stage of Kowert and Hermann's analysis considered the relationship between personality and the predictions of prospect theory, i.e. that risk aversion is associated with gains and risk seeking is associated with losses. Prospect theory was operationalised in terms of a series of decision problems designed to test the effects of positive and negative framing. Three different types of problems were used: economic, medical and political. The latter two problem types involved decisions about human lives. Participants could opt for a certain outcome or a risky outcome for each problem type. Framing effects were found to be significant, particularly for the medical and political problems. The general tendency for the economic choices was to be risk averse. When the pattern of responses was related to personality variables there were some interesting findings. Four response patterns were distinguished: risk taking under conditions of loss; risk aversion under conditions of gain; a combination of both (prospect theory) and the total number of certain (risk averse) choices regardless of frame. Groups 1 and 3 showed the least number of significant correlations with personality factors and facets. The result for group 3 demonstrated that inconsistent risk taking was not associated strongly with personality. Groups 2 and 4, however, showed a number of significant relationships.

Preferences for certainty under conditions of gain and regardless of frame, i.e. risk aversion, were associated with low openness at the factor level, high anxiety (N1), low scores on fantasy (O1) and actions (E4) at the facet level. Overall preference for uncertainty was also related to low scores in agreeableness at the factor level, self-consciousness (N4) and altruism (A3). Kowert and Hermann suggested that these findings supported their proposition that people with different personality profiles have different disposition-based approaches to risk and will seek or avoid risk to fulfil different goals.

Further analysis of the relationships between personality, problem type and problem frame was then carried out. Participants were grouped according to whether they selected the risky alternative or the certain alternative for each of the three problem types. Mean scores for personality factors and facets were compared. Results showed that some aspects of personality, anxiety and conscientiousness, were associated with choices that were both problem and frame insensitive. That is, people with either very high scores or very low scores in anxiety, self-conscientiousness, conscientiousness and deliberation, had consistent approaches to risk. The former group was risk averse and the latter group was risk seeking. In addition, people with higher scores in agreeableness and altruism preferred to avoid risk regardless of situation. Kowert and Hermann revised their risk categorisation and suggested the following groups:

1. People who respond to risk in the directions that prospect theory predicts; risk seeking under conditions of loss and risk aversion under conditions of gain.
2. People who are consistent in their responses to risk and do not attend to problem domain or framing effects.
3. People who are influenced by framing, but not in the direction predicted by prospect theory, e.g. people who score highly in the openness personality factor take risks because they focus on the potential for gain.
4. People who prefer generally to avoid risks because they are altruistic and wish to avoid loss to others.

The authors divided participants into two groups: those who behave in the way that prospect theory predicts and those who do not. An analysis of variance test was used to examine differences between the groups. The key differences to emerge were in altruism

(A3) and openness (O4) ($p < .05$). Further analyses of variance were then carried out for loss and gain frames separately. In the loss frame, altruism was the only personality variable that approached significance between high and low risk takers ($p = .086$). In the gain domain, actions (O4) and the MBTI intuiting dimension, which has been shown to correspond to the NEO PI-R factor of openness (Costa & McCrae, 1991), were significantly different between the two groups. Fantasy (O1) approached significance. It was suggested that these characteristics could interact with framing such that the gain frame could increase the likelihood that people with high openness scores would take risks while the loss frame would decrease the likelihood that altruistic people would take risks.

Kowert and Hermann suggested that risk taking is a combination of gender, risk awareness, agreeableness, anxiety, thrill seeking and the MBTI dimension of intuiting. They tested this proposition using a regression analysis with the total score on the Personal Risk Inventory as the dependent variable. The results of the regression showed significant Beta values at the level of $p < .01$, with the exception of intuiting ($p < .10$). The adjusted R squared was .55 showing that the predictor variables contributed significantly to variance in the Personal Risk Inventory.

The research of Kowert and Hermann is relevant to the research discussed in this thesis for several reasons. First, it demonstrates that there are clear relationships between personality and risk taking. Second, it identifies several different patterns of risk behaviour that are associated with particular personality profiles. The authors showed that some people are relatively frame and problem insensitive, that is, they are consistent in their approaches to risk, while others who have different profiles are sensitive to situation variance. These results and their implications are central to the research described in this thesis. They provide strong support for the role of individual difference factors, in particular personality, in shaping consistent or inconsistent approaches to risk.

A second relevant study of the personality factors which influence risk taking assessed the influence of personality on risk taking and found that there are some significant relationships (Bartram, Clough & Williams, 1997). Participants were 85 undergraduate students. The personality measure was the PREVUE ICES inventory (Bartram 1993,

1994, 1996). This measure assesses a number of facets of personality relating to the four factors of Independence, Conscientiousness, Extroversion and Stability. The authors have demonstrated relationships between their measure of personality and Five Factor model measures including the NEO personality inventory (Bartram 1993, 1996). Two risk measures were administered: a set of behavioural questions, concerning behaviours such as smoking and drug use, and the Personal Risk Inventory (Hockey & Clough, 1996). The PRI presents participants with a series of 20 dilemmas. It is the same measure as the one used in the research of Kowert and Hermann (1997) reviewed above. The PRI adapted the Kogan and Wallach items to assess everyday decisions rather than significant life events. The results showed that although the two measures of risk-related decision making were found not to be closely related, there were significant associations between some aspects of both scales and personality facets. People who reported participation in risky behaviours were more extravert, competitive, had a need for sensation, were impulsive, showed a lack of concern for others and a lack of concern for social and moral rules than participants who reported less risky behaviour. People who perceived risks as greater were non-assertive, timid, viewed the world as a hostile place, and yet were outgoing and sociable. It was also noted that participation in different types of risks, for example everyday hazards versus hazards with potentially serious long term consequences, was related to different personality profiles. The authors suggested that this study showed not only that particular combinations of personality factors predict risk seeking or risk aversion, but also that different types of risk differentially engage particular facets of personality. Thus the results have implications for the research described in this thesis. The data indicated that where people are consistent in their risk-related decisions, the choices that they make could be related to their personality profile. In addition, personality might also impact upon domain-specific risk choices. For example, people scoring high in the agreeableness dimension might select risks that concern only themselves, for example some high risk sports, but would not take risks that could have detrimental effects on others. People scoring low in the agreeableness dimension might be less discerning about their risk-related choices. In sum, there is evidence to support the hypothesis that there are close associations between a number of personality factors, risk preferences and risk taking.

The next part of this section discusses the concept of sensation seeking, a facet of extroversion in the NEO PI-R measure of personality, and its relationship with risk taking. Kowert and Hermann (1997) found that sensation seeking predicted risk taking significantly. The main author of the work into sensation seeking is Zuckerman, who began research into sensation seeking approximately three decades ago. He has published numerous studies supporting the concept and demonstrating its relationship with behaviour. He has described sensation seeking as "the need for varied, novel and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experience." (Zuckerman, 1979a, p10). Sensation seeking is measured using the Sensation Seeking Scale. The current version is the Sensation Seeking Scale V (Zuckerman et al 1978). It was developed following rotated factor analysis of a number of items relating to sensation seeking and items used in previous versions of the test. American data (Zuckerman, 1971) and English data (Zuckerman, Eysenck & Eysenck, 1978) have revealed the same four facets of sensation seeking: thrill and adventure seeking, experience seeking, disinhibition and boredom susceptibility. Each aspect is measured using ten items. Support for the concept has been derived from several sources. For example, analysis of data from 2000 people revealed significant correlations between different aspects of sensation seeking (Zuckerman & Neeb, 1980). Second, there is genetic evidence for sensation seeking. A study of twins showed that for 422 pairs of twins, 70% of the genetic variation was due to a general factor common to both sexes (Fulker, Eysenck & Zuckerman, 1980).

Zuckerman has demonstrated that sensation seeking can be used to predict a range of other behaviours, many of them risk related. The relationship between sensation seeking and risk taking applies to many different risk behaviours. For example, high sensation seekers take more physical risks in dangerous sports (Zuckerman, 1983a); smoke heavily and expose themselves to health risks (Zuckerman, Ball & Black, 1990); drive too fast (Zuckerman & Neeb, 1980); drive recklessly or while under the influence of alcohol (Donovan, Queisser, Salzberg & Umlauf, 1985); volunteer for combat units in the army (Hobfoll, Rom & Segall, 1993); use illegal drugs (Zuckerman, 1983b); take bigger bets in gambling (Anderson & Brown, 1984; Dickerson, Hinchy & Fabre, 1987); make more risky financial investments in simulations (Harlow & Brown, 1990).

Zuckerman has suggested that there are several reasons why differences exist between people who seek sensation and those who do not. First, there might be biologically based individual difference factors that predispose some people to take more risk than others. Second, sensation seekers could have a greater optimistic bias (Weinstein, 1980) than low sensation seekers. That is, they could believe that they are less likely to experience the negative outcomes of risky behaviours and more likely to experience the benefits.

Third, there might be differences in information processing strategies that are associated with the sensation seeking trait. Zuckerman (1979a) suggested that this trait has been shown to affect risk perception. He proposed that high sensation seekers might be more likely to perceive a risk as smaller than low sensation seekers because of different information processing strategies. For example, information contrary to tendencies to seek or avoid sensation might not be attended to. Zuckerman (1979a) showed that people with low sensation seeking tendencies attend more closely to information which amplifies risk and which reinforces their aversion to risk taking. People with high sensation seeking tendencies selectively attend to the positive consequences of risk taking, which can lead to psychological and behavioural reinforcement of risk seeking and risk aversion. This relates to other research into selective attention to and processing of information. For example, it has been noted that there is a qualitative difference between the person who has not heard of a hazard and the person who has heard of a hazard, thought about the hazard and decided there is no risk, so does not act. The former will be open minded about the hazard (Janis & Mann, 1976, 1977) but will not actively seek out information. The latter will have a biased commitment to their point of view, will selectively attend to information which supports this (Festinger, 1957; Frey, 1986; Wicklund & Brehm, 1976), counter argue and maintain beliefs when faced with disconfirming evidence (Nisbett & Ross, 1980).

A proposed mechanism for the relationship between perceptions, behaviour and sensation seeking is a feedback loop where outcomes of behaviour inform perceptions and future behaviour. Horvath and Zuckerman (1992) proposed that risk appraisal is a consequence rather than a cause of risky behaviour, and that behavioural outcomes are likely to be interpreted within an existing framework of risk preferences. Hence high sensation seekers might perceive that there is less risk in the environment, and that they

have a greater ability to avoid negative outcomes as they continue to take risks. In addition, the authors suggested that high sensation seekers attend to the opportunities not the costs of risk taking. That is, they might be motivated to take risks because of the association between risk and gain, as discussed in Chapter 1.

In sum, sensation seeking is another dimension of personality that is an important contributor to risk seeking and risk averse behaviour. People with particularly high or low scores in this trait could be consistent in their risk-related choices. Sensation seeking is a component of the trait of extroversion in the Five Factor model of personality. People with particularly high or low scores on a measure of extroversion could be predicted to have preferences for seeking risk or avoiding risk, respectively. However, it is likely that the sensation seeking trait interacts with other aspects of personality to shape whether risk taking is consistent or domain-specific. For example, a person with a high score in sensation seeking and a high score in the agreeableness factor might be willing to take risks to achieve sensations, but limit their risk taking to sports that are not likely to have a detrimental effect on others, such as bungy jumping. A second example is a person with high sensation seeking needs and a low score in the conscientiousness factor. This person might take risks in the work environment in order to make their day more interesting, and not be concerned about making mistakes in their job. Alternatively, if sensation seeking is coupled with the trait profile identified by Kowert and Hermann (1997) as being the risk taking profile (e.g. low in agreeableness and high in openness), an individual is likely to take risks consistently.

3.2 Summary of personality and risk research

The study of personality is important to the study of risk behaviour for a number of reasons. First, there are strong relationships between dispositions and risk-related decision making and behaviour. Second, empirical evidence suggests that people with strong disposition-based preferences will have relatively stable, characteristic approaches to risk. All the traits in the Five Factor model of personality have been associated with risk preferences. Data have suggested that particular personality profiles might be associated with consistent risk seeking or risk aversion. A typical profile of someone

who likes to take risks might comprise low scores in neuroticism, agreeableness and conscientiousness, and high scores in extroversion and openness. However, variations in the characteristic risk profile could lead to domain-specific risk preferences. For example, agreeableness could be an important factor. A high score in this dimension combined with an otherwise risk seeking profile could lead to domain-specific risk choices; that is, people might be willing to take risks if they will not impact adversely on others. It is plausible that people who lack the strong dispositional orientations to risk are likely to be influenced by situationally variable factors that influence their cognitive and emotional appraisals of risk.

To conclude, personality is an important element of a psychological framework of risk-related decision making. It is a key component of the data gathered in the research discussed in this thesis.

3.3 Loss, gain and framing

The theoretical and empirical work reviewed in relation to personality indicated that for some people, such as those without strong dispositional bases for their behaviour, situational factors are likely to account for some portion of the variance in risk-related decision making. This section discussions theoretical and empirical work that considers factors that that could influence the inconsistency of risk preferences.

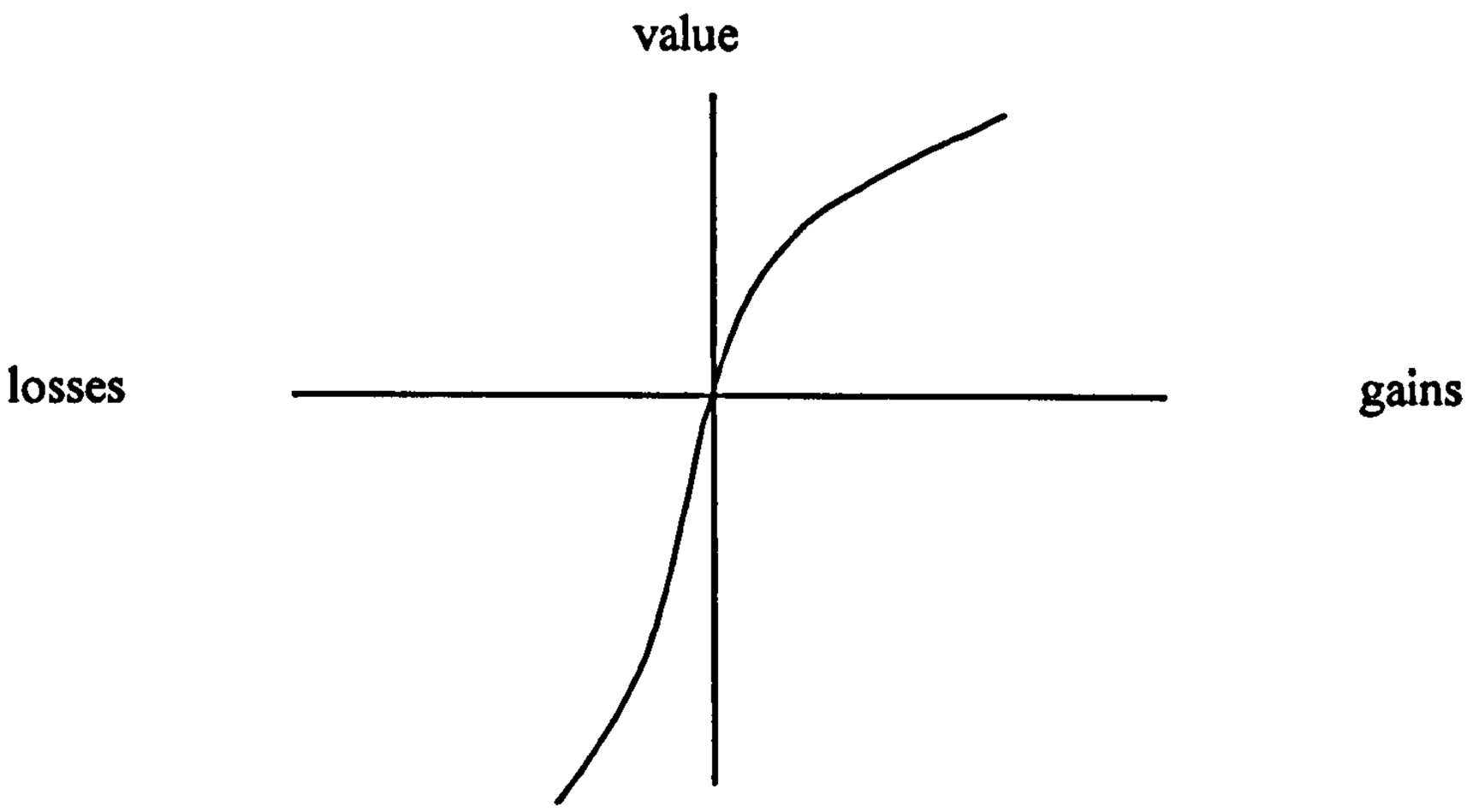
The main theory in this field, which has been the source of much work into the effects of loss and gain and variable risk behaviour, is prospect theory (Kahneman & Tversky, 1979). Prospect theory is important to this research because it predicts that decision making and behaviour depend upon perceptions of loss and gain and are situationally variable. Prospect theory concerns decision situations involving monetary outcomes under conditions of risk, but not uncertainty. That is, probabilities are known. This distinction between risk and uncertainty is similar to the discussion of Knight (1921, 1965) discussed in Chapter 1. The authors sought to build a non-normative framework that could explain why behaviour differs under conditions of loss and gain.

The theory suggested that there are two key phases of choice behaviour. First, there is an initial analysis of the decision problem. In this phase, choice alternatives are framed. That is, some options are selected from the full range of alternatives based upon whether they are presented positively or negatively, the potential outcomes, the habits and expectancies of the decision maker and the features of the choice alternative e.g. shared characteristics of alternatives are cancelled out, and dominated alternatives are excluded from further consideration.

The second phase of decision making is evaluation. The outcome, or prospect, which has the highest value is chosen. An important part of this process is the assignment of decision weights to each of the framed prospects that were selected in the first phase. The weighting function operates such that events of low probability are over-weighted, hence the popularity of lottery tickets, and events of high probability that near certainty are under-weighted. It is at the extremes, i.e. probabilities very close to 0 or very close to 1, that decision weights tend to show greater subjectivity because of the simplification of choices that has taken place in the editing phase of decision making.

In the evaluation phase in the model a subjective value is assigned to each prospect. Subjective values are proposed to be arranged in a distribution above and below a reference point, which is zero. Hence an increase in wealth of £100 from £0 is relatively greater than the increase from £1,000 to £1,100. The value of each alternative is a measure of how far it is from the reference point. The shape of the distribution is an S shape about the reference point; concave for gains and convex for loss. The slope is steeper in the domain of losses reflecting observations that losses have a greater impact on decision making than equivalent gains. The use of subjective values is an important aspect of prospect theory and distinguishes the theory from other approaches that require objective evaluation of risk. Figure 3.2 shows a representation of prospect theory hypothetical value function on the next page.

Figure 3.2: Representation of the prospect theory hypothetical value function (Kahneman and Tversky, 1979, p279)



The evaluation stage of decision making is followed by choice. Two aspects of risky choices are considered in the decision making process – the value function, which concerns the change in wealth a choice alternative represents and can be either positive or negative, and the decision weight.

Prospect theory predicts that behaviour will be risk seeking in the domain of loss and risk averse in the domain of gains. The corollary is that people's risk behaviour will change from risk aversion to risk seeking if they are given choices in the gain domain then choices in the loss domain and vice versa. Both actual and perceived loss or gains are important influences on behaviour. Kahneman and Tversky cited the example of a decision maker who has an expectation of a gain which, if not met, will result in a perception of loss. If the loss is not accepted, behaviour is risk seeking because the situation is negatively framed and the decision maker is in the domain of loss. If the loss is accepted, the reference point is adjusted. This example demonstrates an important property of the reference point that influences decision making: reference points may shift, and different decisions at any point in time can have difference reference points. Reference point shifts are also associated with whether alternatives are considered in terms of absolute loss and gain rather than in terms of relative loss and gain.

In sum, prospect theory represents an important conceptualisation of risk-related decision making and behaviour. Prospect theory sought to apply a more psychological framework to the expected utility model of choice behaviour. The theory proposes that loss, gain and reference points are critical influences on decision making. In addition, the use of decision weights, the differential impact of different probabilities and the overall range of outcomes are important factors that tend to lead to inconsistent risk behaviour. It is one of the most frequently cited and decision making frameworks and has received considerable empirical support. The theory has important implications. In particular, with respect to the effects of positive and negative framing of information and the reference point which suggest that risk preferences could be inconsistent and influenced by situational information.

The authors of prospect theory carried out several pieces of research into the effects of loss and gain and whether the manipulation of perceptions of loss and gain through framing influenced choice behaviour. A key study to demonstrate the framing effect was that of Tversky and Kahneman (1986). The authors presented participants with what has become known as the Asian flu problem. The problem has two forms. Both forms concern a choice between two programmes to fight the disease. The first form presents programme A as saving a fixed number of lives and programme B as having a given probability that a certain number of lives will be saved. The second form of the problem presents programme C as the cause of a fixed number of deaths and programme D as having a given probability of a certain number of deaths. The outcomes of programmes A and C are the same. The outcomes of programmes B and D are the same. The framing, however, is different – lives saved versus deaths. The first form of the problem tends to lead people to choose programme A, whereby a certain number of lives are saved, and programme D, where there is a chance that all lives might be saved (although all might be lost) rather than a fixed, certain number of lives lost. The authors suggested that these findings demonstrate how simple semantic changes can result in difference choices.

The Asian flu problem is just one type of framing effect. There are a number of other ways that the decision making process can be influenced by altering the presentation of the information the decision is based upon. Bazerman (1994) summarised 9 different ways that framing can change decision outcomes:

1. Framing of choices as gains or losses
2. Framing of outcomes as gains or losses
3. Framing of choices as certain or pseudo-certain
4. Paying premiums versus accepting sure losses
5. High versus low transaction quality
6. Whether losses and gains are summed or presented individually
7. Different judgements of time to be spent on the decision problem are made according to how the problem is framed
8. Value of a commodity according to whether it is owned by the self or another
9. Different judgements can be made at different points in time

Different types of framing were considered by Kühberger (1998) who carried out a meta-analysis of studies of framing effects. He reviewed the results of 136 papers with almost 30,000 participants. Results showed that two aspects of framing have particularly strong influences on decision making: whether the manipulation is concerned with reference points or with outcome salience and the type of decision outcome i.e. fixed choice versus ratings or judgements. There were no systematic differences that indicated particular types of decision making associated with loss or gain domains. It was concluded that the framing effect is reliable, but that studies which measure outcome salience should be considered separately from research which manipulates reference points. However it was noted that framing effects are not always observed. Further work by the author and colleagues examining the framing phenomenon (Kühberger, Schulte-Mecklenbeck & Perner, 1999) concluded that cognitive and motivation factors should be considered in addition to problem and domain characteristics (Maule, 1995; Reyna & Brainerd, 1991; Schneider, 1992; Tykocinski, Higgins & Chaiken, 1994).

The inconsistent results of research into the effects of framing could be due to individual difference factors that affect perceptions of loss and gain. It has been noted in the discussion of personality and risk preferences that some people are likely to have psychological characteristics that predispose them to particular, stable approaches to risk. Individual difference characteristics and dispositions were not considered in Kühberger's meta-review. These ideas have, however, formed the basis of research by Highhouse and Yüce (1996). These authors claimed that previous research which has

found risk taking for opportunities and risk aversion for threats (e.g. Hollenbeck, Ilgen, Phillips & Hedlund, 1994) is not a contradiction of prospect theory's predictions of risk aversion for gains and risk seeking for losses. Rather, Highhouse and Yüce claimed that the picture is more complex – perceptions of what a threat is and what an opportunity is can differ according to position in the loss or gain domain. They cited the work of March and Shapira which suggested that people will take risks so long as they perceive the potential for worthwhile gain (1987). Highhouse and Yüce proposed that the concepts of loss and gain are distinct from the concepts of opportunity and threat. Hence when participants are shown the Asian flu problem, what appears to be risk seeking in the domain of loss could be due to perceptions that there is an opportunity to save lives rather than losing lives for sure (e.g. Maule, 1989). Likewise, they cited work that has shown that risk taking is greater when the probability of gaining is emphasised (e.g. Bier & Connell, 1994; Levin, Johnson, Russo & Deldin, 1985); Levin, Johnson & Davis, 1987).

Highhouse and Yüce proposed that it is possible to perceive both opportunities and threats in both loss and gain domains. Participants in their study were 244 undergraduate students. They were presented with the Asian flu problem and a measure that assessed perceptions of choice alternatives as opportunities or threats (Highhouse, Paese & Leatherberry, 1996). They found that participants in the loss domain perceived the risky alternative as an opportunity. In the gain domain, the risky alternative was perceived as a threat. In a second study involving 84 students, the interaction between framing and perceptions was examined. The test materials were two memos similar to the in-basket task used by MacCrimmon and Wehrung (1986). One memo was framed in the gain domain and one was framed in the loss domain. Each memo had two versions – a threat version and an opportunity version. The risks in each were the same. Results showed that participants were more risk taking for opportunity-framed risks than for threat-framed risks. More risks were taken for the loss problem than the gain problem. Highhouse and Yüce suggested that the presentation of situations as opportunities does influence perceptions of risk and increase the likelihood of risk taking. In sum, the research of Highhouse and Yüce indicated that risk behaviour can be variable. However, they also suggested that individual difference factors such as motivation and dispositions, in particular trait neuroticism and need to avoid risk, could be important influences on

choice behaviour and affect perceptions of opportunity and threat. Thus, if people have specific emotional and motivational dispositions for risk aversion, their behaviour might be relatively consistent because they perceive almost all situations as threats and are resistant to framing effects.

A different aspect of framing that is also relevant to this thesis concerns the decision domain rather than the loss and gain domains. The decision domain has been shown to have a significant impact on choice behaviour because the decision maker is required to consider different reference points. Additionally, there are different values, costs and benefits for important life decisions such as health, relationships and finance management. This topic has not been widely researched, but there are some interesting studies in the field that are salient to the research presented in this thesis. It could be that people who do not have disposition-based consistent risk preferences could still be consistent in their preferences, but in some decision domains only. For example, as suggested in the above discussion of personality, someone with a high score in agreeableness in combination with an otherwise high risk personality might take risks in some domains such as dangerous sports, but not in other domains where risk taking could be detrimental to other people, such as reckless driving. Overall, the effects of decision domains are important to consider because there could be a distinction between people who have generalised, cross-domain risk preferences that are consistently oriented towards risk seeking or risk aversion, and people who have domain-specific risk preferences. In the case of the latter group, examination of the decision making processes related to different decision domains could provide insights into risk preferences that are domain specific.

Highhouse and Paese (1996) carried out two studies that considered the interaction of loss, gain, opportunity and threat in the contexts of jobs and money. The first study presented versions of Bazerman's (1984) job layoff problem. There were four variations based upon combinations of loss, gain, opportunity and threat. Participants were assigned to one of the four conditions (52 – 56 student participants per condition, including two control groups). Following participants' choice between prospects, two items were administered to assess whether translation of threat to opportunity, or vice versa, occurred. Scores on the items were summed. A low score represented perception

of threat. A high score represented perception of opportunity. Analysis of the data showed that framing effects were found in both the opportunity and threat domains. In addition, the presentation of the problem had important effects. Risk averse choices were more frequent in the opportunity domain. However, in general the participants were risk averse and did not behave in the ways the prospect theory suggests. There was little evidence for the translation of threats into opportunities or the reverse. The authors suggested that this could be because opportunity and threat are not different ends of a single continuum, but different dimensions altogether. The interaction between frames and decision arena could influence the magnitude of framing effects.

Highhouse and Paese suggested that decision domain could be an important factor that influences framing effects. Hence a second study was carried out to consider money-related threat and opportunity. The participants were 252 students. The measures were problems similar in structure to the first study and concerned with money and taxes. The same translation scales were used as for the first study. Framing effects were found in both domains, however the effect was great in the loss domain. When problems were framed as opportunities, participants tended to be risk averse. When problems were framed as threats, the difference in frequency of risk aversion and risk seeking was smaller. Translation effects were weak, as in the first study, suggesting that reference points might not be changed as a result of problem framing. Perceptions of problems as threats or opportunities did not influence the relationship between framing and choice behaviour.

Overall, Highhouse and Paese concluded that framing effects were observed, but that reversals of preference were not. They proposed that studies of framing show more about the reliability of preferences than about preference reversals. The authors suggested that people might be more reliable, or consistent, in their choices in the gain domain than in the loss domain. Evidence was cited for the loss domain provoking greater goal conflict (Schneider, 1992) and a greater number of attempts to prevent loss (Dunegan, 1993) than the gain domain, thus increasing the variability of choice behaviour. They concluded by suggesting that the interpretation of framing studies needs to be carried out carefully. First, there is a need to clearly distinguish between a choice reversal and a framing effect. Second, the problem domain itself might cause behaviours

not generalisable to other problem domains. Third, the risk-return trade off needs to be considered.

The work of Highhouse and Paese is relevant to this research because it attempted to examine the cognitive effects of framing and to assess whether people do change their perceptions of threat and opportunity. It provides some data concerning the reliability, or consistency of behaviour under conditions of loss and gain. As with other framing studies, it would be interesting to examine individual-level data to assess stability of preference and its relationship with individual difference variables. However, the authors suggested that inconsistent behaviour is more likely when people consider themselves to be in a loss situation. The data do not preclude the possibility of relationships between disposition variables and susceptibility to framing effects.

A second, relevant study was carried out by Fagley and Miller (1997). These authors examined the effects of two decision domains, hypothetical money and human life situations, on choice behaviour and found that domain did influence choice. After reviewing the literature into the framing effect, Fagley and Miller suggested that the existence and size of framing is influenced by a number of variables including sex, the decision problem, the nature and degree of loss and gain and the decision context. They proposed that multiple problems are required to understand the framing effect and cited evidence to support this proposal (Chapman, 1994; Frisch, 1993). Fagley and Miller hypothesised that there could be two possible predictions for the relationship between framing and decision domain. First, it could be that decision domains are perceived as qualitatively different and that loss and gain do not have uniform effects in the different decision domains. Second, it could be predicted that decision domains are considered in terms of a continuum ranging from more to less important. In the case of this study, money could be regarded as less significant than human life, and the overall framing effect could be as prospect theory suggests. Hence it was suggested that choices in the gain domain would be more risk averse for human life than for money, and that choices in the loss domain would be more risk seeking for human life than for money.

Participants in Fagley and Miller's research were 297 undergraduate students. Three decision problems were developed for each decision domain, rather than just one

problem in each decision domain, to increase the construct validity of the measure (Cook & Campbell, 1979; Maher, 1978). The human life problems were a version of the Asian flu problem, modified to increase the number of lives at risk (Tversky & Kahneman, 1981), a military ambush problem (from McKean, 1995) and a civil defence problem (from Fischoff, 1983). The money domain problems concerned a stock investment item (from Roszkowski & Snelbecker, 1990), an industrial supplier problem (from Hogarth, 1987) and a home selling problem developed by the authors.

There were a total of 16 experimental conditions resulting from the interaction of decision domain (money, life), loss or gain domains, labelling (A and B versus C and D) and presentation order of the certain version of the problem (first versus second). Participants were assigned randomly to a condition. Multiple regression was used to analyse the data. Choice was the dependent variable. Results showed that decision domain had a significant effect ($p < .001$). There was an interaction between frame and sex ($p < .001$). Women chose more risky options in the negative framing condition than in the positive framing condition. Men made more risky choices in the positive frame than in the negative frame. However the differences in choices were only significant for women, and the effect was not as great as previous research has found (e.g. Tversky & Kahneman, 1981). When the problems were considered individually, three out of six showed significant framing effects for women. None showed significant effects for men. The reflection effect (preference reversal) was not significant. The authors suggested that sex differences are an important consideration in the interpretation of framing research.

Overall, an interaction between frame and decision domain was not observed. The effects of decision domain, however, were significant. Participants tended to be risk taking in decisions concerning life in both loss and gain frames preferring to try to save lives rather than accepting sure loss of life. The authors hypothesised that different decision domains evoked different reference points and aspirations, which are associated with different risk-return trade-offs. In addition, they concluded that individual risk propensity could be an important, unmeasured variable that influences the effects of framing. They suggested that risk propensity could be an important element of future research.

An alternative approach to framing was taken by Chapman (1996). Her research considered two different decision domains (health and money) and examined the characteristics of these domains that influenced choice behaviour. The particular focus of the research was the effects of the sequential presentation of information. Student participants completed a questionnaire that presented a series of decision problems concerned with money and health. Overall, the results showed that preferences were found to be influenced by expectations of health and financial state, the former being expected to decline and the latter to rise over a lifetime. This pattern was perceived to be preferable to the reverse situation. When presented with short term (one year) decision making tasks, preferences for health and wealth did not fit this pattern. However, there was internal consistency. While preferences varied for money and for health, preferences did fit in with expectations for each. Chapman suggested that expectations mediate between decision domain and sequence length. The trade off between health and wealth is an important consideration. It is well known that health will decline with age but the projected increase in wealth and associated comfort might be perceived as an adequate substitute.

Chapman's study provides further evidence for the relationship between decision domains and choice behaviour. As with the work of Highhouse and Paese, this research has shown that expectations and reference points associated with different decision domains affect the decision process.

3.4 Summary of framing research

There has been considerable theoretical and empirical effort directed towards the exploration of situational effects on risk-related decision making and behaviour. Much of this research has focused upon the variability of risk behaviour and the key factors that might cause inconsistency. Two important situational variables have been identified: framing and the decision domain. There is evidence to suggest that people take more or less risk depending upon whether a situation is presented in positive terms or negative terms. Many authors have concluded that people are largely inconsistent in their risk preferences. However, it has been noted by some authors that framing effects are not

always observed and that there could be interactions between individual difference variables, framing effects and decision domains that influence risk taking. In addition, study of individual-level variability in susceptibility to framing effects and inconsistent behaviour has not commonly been part of the research method. In sum, it can be concluded that some situational factors do impact upon risky choices. Yet the possibility of stable individual preferences remains. First, because some people without strong disposition-based preferences could be influenced by situational effects. Second, because, as with some of the research reviewed in the previous chapter, it could be that perceptions and choices might change in accordance with situational influences while underlying preferences remain stable.

3.5 Emotion

This section discusses the nature of emotion. Theoretical and empirical evidence for the relationship between trait and state emotions and risk-related decision making are reviewed. There is a considerable volume of published research concerned with emotions and decision making. Hence a number of studies are mentioned in brief only. A small number of cogent studies have been selected for more detailed analysis due to their relevance to the research described in this thesis.

Emotions are relevant to risk preferences and risk taking for three key reasons. First, trait-based emotions are important. Emotions are closely associated with dispositions, in particular the trait of neuroticism, sometimes referred to as negative emotionality. The relationship between personality traits and risk taking has been discussed in the previous section. People scoring high on the emotionality scale are likely to be consistently more risk averse than average (e.g. Bartram, Clough & Williams, 1997).

Second, state-based emotions need to be considered. Emotions can have powerful effects on the decision making process, as will be illustrated below in the discussion of empirical research. If risk behaviour is more closely associated with emotions that change on a situational basis than to dispositions, at least for some individuals, then it might show little cross-situational consistency.

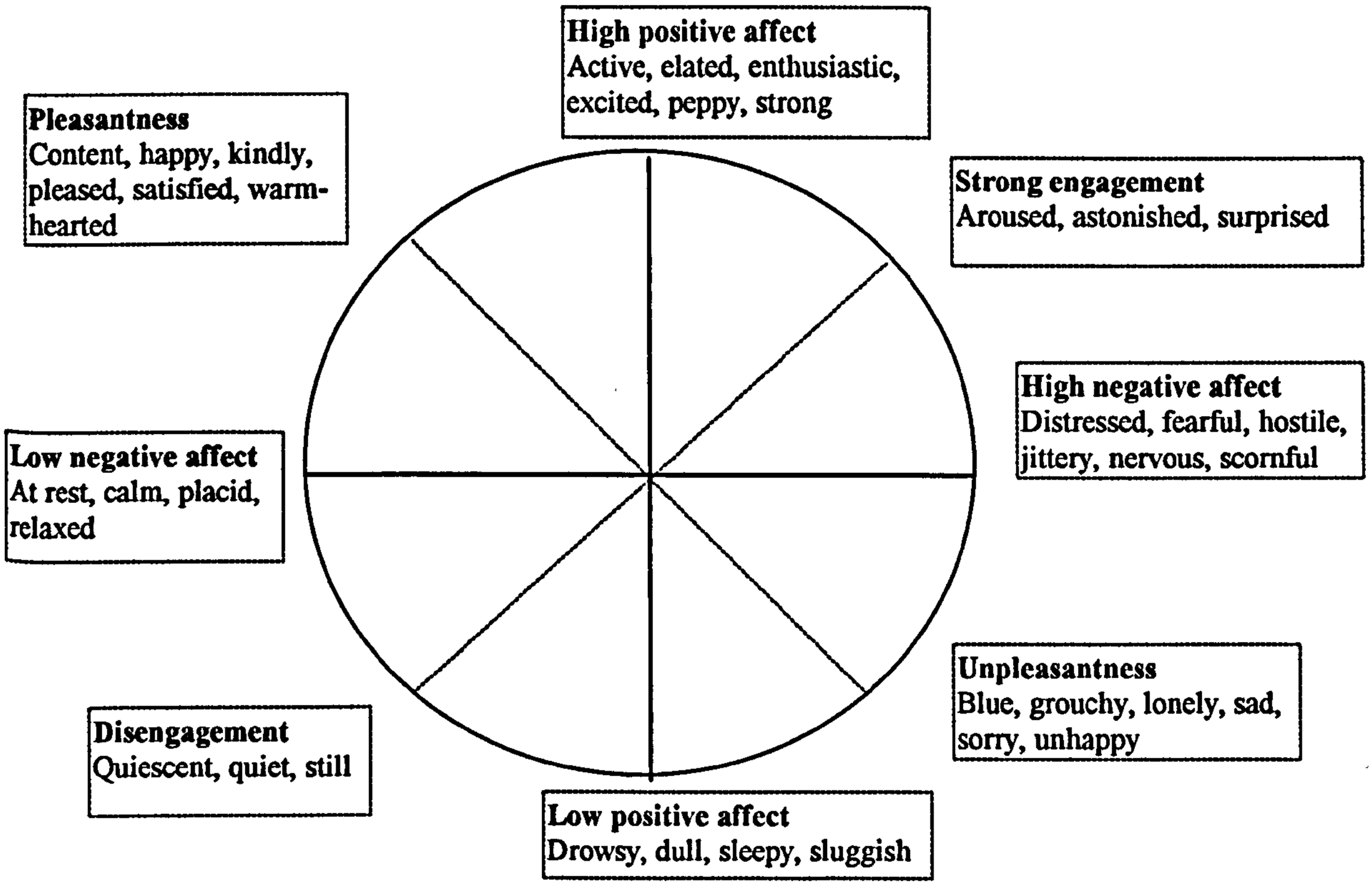
A third issue, related to point two above, is that there is likely to be a close relationship between emotions and risk because actual and perceived loss and gain are associated commonly with negative or positive affect. Again, where this is true, risk behaviour might be situationally dependent and inconsistent.

3.5.1 The nature of emotion

Recent research has confirmed the importance of emotions in the decision making process. Emotions have been demonstrated to have physiological bases and to be linked to many different areas of the brain (Davidson & Irwin, 1999). Emotions have been shown to have the ability to over-take thoughts before the individual is aware of them (Le Doux, 1986) and can prompt action without conscious intervention (Goleman, 1996). This research and other similar works have resolved a debate about whether emotions or cognitions play the primary role in the decision making process, (e.g. Lazarus, 1984; Zajonc, 1984).

As with research into personality traits, there have been a number of attempts to resolve the issue of how emotions are organised and categorised. Recently there has been some convergence upon a conceptualisation that arranges emotions on four bipolar dimensions. These are represented on the next page (from Watson & Tellegen, 1985, based upon Russell's circumplex, 1980). It needs to be acknowledged that the representation that follows is schematic. Watson, Wiese, Vaidya and Tellegen (1999) suggested that the four dimensions are not truly independent and they are not strictly bipolar (the exception being pleasantness - unpleasantness). A circumplex does not accurately represent the relationships between the different emotions, that is, there is evidence that some emotions are clustered together rather than being equidistant from each other. Nonetheless, the diagram illustrates usefully the range and type of emotions and presents an approximate representation of the relationships between different emotions.

Figure 3.3: The emotion circumplex (Watson & Tellegen, 1985)



3.5.2 Emotions and decision making

The first section of this chapter discussed personality and its influence on risk behaviour. It was noted that the trait of neuroticism is especially relevant to risk taking. Research into the emotions associated with neuroticism and its relationship with decision making has shown that this trait influences the intensity of emotions and the frequency of positive versus negative emotions (George, 1995). Trait anxious people pay more attention to threatening information (Broadbent & Broadbent, 1988; MacLeod & Cohen, 1993; Mathews & McLeod, 1985), act faster when prompted by threatening stimuli (Broadbent & Broadbent, 1988) and believe that they are more likely to experience negative events than others (Butler & Mathews, 1987). Gasper and Clore (1998) suggested that people with high trait anxiety tend to believe their anxiety has a stable source and feel the anxiety in different aspects of their lives. These people are more influenced by short term causes of anxiety, and involve their emotions in their decision making because the feelings fit in with their general anxious state of mind. In contrast, people with low trait

anxiety tend to believe that the anxiety they experience is due to short term and specific causes. In sum, research evidence suggests that people who are high scorers in a measure of neuroticism are likely to be consistently more risk averse than people who have low scores in the same measure because of their emotion-based motivations to avoid risk.

In addition to research on trait based emotions, state emotions have many important influences on the decision making process. For example, mood state influences numerous aspects of perception and interpretation of outcomes (Johnson & Tversky, 1983). Emotions have been found to influence the way that memories are structured (Bower, 1981) and to influence memory and recall processes (Fiske & Taylor, 1984). Positive affect has been found to activate subconsciously positive thoughts and vice versa for negative affect (Fiske & Taylor, 1984). Emotions can change usage of decision making rules, such as the selection of information processing rules (Forgas, 1989), decision coping patterns and heuristics (Janis, 1989; Janis & Mann, 1977). Emotionally driven heuristics have been shown to impair self-regulation (Keinan, 1987) because a quick, easy solution is sought that does not involve cognitive analysis of outcomes (Baumeister, Heatherton & Tice, 1994). It seems clear that there is likely to be an important relationship between state emotions and risky decision making. People without strong disposition-based emotions are more likely to display cross-domain variance, as discussed in the personality section of this chapter. This variance could, in part, be due to emotional variance. A number of research studies have explored the reasons why emotions influence risk behaviour.

Research by Hockey, Maule, Clough and Bdzola (2000) examined the relationship between mood and risk taking. The research showed that there are interactions between negative affect, in particular fatigue, and risk preferences.

Three affect dimensions were selected for study: anxiety, depression and fatigue. An interesting feature of this research, compared with other research that uses mood induction to measure the effects of different emotions, was the use of a mood diary to establish characteristic patterns in individual-level emotion. This enabled the authors to calibrate mood to assess individual-level variability and baseline emotions. The mood diary was used to record emotion daily for two weeks prior to the test session. Data

analysis showed that the mood diary was an effective way to measure affect, and to separate state changes in affect from underlying trends.

Participants in the first study were 34 undergraduates. The first measure was the Personal Risk Inventory (PRI), which presented participants with a series of 13 scenarios designed to represent typical everyday decisions. Participants were asked to chose between a safe option and a risky option using a 10-point Likert scale to show strength of preference, to rate each option in terms of the effort involved in carrying out the choice, and to rate how much risk the choice involved. In addition, participants rated their familiarity with each situation, the importance of getting a favourable outcome and the emotional impact of the problem. The results showed that people who were more fatigued, both in general and at the time of testing, had a somewhat stronger preference for choosing the risky options in the scenarios than people who were not fatigued. Anxiety had no relationship with risk choice, although it was noted that test anxiety might have contributed to the relationship between fatigue and risk choices. There were no significant associations between mood and perceived risk. The authors suggested that state rather than trait mood had a stronger effect on choice behaviour. Further, it was proposed that people who have greater variability in state mood might be more likely to vary their decision choices. This suggestion supports the point raised in the personality section of this chapter: that people with consistent trait based emotions, e.g. a low score in the neuroticism scale, might be more consistent in their risk preferences than people without this profile who have greater susceptibility to situational variance and the associated emotional variance.

The second study by Hockey and his colleagues aimed to assess whether the findings of the first study could be confirmed in a different test setting and whether the relationships between mood and choices could be explored further. In particular, anxiety was considered to be an important factor that was not revealed to be independently significant in the previous study. In this study, participants completed the mood diary for four weeks and completed the PRI at home on two occasions two weeks apart. The participants were 58 students. These data did show a significant negative relationship between the stable measure anxiety and risk choices for both sets of PRI results, i.e. people who were more anxious were more risk averse, and between fatigue and choice in

one set of PRI results. There were no relationships between mood and perceived risk. When the relationships between the state mood and risk data were analysed, the only significant associations were between risky choice and fatigue. There were no relationships with anxiety or between mood and perceived risk. It was suggested that the results might have been due to the timing of data collection. One set of PRI scores was gathered on a Saturday when levels of the negative moods were in general lower than weekdays. Examination of both sets of PRI data showed that there was not a general trend towards consistent responses. The situational characteristics were shown to have some relationships with preferences and perceptions. People took more risks with familiar situations than with unfamiliar situations, and perceived familiar situations to be less risky. Participants took less risk with situations they rated as important, but data showed that when fatigue was greater, caution was reduced and people were more willing to take risks in important situations. The date indicated that fatigue and anxiety co-varied. It was suggested that there are likely to be complex interactions between these two affective states that are associated with changes in risk taking. Further examination of the data showed that less anxious individuals took more risk when they are moderately fatigued. More anxious individuals took more risk at medium to high levels of fatigue. The authors proposed that people who have underlying levels of high anxiety are likely to be risk averse, except when they have high levels of fatigue.

The third study by Hockey and colleagues considered the effects of mood manipulation on risk-related decision making. Participants were 55 management trainees. The participants were divided into two groups: a control group, and a group in which fatigue was induced. The PRI was administered both before and after the mood manipulation. The induction comprised giving the participants a difficult set of practical exercises with little feedback or opportunities for control. The mood induction was found to be effective in changing mood ratings, particularly with respect to fatigue and anxiety. The PRI data showed changes in risky choices and perceived risk. Risk taking was found to increase with increased fatigue. In addition, the results indicated that fatigue has a greater impact on risky choice when combined with high anxiety.

These studies have provided some useful information concerning the relationships between emotions and risk-related decision making. First, in these studies risk

preferences, in terms of choices, changed while risk perceptions remained relatively stable. This suggests that at least some components of the decision process can be relatively consistent. As Weber and Milliman (1997) proposed, the identification of the specific stable components is likely to depend upon the conceptualisation and measurement of the decision process. Second, the results of the studies showed that trait anxiety was a significant influence on the decision making, such that high levels of anxiety are associated with risk aversion except under conditions of high fatigue that reduces the habitual level of caution. In sum, there is evidence for individual differences in the consistency of risk-related decision making. People with particular combinations of traits are more likely to be consistent across situations than others are. A key factor that is likely to influence consistency, and that could moderate the relationship between traits and preferences, is the degree of fatigue. The importance of individual factors rather than situational factors in influencing risky choices was emphasised.

A second study that is relevant to the research in this thesis is the work of Mittal and Ross (1998). The subject of framing and its effects on decision making have been discussed in the previous section. It was shown that perceived and actual loss and gain affect behaviour. Research that considers the emotional states associated with framing, loss and gain has added some insight into why the framing effect might occur. The study by Mittal and Ross examined the impact of positive and negative emotion and framing on issue interpretation and risk taking.

The Mittal and Ross study focused on transient affective states, not strong emotional states or trait-based emotions, and related them to two aspects of strategic decision making: issue interpretation and risk taking. Risk taking was operationalised similarly to Sitkin and Pablo (1992), as the degree to which participants "were willing to spend resources to obtain an outcome with a given expected value" (p299). These two variables were chosen because they are suggested to be critical to organisational performance (Ginsberg & Venkatraman, 1992; Hickson, Butler, Cray, Mallory & Wilson, 1986; Thomas, Clark & Gioia, 1993). The research had three aims: to examine the effects of positive and negative affect on risk taking; to assess the effects of framing a situation as a threat or an opportunity; to try to generalise past work in this area to a managerial context. Two studies were carried out. The first study examined the direct

effects of mood on risk taking and issue interpretation. The second study examined how mood moderates the impact of issue framing.

Participants in the first study were 63 undergraduate and MBA students. The procedure involved the participants reading a short story designed to evoke positive or negative emotion (adapted from Johnson & Tversky, 1983). Participants were divided into two groups. One group was given a negatively framed story, concerning a student with leukaemia, and the other group was given a positively framed story, concerning a student being awarded a scholarship. Manipulation checks assessed whether the mood induction was successful. The second stage was the presentation of an ambiguously worded business scenario (adapted from Jackson & Dutton, 1988 and Thomas & McDaniel, 1990) followed by a questionnaire to measure issue interpretation and risk taking. Issue interpretation was measured using a five-item Likert scale. An example of an item is the statement: these new developments are a threat. Risk taking was measured as the amount of money a participant was willing to pay for nine different action plans that could follow the strategic decision. This type of measure has been used in previous research (e.g. Mano, 1992; 1994). Each plan included a level of profit and the likelihood of attaining that profit level. Three profit levels and three probability levels were combined to form a total of nine options.

Results showed that the stories were effective in inducing the desired mood state. Analyses of variance were used to examine the relationships between mood, issue interpretation and risk taking. It was found that in the positive condition, issues were significantly more likely to be interpreted as opportunities than issues in the negative condition. Affect was also found to have a significant impact on risk taking. Participants showed greater willingness to pay for plans, i.e. risk taking, when in a negative affective state than the positive affect group. People in the negative affect group were willing to spend more at all probability levels and the rate of increase of willingness to spend as profit levels rose was greater than people in the positive affect group. The authors suggested that these results indicated that people experiencing positive mood are more reluctant to take risks and increase the chance that they will incur negative outcomes that could reduce their mood. They also suggested that mood might be acting to influence risk preference.

The second study was developed to build on the results of the first. This study considered whether positive and negative states have different effects and whether there is an interaction between threat, opportunity, positive and negative affective states. Participants were 80 undergraduate and MBA students. There were several stages to the procedure. First, participants took the General Business Skills Test which measured grammar, algebra, economics and current events. Next, participants were randomly assigned to one of two groups: a positive feedback group and a negative feedback group. Feedback was unrelated to task performance. After receiving feedback, affective state was measured using a scale developed from Mano (1992). Finally, participants competed the strategic decision making task. There were two versions of the task: a threat-framed scenario and an opportunity-framed scenario. As with the first study, the two key variables were issue interpretation (measured using a three item scale reduced from five items) and risk taking (measured using the same nine plans as for the first study).

The results showed that affect had a significant influence on issue interpretation. Positive affect was associated with positive perceptions of the decision situation and negative affect was associated with negative perceptions. The effects of emotion on issue interpretation were not symmetrical. Negative affect was found to have a larger impact upon issue interpretation than positive affect. Mittal and Ross suggested that negative mood leads to less effective information processing. Positive affect could lead to increased likelihood of perceiving a threat as an opportunity due to the desire to maintain a positive state of mind. Risk taking, in terms of willingness to spend, increased with negative framing. The result was similar to Sitkin and Weingart's (1995) finding. Increased risk taking was also associated with increased levels of profit and likelihood of profit. Overall, affect was not found to moderate the relationship between issue framing and risk taking. However, when the frames were considered individually, it was revealed that framing did influence risk taking in the negative affect condition, but not in the positive affect condition. In sum, it was suggested that affect influences risk taking through effects on assessments of the amount of money involved in a choice, and that framing influences both perceptions and probability assessments.

Mittal and Ross concluded that both affect and framing are critical to the understanding of risk taking behaviour. The interaction of these two factors has important influences on the motivational goals of behaviour, for example the maintenance of positive mood, and the processing of information.

One possible reason why emotions influence decision making and behaviour discussed by a number of authors, including Mittal and Ross, is that they are fulfilling the important roles of self-protection and self-regulation. Behaviour, including risk behaviour, could reflect needs associated with different emotions. The mood protection hypothesis (Davison, Suppes & Siegel, 1956) suggests that someone experiencing positive emotions is likely to be motivated to maintain their mood and behave accordingly. This can be manifested in risk aversion because taking a risk and making a gain is not likely to significantly improve mood but a loss would decrease mood. The reverse is the case when the emotion experienced is negative. Taking a risk that results in loss will not greatly decrease mood, but making a gain could significantly lift mood and hence risk taking becomes an attractive option. The mood protection hypothesis is, to some extent, an extension of Prospect Theory and adds the construct of emotion to the domains of loss and gain.

There is some empirical evidence to support the mood protection concept. For example, Mano (1992) found that high negative affect increased risk seeking in terms of willingness to pay for lotteries, but risk aversion when choosing between a gamble and its certainty equivalent. He suggested that in the context of a lottery, taking part is the only way to make possible gains to improve mood. In the case of gambling, the certainty equivalent provides an opportunity for sure gain and mood improvement. Hence Mano (1992) suggested that risk taking becomes more appealing under certain emotional conditions.

Mood protection is also related to changes in perception. People with positive affect can be more sensitive to potential loss because affect interacts with probability and subjective weighting of likelihoods (Isen, Nygen & Ashby, 1988). These authors suggested that likelihoods are assessed when considering gains. When considering losses, both likelihoods and the impact on mood also are taken into consideration. Judgements

regarding losses are more influenced by affect than assessments of gain. Gains might not serve to improve mood significantly. Losses, however, can significantly reduce mood and are therefore aversive.

The hypothesised mechanism by which mood protection occurs concerns the relationship between emotions and cognitions whereby emotions increase the complexity of the cognitive context by priming affective features and by activating certain brain regions (Isen, 1987). Motivational changes associated with different emotional states are also important. Isen proposed that people are naturally inclined to maintain a happy state, rather than a sad one. They use positive affect as a cue, but not negative affect. In addition, the cognitive structures associated with positive and negative affect may differ in ways that result in differences in recall and cueing. For example, decision making processes are simplified when tasks are not enjoyable (Lewinsohn & Mano, 1993). Isen (1992) suggested that this is because a smaller range of material is accessed by negative affect than by positive affect.

The relationship between positive and negative emotions and risk taking is likely to be complex. As suggested in the discussion of framing and reference points, it could be that there are subtle interactions. What appears to be a gain might not in fact be perceived to be a gain and might not have positive associated emotion. This hypothesis was applied to data gathered by the author and colleagues at London Business School as part of an ESRC[1] co-funded research project. This research examined individual and organisational influences on the performance of traders in investment banks. Four top-tier international banks with offices in the City of London were involved in the research. Participants were 118 traders and 10 senior managers who did not trade (Nicholson, Willman, Fenton-O'Creevy & Soane, 2000). The method comprised gathering survey data, administering a computer-based task and a semi-structured interview. During the interview, traders were questioned about their emotions and the impact of their emotions upon decision making. Qualitative analysis of the interview transcripts revealed that, contrary to the trading lore which suggests traders are unemotional operators (e.g. Kovner in Schwager, 1989)

[1] Reference number L211252056

emotions are a pervasive and significant part of both the traders' everyday experiences and their decision making processes.

When asked about the effects of positive and negative emotions, an interesting pattern of results emerged. As previous research has suggested, positive and negative emotions were found to have different effects. The pattern of behaviour changes in the loss and gain domains was complex. The most straightforward interpretation of prospect theory and the mood protection hypothesis would be to suggest that risk taking was associated with losses and risk seeking was associated with gains. There was some evidence to support these predictions. A small number of participants did report risk seeking, or an increased likelihood of risky decision making in the domain of losses, as the following quotation shows:

> "If you are down the temptation is to take the chance. If one position is a bit offside, you are more willing to run with it in the hope that it will come back flat or a bit positive rather than lock in a loss."

The general trend, however, was not to be increasingly risk seeking as losses increased. This is due to increased managerial controls in the domain of losses (Willman, Fenton-O'Creevy, Nicholson & Soane, in press). Losses were often managed successfully. The quotation below is typical of the comments made by managers about managing traders.

> "My role as a manager is to cover the downside rather than the upside. I try to enforce the discipline of cutting losses rather than pushing them to add to positions."

In the domain of gain, a few traders did report becoming risk averse, as prospect theory predicts.

> "I have 2 or 3 big trades a year. If these make money I just shut up shop."

The majority of traders, however, did not initially appear to fit with the mood protection hypothesis and its prediction of risk aversion in the domain of gain. Many traders associated gain with positive emotion, confidence and increased risk taking. For example:

"The times I have lost money are the times when I am up. I feel very relaxed and put on trades that I shouldn't."

"If you are sitting on a pile of money you have made, you feel more confident. ...When you are feeling good, you have momentum and you have a bit more passion. You are able to do what your intuitions or emotions say."

"When you feel you are on a run, you are more inclined to roll the dice a bit more. Got more money to play with."

When the traders' comments were examined in relation to their discussions concerning their bonus targets, however, it became apparent that framing and reference points were exerting an influence on traders' perceptions of loss and gain. The traders who reported risk taking in circumstances of positive emotion and confidence also talked about how they continued to take risks because they wanted to make more money. They were not willing to be conservative when they still had opportunities to overreach their target and increase their end of year bonus payment. Thus the traders perceived themselves to be in a position of loss compared with their profit target. Their continued risk taking might be explained in terms of positioning in the domain of loss. The presence of positive emotions could be associated with past profit and the anticipation of future profit. To test for relationships between personality and emotion-led behaviour change, individual interview data were coded into one of two groups according to whether participants reported changing their behaviour in response to emotional reactions or not. Group membership was correlated with NEO PI-R facet data gathered for 52 participants. The reduced sample size for the personality data was due to the voluntary and time-consuming nature of the questionnaire. Changes in behaviour were associated significantly with three low scores in facets of the conscientiousness domain: competence, order and achievement-striving ($p < .05$). These results support further the notion that consistent behaviour has important dispositional anchors.

In sum, emotions were found to be an important influence on traders' decision making processes. Positive and negative emotions did have different effects on risk taking. The pattern of effects was complex, and related to individual-level perceptions of loss and gain, showing the importance of framing and reference points. However, consistent

behaviour was likely to have a disposition-based component associated with the conscientiousness trait.

3.6 Summary of risk and emotion research

Emotions have been shown to be powerful influences on decision making and behaviour. Disposition-based emotions have been shown to be associated with consistent patterns of risk behaviour. In particular, a high scale score in the trait of neuroticism has been related to risk aversion. State, or situation, based emotions also have been demonstrated to have important effects on decision making and behaviour. It is likely that there are some relationships between positive and negative emotions and the effects of positive and negative situational frames. One possible reason for the observations that emotions affect decision making is that experiences of different emotions lead to inconsistent, situationally variable risk behaviour because of changes in perception and information processing strategies. The effects of emotions could be similar to the effects of framing. As discussed in the previous section, there is some evidence to suggest that situational variables can affect perceptions and judgements, while underlying preferences are relatively stable. Likewise, emotion-related changes in decision making could be consistent with general risk preferences.

In sum, as has been suggested in the previous section summaries in this chapter, it is possible that two key categories of individuals exist. First, those for whom emotions are trait based, relatively stable and are associated with relatively consistent approaches to risk-related decision making. Second, those for whom emotions are situationally variable and lead to inconsistent risky choices.

3.8 Hypotheses

These theory and research discussed in this chapter and preceding chapters led to the development of a set of hypotheses be tested in this research:

1. Risk propensity can be conceptualised and operationalised in terms of cross-domain risk preferences.
2. Whether people are consistent or inconsistent in their cross-domain risk preferences, and the degree of consistency of cross-domain risk preferences, will be influenced by personality factors and the consistency of cross-domain decision preference variables
3. The predictors of domain-specific risk preferences are different for the work, health and finance domains.

The method developed to test these hypotheses is discussed in the next chapter.

3.7 Chapter summary

This chapter has presented and discussed issues that are important influences on risk-related decision making and behaviour. These factors have each been shown to be significant components of risk-related decision making. There are three sets of implications for the explanation and prediction of behaviour.

First, personality. Particular sets of personality traits have been associated with relatively consistent cross-domain risky choices and risk behaviour. Specifically, low scores in the traits of neuroticism and conscientiousness combined with high scores in extroversion, which includes the facet of sensation seeking, have been demonstrated to be significant predictors of risk seeking behaviour. The reverse pattern of scoring has been shown to relate to consistent risk averse behaviour. Agreeableness is an additional influence on risk behaviour, but its effects are more complex. A low score in a measure of agreeableness when added to the risk seeking profile is likely to contribute further to risk seeking. A high score in agreeableness added to the risk seeking profile could lead to risk taking in some situations, or domains, that are judged not to impact adversely on other people. Hence that profile might be associated with behaviour that seems to be inconsistent, or domain specific. People without strong dispositional influences on behaviour could be less likely to show cross-domain consistency.

Second, loss, gain and framing. Changes in perception associated with framing, loss and gain have been shown to increase the variability of risk behaviour. Many research studies have shown that people tend to have risk preferences that change according to whether information is presented in positive terms or negative terms. However, a few researchers have taken an alternative approach and have shown that two alternative explanations are possible. First, when data are considered on an individual level, some people have been shown to be consistent in their preferences while others are not. Second, where preferences are variable, it has been shown that although perceptions of what seems to be the more attractive option might change, while the underlying preference for more or less risk remains relatively stable. Hence while it might indeed be true that risk-related decision making is open to the influence of situational variables, this is likely to be truer for some people than others. The interaction between variability, consistency and personality is an important area for study.

Third, emotion. Emotions have been shown to have numerous effects on the decision making process and risk behaviour. Both trait and state emotions are important factors. As discussed in above, trait based emotions are likely to lead to relatively consistent approaches to risk-related decision making. State emotions associated with situational factors could be associated with variations in perception and sensitive to situational variance.

Chapter 4

Method

4.1 Chapter abstract

Chapter 4 describes the research framework and the method used to gather data. The research was designed to test the hypotheses presented in Chapter 3. The aims were threefold. First, to assess of risk preferences in several decision domains (work, health and personal finance). Second, to examine the factors that are associated with consistent and inconsistent risk preferences. Third, to assess the differences between cross-domain risk preferences and domain-specific risk preferences.

The chapter describes the development of the research measure and how data were gathered. The measure was a questionnaire that assessed biographical variables, a set of cognitive and emotion related decision preference variables for each decision domain, and a set of domain-specific decision preference items. Personality was measured using an existing personality inventory. The sampling strategy was to create a sample that encompassed a range of different approaches to risk. There were five sample groups: academics, chess players, fire fighters, mountain climbers and traders.

The chapter concludes by summarising the key characteristics of the research method and discussing how this method relates to previous work in the field.

4.2 The research framework

The aims of the research were to contribute to the literature concerning individual-level consistency with respect to risk-related decision making, and to explore whether consistency or inconsistency are related to factors such as personality. The focus of the research is the individual.

The research sought to be both exploratory, to assess the relationships between decision styles and individual difference variables, and descriptive, to characterise participants in terms of whether they were consistent or not in their cross-domain risk preferences as well as the degree of inconsistency.

The research framework was developed to fulfil the aims of the study. The design was between-participants and cross-sectional. This enabled the examination of the relationships between biographical variables, personality factors, decision preference variables and risk preferences. A normative approach was taken.

The research method drew closely upon other research into the concepts of risk propensity and risk preferences. The focus of much previous work has been on the concept of risk propensity. As demonstrated in the literature reviews in Chapters 2 and 3, a number of previous researchers have operationalised risk propensity in terms of risk preferences or risk choices in only one decision domain. A typical approach has been to measure risk preferences using a small number of Likert scale items. In this research, the Likert scale method of measurement is used. Since the central aim of the research was to examine the concepts of cross-domain and domain-specific risk preferences, risk propensity is operationalised in terms of the degree of consistency of cross-domain risk preferences. This operationalisation was derived from the work of Sitkin and Pablo (1992) who proposed that risk propensity would be reflected in expressed preferences. Hence, an individual who shows strong preferences for taking risk in each of the decision domains measured has something akin to what Sitkin and Pablo would call a propensity to take risks. However, it could be that cross-domain preferences for general risk seeking or risk avoidance are associated with different decision processes from those that drive domain-specific risk seeking or risk avoidance. That is, the personality and decision

preference profile of someone who is a consistent risk seeker is likely to be different both from a person who consistently avoids risk, and someone who takes risks in one domain but not others. The concept of risk propensity in the Sitkin and Pablo terms does not encompass those different patterns of risk preferences. Hence the two key concepts that the measure was developed to assess were domain-specific risk preferences, associated with work, health and finance decision domains, and cross-domain risk preferences that represent the consistency of risk preferences across the three decision domains.

4.3 The research method

Research in this field can be categorised in terms of method. First, a common method is laboratory-based work. Studies using this method often present standardised scenarios to participants, e.g. the Kogan Wallach choice dilemmas (1964). Responses to scenarios are commonly assessed using Likert scales. Second, an alternative approach is to use standardised gambles or lotteries, for example the work of MacCrimmon and Wehrung (1986). Gambles are usually designed to vary with respect to the size and probability of payoffs. Participants are asked to state which gamble they prefer. A third research method is the use of the normative survey technique. An example of this method is the work of Kärhä (1998) reviewed in chapter 3. Kärhä's study used the survey method to examine the individual and organisational influences on the decision making of managers in the timber industry. This format uses Likert scale items to assess a range of individual-level variables.

The method chosen for use in this research was a structured questionnaire designed to provide normative data. This method was considered to be more appropriate than both standardised scenarios and gambles because it enables best the aims of the research to be met. This research was developed to examine the consistency of individual-level risk-related decision making and to assess whether patterns of decision making could be anchored in other individual characteristics. The triangulation method is used commonly in psychological research and is a feature of a number of the studies reviewed in chapters 2 and 3. What is notable about the research discussed in those chapters is that while they aim to assess risk propensity, there is a tendency to measure risk preferences with respect

to a small number of decisions in one domain. In particular, studies in this field have focused largely on business decision making and financial decision making. The small number of studies that have been conducted on decision making in different domains has shown that decision domain has important effects on choice behaviour (e.g. Fagley & Miller, 1997). This research was developed to contribute to development of a cross-domain conceptualisation of risk preferences. The aim was to assess more than one decision domain in order to explore and describe the issue of decision consistency rather than just to focus on risk preferences in one domain. Reported risk taking or risk preferences in one decision domain alone might not be the optimal way to operationalise the concept of risk propensity in the way that Sitkin and Pablo (1992) define it.

A questionnaire method was suitable for this type of research for three further reasons, as discussed by Robson (1993). First, the survey method provides data on a large number of standardised variables. This enables the quantitative analysis of within-participant and between-participant data. Second, the survey method is an efficient way to collect a large amount of data at relatively low cost, in terms of both time and money. Third, the anonymity that a survey provides can be useful in increasing response rates.

There are several potential disadvantages of the survey method, also discussed by Robson (1993). Data might be influenced by how interested or motivated the respondent is in the topic. It is common for response rates to be low when surveys are conducted by post. There can be ambiguity in the survey items. Participants may not perceive the item to be asking the same question as the survey developer believes it does. Respondents may not be truthful in their answers. Efforts were made to overcome these disadvantages. First, the questionnaire was piloted to try to eliminate ambiguous questions. Second, the survey was voluntary. Third, whenever possible, I met or spoke with respondents on the telephone, or had individual email contact. This process was useful to explain the aims of the research and to answer questions about questionnaire completion. Only one out of five sample groups surveyed had no contact with the researcher. This group was the academics who were likely to have experience of completing questionnaires and were less likely to require an explanation of the research procedure.

4.4 Sampling

The aim of the sampling strategy was to target people who have self-selected into groups where the nature of risks involved vary. The method was non-probability sampling of the heterogeneous type (Robson, 1993) where the aim is to gather data from individuals representing the range of individual difference characteristics being measured. It is likely that a random sample of the general population could have served to meet these aims. However a random sample would have had to be sufficiently large to ensure that a range of risk orientations was captured. The targeted sampling strategy was a more efficient way to gather the necessary range of data. The aim of the sampling strategy was not to use sample groups as the basis for comparison, although data were examined to see whether there were significant differences between the groups. Rather, the aim was to achieve variance on the individual-level variables in the questionnaire. Both work and nonwork foci were used to select the sample groups. The groups were academics; chess players; fire fighters; mountain climbers and traders in financial markets. It is acknowledged that the groups are not mutually exclusive, but that this sampling strategy could be an effective method to achieve heterogeneity within and across groups. The methods used to gather data from each of these groups are described section 4.9 below.

4.5 Questionnaire development

The questionnaire was developed to gather standardised data. No specific knowledge was required to complete the questionnaire. The questionnaire was structured to assess a range of demographic and individual-level variables that reflected the aims of the research. The level of analysis was the individual and, as Fishbein and Azjen (1974) suggested, the level of specificity in the questions reflected this.

A key feature of the questionnaire was the measurement of concepts in three decision domains in order to assess the consistency of individual risk preferences and risk-related decision making. Three decision domains were selected on the basis that this is the study of different decision arenas is a basic requirement of a measure which seeks to examine the factors that are associated with consistent and inconsistent risk preferences and the

concepts of cross-domain and domain-specific risk preferences. The three risk-related decision domains were work, health and finance. These arenas were chosen for three reasons. First, it seemed likely that a sizeable proportion of the variance in cross-domain risk preferences could be captured by assessing three key domains that are central to many people's lives. Second, it was thought that these domains would be applicable to almost all respondents in the sample groups chosen. Third, there is a history of research in each of the three domains from which to draw measures. However, as noted, the items in the questionnaire could not all be based upon work in the field of risk propensity alone since research in this field has tended to focus on just business or finance decisions.

In the questionnaire risk was defined as being a choice where there are possible negative outcomes that you prefer to avoid. This very general definition was chosen to reduce the likelihood that participants' perceptions of risk would be shaped by the researcher. The loose definition was presented in a way that was intended to allow individual-level interpretation of risk. In addition, the definition needed to be broad enough to apply across different decision arenas and to encompass the notion that not all risk involves loss. This definition does not acknowledge the possibility of gain, as the definition does that is used in the discussion of the nature of risk in this thesis, however, the aim was to present a relatively non-academic definition which would be a general frame for approaching the questions. A definition that indicated a risk event was one which could lead both to positive and negative outcomes could have lacked face validity; it could have appeared too general to be useful to participants.

4.6 Validity and reliability

The questionnaire comprised newly developed items, items based upon the work of other authors adapted to each decision domain and a previously developed scale to measure personality. The development and adaptation of items raises several issues concerning the validity and reliability of the measure.

There are a number of different types of validity. Three types of validity are relevant to this study. Construct validity concerns whether the items measure the concepts of

interest in the research (Cook & Campbell, 1976). This issue was particularly relevant to the items concerned with measuring the consistency of decision making. Where possible, items were used that have been shown to have construct validity in previous studies by different authors. The design of new items attempted to maximise construct validity by developing items that are clearly linked to the construct they are trying to measure, rather than by using opaque items which have been shown to relate to the concepts in previous research although the causal mapping might be unclear. The research design was to assess relationships between the decision making items and other individual difference characteristics, namely demographic, biographical and personality data. The data were gathered using one instrument, the questionnaire, and as such the approach does not allow multi-method data comparisons, for example between questionnaire responses and an independent measure of risk taking. However, the design did allow triangulation. This enabled the examination of whether the decision making variables developed for this research related to biographical information and a well established approach to the measurement of personality.

The second type of validity that is an issue for this research is external validity. This is the degree to which the results of the study generalise to the wider population (Cook & Campbell, 1979). The greater the range of demographics, decision making preferences and personality captured by the sampling, the more likely it is that the results are generalisable to the population. The sampling strategy was developed to try to capture variance on the variables in the questionnaire by gathering data from people likely to have a range of orientations to risk. This increased the likelihood that the study had external validity.

Third, the face validity of the questionnaire was considered. The items were developed and presented in a way that would increase the likelihood that participants would perceive them to be appropriate to the subject of study and the aims of the research.

The second important issue relating to questionnaire construction is reliability. There are two key components of reliability that apply to the measure used in this research. First, the reliability of a measure concerns whether data gathered at one point in time would be the same as data gathered at a different point in time. Second, reliability concerns the

consistency of responses. For example, items within a scale should relate to the same underlying construct and answers should be relatively consistent. A high degree of inconsistency could indicate that the items were measuring a number of different constructs. It is anticipated that responses to the questionnaire developed for this research could change over time and with experience of difference risk-related events. However, questions were developed to assess some relatively enduring decision making preferences that were likely to be related to personality that is relatively consistent over time for a portion of the sample. In this respect, it was expected that the first aspect reliability of the questionnaire could be increased. The second aspect of reliability, concerned with the consistency of responses, was a less important issue. Items were not developed with the intention of forming scales. Rather, cross-domain consistency was the focus of the research of the. Lack of inconsistency of responses was considered to be a characteristic of the individual respondent, and analysed in terms of other individual-level data such as personality and demographic information. The sets of items that were specific to each decision domain items were developed to be assessed as individual items, however, they were also examined to see whether they formed reliable scales that could be related to other individual level characteristics. These data are discussed in Chapter 7.

4.7 Variables in the questionnaire

The questionnaire is shown in Appendix 2. The sections that follow discuss the items in the questionnaire and their derivation.

4.7.1 Questionnaire section I

The first section concerned demographic and biographical variables: age; sex; highest level of education; seniority within the organisation operationalised in terms of levels between the individual and the CEO, or most senior person in the London offices of the organisation if it was very large such as the investment banks; tenure; annual income including bonuses and overtime pay. There was an additional open-ended question that

asked participants to note the risks they perceive their job and their nonwork activities to involve.

This section of the questionnaire had to be adapted for some of the sample groups. The open-ended question was not included in the traders' version of the questionnaire because data collection from traders was part of a wider research project and a number of other questions related to the project had to be added to this section of the questionnaire. For reasons of keeping the data collection to a manageable time, these two open-ended questions were omitted. The fire fighters' questionnaire also had to be altered at the request of the London Fire and Civil Defence Authority. It was suggested that the change would both increase perceptions of anonymity, thus increasing the likelihood of participation, and reduce the overall length of time spent on the questionnaire. This was because respondents were undergoing selection assessments and had already completed a lengthy battery of measures prior to completing the questionnaire used in this research. The different versions of this section of the questionnaire are shown in Appendices 2b, 2c and 2d.

4.7.2 Questionnaire section II

This section comprised a set of items that were repeated across decision arenas. These items were adapted from previous research into risk-related decision making that has identified some of the key concepts related to choice behaviour. In particular, the work of Sitkin and Pablo (1992) was important.

The first item in this section was an open-ended item that asked participants to record any significant positive or negative risk-related events. This item had two purposes. It allowed the gathering of some qualitative individual data regarding the risk experiences of participants. The item had the additional aim of shifting participants' thinking from one decision domain to the next and encouraging them to think about each domain prior to answering further questions. Recent examples of risk experiences were requested because it has been suggested that this is the optimum time frame to use when asking participants about potentially negative events. If longer time periods are asked about, the

events reported are likely to have been subject to psychological manipulation that influences the accuracy of recall (Cannon and Nicholson, 1997).

The next eight items in this section were presented in the form of statements that were rated on a 5-point Likert scale (Likert, 1932). Participants were asked to circle the appropriate number. These items were essentially the same for each decision domain. The only differences were the adaptation of the item to make reference to work, health or personal finance. These items were constructed to reflect previous research and to assess cognitive and emotional aspects of risk-related decision making.

Items one and two in this section considered reactions to events noted in the previous open-ended question. The two items considered change in risk related behaviour as a result of experiencing risk (rated from significant change to no change) and the direction of change in behaviour (rated from less cautious to more cautious). These items were developed to assess whether behaviour was variable, changing in response to risk events, or relatively consistent and resilient despite recent risk experiences.

The third item drew upon the work that has considered emotions and risk, reviewed in the previous chapter. This item measured general affect in each decision domain. The response range was negative feelings to positive feelings.

The reference point was the focus of the fourth item. This item was based upon the research of Kahneman and Tversky (1979) and the associated work, which was reviewed in Chapter 3, that has shown that perceptions relating to loss and gain can influence decision making. The response range was worse than usual to better than usual.

The fifth item assessed the cognitive aspect of decision making for each domain. This item was included because of the research into perceptions of risks that has shown information processing and cognitive biases to be important components of risk-related choice (e.g. Forgas, 1989; Janis, 1989; Janis & Mann, 1977). An additional influence was the tradition of expected utility theory-based research that considers decision making to be a rational process involving the consideration of decision alternatives. The item asked participants to rate the frequency of consideration of payoffs and costs of each

alternative in decision making to show whether a generally cognitive approach was taken to risk-related decision making. The response range was very rarely to very often.

Emotions were the focus of the sixth item. Emotions have been shown to be a key factor influencing decision making in a number of research studies (e.g. Hockey et al, 2000; Mittal & Ross, 1998). This question asked participants to rate the frequency of influence of emotions on decision-making. The aim was to assess whether a generally emotional decision making strategy was preferred. The rating scale ranged from very rarely to very often.

The seventh and eighth items were developed from the Sitkin and Pablo's paper on risk propensity (1992). These authors proposed that the two key factors in risk behaviour were risk perception and risk preference. Participants were asked to rate their overall level of perceived risk in each domain ranging from much risk to little risk. General risk preference was measured in terms of whether people rated themselves as preferring to take risks or avoid risks.

4.7.3 Questionnaire section III

The third set of questions was developed to measure issues that were specific to each decision domain. Items in this section were selected on the basis of the previous empirical evidence into risk perception, risk propensity and risk taking. The specific questions for each domain followed the general questions, as recommended in Robson (1993). The domain-specific items were included in the questionnaire for two reasons. First, these items provided further data concerning the nature of the decision making process. Second, the data gathered could be correlated with the demographic, biological and personality variables to assess whether individual difference characteristics were associated with particular patterns of decision making. Third, the items could be factor analysed and then used to develop scales for further analysis of domain-specific decision preferences.

The items in this section of the questionnaire were, by their nature, domain specific. This was to assess whether there were overarching approaches to risk-related decision making that were more significant in the decision making process than the decision domains themselves. The themes for each set of domain-specific variables were the following:

1. Risk as positive
2. Risk as negative
3. Negative emotions associated with risk
4. Positive emotions associated with risk
5. Behavioural frequency

These themes were chosen to reflect the cognitive, emotional and behavioural facets of risk. The dimensions of emotion were high positive affect and high negative affect following a consideration of the emotion and sensation seeking literature reviewed in Chapter 3.

The form of each question was a 5-point Likert scale item. The response range was strongly disagree to strongly agree for each item.

Within each decision domain there were two sets of items designed in this way. This was to increase the likelihood of capturing cross-domain consistency while keeping the overall length of the questionnaire within reasonable limits. The section that follows describes the items used in each domain and the derivation of items. The items are shown in the questionnaire in Appendix 2e, and are numbered q10 and q11 in each domain.

4.7.4 Work domain specific items

Work was the first decision domain to be considered. This domain was chosen because it is the key focus of much theoretical and empirical work in the risk field. In addition, there is increasing concern about the management of risk taking in the workplace. The items sought to assess whether individual differences in risk orientation were associated with particular perceptions and reactions to work-specific risks. The aspects of work-

related risk taking included in the questionnaire were error risk taking and taking risks to meet goals.

4.7.5 Error risk taking at work

These items were taken from the Error Orientation Questionnaire (EOQ), developed by Rybowiak and his colleagues (1999; unpublished version 1997). This questionnaire was developed to measure how people perceive and behave in relation to errors. The authors considered errors as being important issues in organisations that result in negative consequences such as accidents, stress and low morale.

One aspect of the EOQ is error risk taking. The authors proposed that error risk taking is caused by general flexibility and openness towards errors, or to high achievement orientation. The implication is that errors will be accepted as a part of achieving higher order goals. This scale was adapted for inclusion in the questionnaire because making an error is applicable to almost all jobs. Second, individual differences in the error risk taking could be associated with other aspects of risk-related decision. Third, the scale relates to the risks that might be associated with errors, including the disruption of goal directed behaviour (Frese & Zapf, 1994; Leitner, Lüders, Greiner, Weber & Hennes, 1987, Semmer, 1984), which is the second work-specific set of items.

4.7.6 Meeting targets at work

The second set of items concerned goal directed behaviour. These items considered the level of risk that individuals are prepared to take in order to meet goals. The items were considered relevant for a number of reasons. First, the concept relates to prospect theory (Kahneman & Tversky, 1979). Prospect theory proposed that when people are below their targets they are more willing to take risks than when they are at or above targets. This theory has been the focus of much research. It is one of the most important frameworks to propose that risk-related decision making is contingent upon situational factors. Second, the items complemented the error risk taking questions. Third, the items

assess general goal orientation. This construct could have an interesting relationship with other areas of risky decision making. For example, a person who has a strong orientation towards risk seeking might also be willing to accept risk in order to achieve goals. These individuals might have different decision making and personality characteristics from people who are not willing to accept risks.

4.7.7 Health domain specific items

Health was considered to be an important area to include in the questionnaire because health is an issue that is relevant to everyone. Risks that have negative impacts on health can have subsequent effects on other areas of life, such as work.

The issue of individual-level choices about health behaviours and risks to health has been the subject of theoretical and empirical work. The complexity of risk behaviour has led to the health-related risk research being largely separate from the work-related risk research. Different theories have been developed to describe, explain and predict behaviour in the different risk domains. There is very little published research applied to health decision making that considers the issue of risk propensity in the way that Sitkin and Pablo have conceptualised it. The items that were included in the questionnaire attempted to capture two aspects of health-related risk choices that could be related to risk perceptions and preferences. The issues concerned health protection and the balance between work and nonwork. Both sets of factors have been used in previous research.

4.7.8 Health protection

Health protection was the focus of a paper by Moorman and Matulich (1993). These authors considered the impact of individual-level health-related perceptions and beliefs on health protective behaviours and health information seeking. Health protection was chosen as an appropriate topic to be included in the questionnaire because of its widespread application to the general population, and growing awareness of health issues among the general population (Moorman & Matulich, 1993). In addition, as the authors

noted, given that there is large expenditure and considerable research into how to develop preventive health behaviours, it is interesting to examine whether health protection beliefs are associated with other individual difference characteristics.

The items in this section of the questionnaire were adapted from the Moorman and Matulich scale to fit in with the cross-domain item structure.

4.7.9 Life balance

Life balance refers to the relationship between different key activities, in particular, work and nonwork. Zedeck (1992) defined nonwork as encompassing activities and attitudes related to family, as well as leisure, hobbies, health-related behaviours, religion, community and social activities. This division became apparent after the industrial revolution when the nature of work changed fundamentally. The rationale behind the item is that physical and mental health could be at risk if a balance between work and nonwork cannot be achieved.

The balance between work and nonwork was chosen for inclusion in the questionnaire because it was a second issue of interest in the above-mentioned paper by Moorman and Matulich (1993). Life balance was considered by the authors to be one of the factors that contributes to health protective behaviour. Again, potential relationships between these variables, other risk-related decision choices and individual difference characteristics might help to explain health risk taking choices within an overall risk preference framework. The items in this section were adapted from items developed by Moorman and Matulich (1993).

4.7.10 Finance domain-specific items

The finance domain has been the focus of much previous empirical work. A lot of this work in this field has used hypothetical gambles. This method of item construction was not applied to the questionnaire because different types of items might have led to

different results. Hence the format of items was different from some of the research in the field, however the areas of interest were typical of previous studies.

4.7.11 Use of money

The first set of items considered the use of money. The choice to include this concept had two bases. First, it could be that the use of one's own money might reflect well an individual's underlying preferences that could differ from choices made with others' money (Kahneman, Knetsch & Thaler, 1991). Second, the work of MacCrimmon and Wehrung (1986) found that use of own money was an interesting part of the profile of executive risk preferences. Their research examined a number of different aspects of risk taking, and was summarised in Chapter 2. The set of items in this section was adapted from MacCrimmon and Wehrung's research to fit in with the cross-domain framework.

4.7.12 Gambling

Gambling is defined as the risking of money, in particular, with the possibility of ultimate gain (Reber, 1985). Gambling is a much studied risk behaviour (e.g.Wagenaar & Keren, 1985) and a number of causes have been proposed. For example, it has been hypothesised that gamblers are taking risks to meet different goals such as seeking excitement and making money (Wagenaar, Keren and Pleit-Kuper, 1984). It has also been suggested that gamblers perceive risk in a different way from non-gamblers, e.g. March and Shapira (1987) and Gilovich (1983). This set of items was included to examine whether individual differences in decision making and personality profiles were associated with different perceptions and feelings about gambling.

The items in this section were not drawn from one specific paper. Rather, the items reflected the widespread research interest in the gambling phenomenon. In addition to the cross-domain items, there was a forced choice item that asked participants whether they gambled or not. This item was added following the advice of a colleague who

suggested that people might have an ethical stance against gambling and would not appreciate an assumption that they did gamble.

4.7.13 Questionnaire section IV

This section comprised the Big Five Inventory (John, Donahue & Kentle, 1991). The Big Five Inventory comprises 44, five-point Likert scale items designed to assess the five key dimensions of personality: neuroticism (8 items), extroversion (8 items), openness (10 items), agreeableness (9 items) and conscientiousness (9 items). This measure provides data on the five factors only and not the constituent facets that are assessed in other measures e.g. the NEO PI-R (Costa & McCrae, 1991). Data can be used for research purposes. The results are not sufficiently detailed for individual-level feedback. This measure was found following an Internet search for personality measures. I contacted Oliver John at the Institute of Personality and Social Research at the University of California, Berkeley. It was agreed that I could use the measure provided it was for research purposes only.

The measure is headed "I see myself as someone who...". Participants are asked to rate their level of agreement with statements such as "Is inventive". A number of the items are worded negatively and recoded subsequently. A set of items corresponding to each of the five personality factors is summed to give a score for each factor.

The traders' version of the questionnaire did not include this section. This is because the access to this sample group was part of a wider research project that involved a number of other measures. These measures included a longer personality measure, the NEO PI-R (Costa & McCrae, 1991) that enabled detailed personality information about the traders to be gathered and allowed for personal level feedback, an important component of the research project. It did not seem reasonable to ask trader participants to complete a second personality measure. The two measures have been found to correlate well (John, Donahue and Kentle, 1991). It is likely that the two measures do indeed measure the same five factors of personality. In the analysis each individual's factor score was

transformed into a standardised z score to enable more effective comparison of data from the two measures. This process is discussed in more detail in the next chapter.

4.8 Pilot study

The pilot work for this research had two components. First, semi-structured interviews were conducted with 21 participants. The interviews were part of the development of the London Business School research project concerning the influences on financial trader performance in which I was employed as research officer. The participants were people who were students at London Business School with experience of working in investment banking. The concepts of risk perceptions and risk preferences that are central to the research described in this thesis were explored during the interviews. Although the participants were all drawn from the investment banking population, interview data showed a range of responses concerning risk perception, risk preference and behaviour.

The second stage of the pilot work was to test the questionnaire items and format. The questionnaire was given to 20 social sciences graduates. Feedback from the respondents was used to clarify the wording of a few items. A full pilot study to test the new items in the questionnaire was not considered to be necessary because the construction of the questionnaire enabled triangulation with biographical and personality variables that were assessed using established methods. In addition, many of the items were selected from previous research.

4.9 Data collection

This section describes the data collection method and process for each of the five sample groups. The aim was to have approximately 50 people in each sample group to enable quantitative analysis of a sufficiently large overall data set.

4.9.1 Academics

This sample group comprised academics at the University of Sheffield. The first survey was carried out in November 1998. 250 questionnaires were put into faculty pigeonholes with an accompanying letter explaining the research. Seven departments representing the disciplines of science, social science and arts were chosen. The aim was to collect data from a range of areas. The departments were psychology, physics, animal and plant sciences, modern languages, Oriental studies and landscape design. A total of 34 questionnaires were returned. This was a response rate of 13.6%.

A second survey was carried out in April 1999 to increase the sample size. The departments involved in this round of data collection were economics, health studies, the management school and mechanical engineering. 200 questionnaires were distributed. A total 35 were returned. This was a response rate of 17.5%.

4.9.2 Chess players

Participants with an interest in chess were recruited from several sources. A visit to the London Chess and Bridge Centre on 27 October 1998 led to the recommendation that an advert be placed both the shop and in Chess Monthly, a quality specialist publication. The advert in the shop took the form of an A4 description of the project. The advert in the magazine had to take the form of a classified, paid for advert and as such was restricted in size. Twenty questionnaires were also left in the shop and one of the employees agreed to encourage colleagues and customers to take part. The advert for Chess Monthly was submitted in November 1998.

The British Chess Federation was contacted on 29 October 1998. It was recommended that a classified advert be published in the BCF newsletter. This publication had a circulation of approximately 1400. The advert was submitted to BCR newsletter in December 1998. The adverts are shown in Appendix 3.

The advertisements yielded a very low response rate. It seemed that an advert for risk research was not appealing to the magazine readers. There were 3 responses and all completed the questionnaires. One participant, however, was enthusiastic about the research and agreed to help with distribution of questionnaires. This participant organises chess tournaments and agreed to take some questionnaires along to tournaments, along with a note explaining the research. In addition I attended two tournaments in April 1999. The tournaments yielded a further 24 responses. As the overall response rate was low, a different strategy was used to contact chess players. An email was sent out to all students, faculty and staff at London Business School. A total of 22 people responded and completed the questionnaire.

4.9.3 Fire fighters

Information concerning the organisation of the London Civil Fire and Defence Authority (LFCDA) was gathered from their website. A letter was sent to the chairperson of the LFCDA. This letter was passed on to the occupational psychology department, which is in charge of carrying out recruitment and development centres. A meeting with an occupational psychologist was arranged and data collection was discussed. It was agreed that I could distribute my questionnaire as part of the recruitment assessment centres. The assessment centres take place after the application form and initial screening stages. The assessment centre stage of the process involves grouping candidates and presenting them with a range of psychometric measures at the LFCDA training centre in London. I attended each session for the summer 1998 block of candidates. On completion of their psychometric tests, an LFCDA assessor introduced me as a research officer seeking to gather data. Participants were told that: the questionnaire was part of research being carried out by the London fire brigade and London Business School; it is completely confidential; the questionnaire has nothing to do with the selection process; participation is voluntary; there would not be feedback because of the number of people involved. Questionnaires were distributed to all the candidates. A total of 123 were completed. 5 questionnaires were left blank. The response rate was 96.1%.

4.9.4 Mountain climbers

Data in this sample came from several sources. First, an advert was placed in "High" magazine, which is the official magazine of the British Mountaineering Council. This advert took the form of a brief description of the project and a request for volunteers. The advert is shown in Appendix 3. This yielded 22 responses. All requests for questionnaires resulted in a completed returned questionnaire.

The next stage was to contact The London Mountaineering Club to assess interest. The club secretary took 16 questionnaires with her on a climbing weekend. 14 were completed. I attended a meeting of the club to discuss the research with individual members directly and distribute the questionnaire. This resulted in a further 19 questionnaires being completed. The overall sample size was 55.

4.9.5 Traders in financial markets

Access to traders in financial markets was gained through my involvement in an ESRC funded project "Individual and Contextual Influences on the Market Behaviour of Finance Professionals." It was agreed with my employers at London Business School that I could use the access into organisations to collect my own data. The sample comprised 118 traders from 4 major investment banks. The data was collected between September 1997 and March 1999. In the early phase of the research project, questionnaires were given to traders to complete voluntarily. This led to a low response rate. The research strategy was altered to include the questionnaire in the data gathering session developed for the ESRC project. The total sample size was 77.

4.10 Chapter summary

The research method described in this chapter was developed to enable the hypotheses to be tested. The aim of the research framework was to collect data that could be used to examine the key questions of what biographical variables, personality factors and

decision preference variables were associated with consistent and inconsistent risk preferences, and whether same factors were associated with domain-specific risk preferences. Open-ended questions were included in the questionnaire to gather some qualitative data concerning risks that people considered to be part of their everyday lives and recent risk events in each of the work, health and finance domains. These data were used to gain insight into the domain-specific risk issues that could explain why people take risks in some domains but not others.

The measure was a survey format questionnaire developed from several pieces of previous research. In this research, risk propensity is operationalised in terms of the degree of consistency of cross-domain risk preferences. The main influence was the work of Sitkin and Pablo (1992) and the empirical research that has been founded upon it. The concept of risk preferences was chosen as the key variable first, because of its significance in the work of Sitkin and Pablo. These authors proposed that risk preferences are one of the components of risk propensity and that risk propensity is reflected in expressed preferences. Second, risk preferences were measured because they have been noted to be a factor that is associated with personality and can be consistent across situations (Weber & Milliman, 1997).

The questionnaire was used to survey five sample groups that were chosen to represent a range of approaches to risk. The sample groups were academics, chess players, fire fighters, mountain climbers and traders. A total of 371 participants completed the questionnaire, yielding 358 usable questionnaires.

Chapter 5

Data screening and description

5.1 Chapter abstract

Chapter 5 considers the nature of the data gathered using the survey questionnaire. In particular, the data screening and data distributions are discussed in relation to characteristics of the data set that might influence subsequent analysis.

The first section sets out the aims of the chapter, followed by the presentation of descriptive statistics for the key variables measured in the questionnaire. The differences between the sample groups were considered to examine whether there was variance both within and between sample groups. In general, variance was achieved on all items across the sample. The full descriptive statistics for each item are shown in Appendix 4.

It is concluded that, overall, the data do not raise significant problems for the analysis that follows.

5.2 Chapter aims

This chapter discusses the preliminary screening and examination of the data with a view to highlighting issues that might affect the interpretation of the analysis, discussed in subsequent chapters. The aims of the chapter are the following:

1. To describe the data screening process.
2. To describe the data in terms of the overall sample and the 5 sample subgroups.
3. To assess whether analysis discussed in subsequent chapters is likely to be affected by the nature of the data e.g. non-normality.
4. To examine whether there are characteristics the sample groups that might affect the interpretation of the analysis.
5. To examine the distributions of the continuous demographic data.
6. To describe the sample in terms of personality characteristics and examine differences between sample groups using a oneway analysis of variance.

All data screening and analyses were carried out using the Statistical Package for Social Sciences (SPSS).

5.2 Data screening

The raw data were screened prior to analysis. This took place in several stages. First, the descriptive statistics function was used to check that the raw data had been entered correctly. Examples of mistakes identified included '11' instead of '1' and '23' instead of a '2' followed by a '3'. Referring back to the original questionnaires for the correct data rectified these data entry errors.

Second, missing data were considered. Three strategies were used to cope with missing data. First, 13 cases were deleted. In 7 cases, only the 'general information' and 'work' sections of the questionnaire had been completed. Insufficient data remained for those cases to be included in the analysis. A minimum of 10 responses had been omitted in the other 6 cases. The pattern of omission was such that replacement of missing data would have proved unsatisfactory, for example, missing out items key to risk behaviour

prediction, or leaving incomplete a section of the Big Five Inventory. This left a total of 358 cases. A number of cases still had some missing data on a small number of variables. This was dealt with in two ways. The variables in the work, health and finance sections in the SPSS data set and the completed questionnaires were visually scanned. It was assumed that missing data were random. The 'listwise' or 'pairwise' deletion facilities in SPSS were used in the analysis, whichever was appropriate for the procedure.

Second, missing data in the Big Five Inventory (BFI) was replaced using regression. A total of 13 cases had one item each missing on 12 items in the BFI. One person had missing data on two items. The replacement of missing data was particularly important for the personality data to ensure a score for each factor could be derived for each individual and used in further analysis. Such replacement prevented these cases being excluded from the analysis. It appeared from an examination of completed questionnaires that data was missing due to the oversight of the participant rather than systematic biases.

The missing data were replaced using regression. The regression method puts the variable with the missing data as the dependent variable. The other relevant variables, in this case the other items which together form each personality factor, as the predictor variables. The standardised beta weights for each of the predictor variables were used to calculate the missing value.

For example, the first item on the neuroticism scale, N1 is missing. There are 8 items in the scale. N1 is calculated using regression. For the single case with the missing N1 value, the following equation was used:

N1 = Constant + (standardised beta weight for N2 x N2 value for that case) + ...
(standardised beta weight for N8 x N8 value for that case)

This process has the advantages of being objective, being more sophisticated than replacing a missing value with a mean and enabling cases to be retained for analysis rather than excluding them. There are three problems. First, because the regression procedure uses each case's other data, the replacement value can be closer to the other

data in value than it actually would have been. Second, the variance is potentially reduced. Third, estimates do not always fall within the range of the item (Tabachnik & Fidell, 1989). This was the case for one item. The result of the regression analysis was a figure that exceeded the maximum scale value of 5 by approximately .1. The value was entered into the database as 5. Given the small number of values replaced using the regression method, these problems were not considered likely to have a significant impact on subsequent analyses.

Third, the normality of all the variables was assessed by checking the skew and kurtosis. These data are shown in Appendix 4. No variables were excluded from the analysis on the basis of non-normality.

Fourth, outliers were considered. Outliers are cases or variables with unusual values, or in the case of multivariate outliers, unusual combinations of values. Outliers can have an important influence on the distribution of values and statistical analyses. Outliers were not considered to be an a priori problem for the data that were used to create the dependent variables. This process is discussed in detail in the next chapter. In the multivariate analyses discussed in the next chapter, the SPSS program checked for outliers. No outliers were revealed in the regression analyses.

Fifth, the differences between the two personality measures were considered. As discussed in the method chapter, the Big Five Inventory was used to gather data from the majority of participants: academics, chess players, fire fighters and mountain climbers. The traders, however, were part of a larger research project carried out with colleagues at London Business School that involved gathering extensive data regarding a number of issues. In order to provide full data and enable personality profiling, the NEO PI-R was used.

The reliabilities of both personality scales were examined. The results are shown in table 5.1 on the next page.

Table 5.1: Cronbach's alpha for the Big Five Inventory and the NEO PI-R

	BFI alpha	NEO alpha
Neuroticism	.853	.834
Extroversion	.878	.661
Openness	.767	.579
Agreeableness	.624	.748
Conscientiousness	.833	.777

Cronbach's alpha reaches the recommended minimum of .7 (Nunnally, 1978) for 7 out of 10 personality factors. The 3 factors that have Cronbach's alphas of below .7 were retained in future analysis without alteration. While the value of the alpha could have been increased by deleting scale items, and thus changing the construction of the scales, the questionnaires have been developed and validated in previous research. To change the construction of the scales could have changed fundamentally the nature of the personality factors that were measured. All the scales were retained in their original form for use in the analysis.

Given the background of the two personality measures, as discussed in Chapter 4, it was assumed that they both had validity and that they both measured the same five personality factors. In order to assign each individual a value for each personality factor that could be included in the analysis, the factor scores were transformed into standardised z scores. The transformation took place in two stages. First, the Big Five Inventory scores were transformed. Second, the NEO PI-R scores were transformed. This process resulted in a score for each individual that represented their position in relation to a standardised distribution for each personality factor.

5.3 Descriptive statistics

The descriptive statistics that follow are shown for the overall sample and for each of the five sample groups. The results are presented for each sample group to see whether there was heterogeneity within and across sample groups. The aim of the sampling strategy was to gather data that reflected a range of responses to risk.

5.3.1 Descriptive statistics: Categorical variables

This section presents descriptions of demographic and biographical factors measured. The aim was to examine the nature of the data to assess whether any issues arise that might influence the interpretation of subsequent analysis. Data are presented for the overall sample and for each sample group. The variables considered in this section are sex; level of education; seniority (levels to CEO); annual income; whether the job referred to is current or past.

The table on the next page shows the frequency of distribution of men and women in the overall sample and for each sample group. The results show that, overall, women are under-represented in the sample compared with the average population. The sample groups have tended to be male dominated, apart from the academic sample group.

Table 5.2: Frequencies of men and women for the overall sample and each sample group

	Frequency	Valid %	Frequency	Valid %
	Sample overall		Fire fighters	
Male	309	86.3	122	99.2
Female	49	13.7	1	.8
Total	358	100	123	100
Missing	0		0	
	Academics		Mountaineers	
Male	33	50	37	72.5
Female	33	50	14	27.5
Total	66	100	51	100
Missing	0		0	
	Chess players		Traders	
Male	41	100	76	98.7
Female	0	0	1	1.3
Total	41	100	77	100
Missing	0		0	

The following two tables show the highest level of education and the number of levels between each participant and their CEO. For the fire fighter sample group, there was no data concerning levels to CEO. This was due to the editing of the first section of the

questionnaire that was carried out at the request of the London Fire and Civil Defence Authority in order to reduce the total time taken to complete the questionnaire.

Table 5.3: Frequencies of categories of education for the overall sample and each sample group

	Frequency	Valid %	Frequency	Valid %
	Sample overall		Fire fighters	
PhD	65	18.5	3	2.6
Masters	58	16.2	1	.9
Degree	79	22.5	13	11.3
Diploma/HND	29	8.3	15	13.0
A-Level	35	10.0	17	14.8
O-Level/GCSE	85	24.2	66	57.4
Total	351	100	115	100
Missing	8		8	
	Academics		Mountaineers	
PhD	39	59.1	7	13.7
Masters	16	24.2	12	23.5
Degree	9	13.6	25	49.0
Diploma/HND	2	3.0	4	7.8
A-Level	0	0	2	3.9
O-Level/GCSE	0	0	1	2.0
Total	66	100	51	100
Missing	0		0	
	Chess players		Traders	
PhD	6	14.6	9	11.7
Masters	13	31.7	16	20.8
Degree	11	26.8	21	27.3
Diploma/HND	5	12.2	3	3.9
A-Level	5	12.2	11	14.3
O-Level/GCSE	1	2.4	17	22.1
Total	41	100	77	100
Missing	0		0	

The results of the above table concerning highest level of education show that in all groups there is a spread of educational achievements from the highest level measured, PhD, to the lowest level measured, O-Level, with the exception of the academics group. Overall, the fire fighters showed the lowest mean level of academic qualification.

The data on the next page show the seniority levels of participants.

Table 5.4: Frequencies of different levels to CEO for the whole sample and each sample group

	Frequency	Valid %	Frequency	Valid %
	Sample overall		Mountaineers	
0	26	11.3	12	24.0
1	53	23.0	8	16.0
2	85	37.0	20	40.0
3	41	17.8	8	16.0
4	18	7.8	1	2.0
5	5	2.2	1	2.0
6	2	.9	0	0
Total	230	100	50	100
Missing	128		1	
	Academics		Traders	
0	5	7.7	0	0
1	27	41.5	11	14.3
2	24	36.9	27	35.1
3	8	12.3	20	26.0
4	1	1.5	14	18.2
5	0	0	3	3.9
6	0	0	2	2.6
Total	65	100	77	100
Missing	1		0	
	Chess players			
0	9	23.7		
1	7	18.4		
2	14	36.8		
3	5	13.2		
4	2	5.3		
5	1	2.6		
6	0	0		
Total	38	100		
Missing	3			
	Fire fighters			
Missing	3	123		

Table 5.4 shows that within each sample group people from a range of positions within their organisation are represented. Self-employment or the most senior position accounted for approximately one quarter of the participants from the chess and mountain-climber groups. The majority of participants were 2 to 3 levels below their CEO. In the case of people working for multi-national organisations, in particular traders, the CEO was the senior manager of London operations. Several traders'

reported being 5 – 6 levels below the CEO. Subsequent interviews carried out as part of the ESRC research and the sample strategy for that research, which precluded very junior traders, suggested that this result is likely to be due to the traders considering the CEO of the whole organisation rather than the CEO of the London operation.

Annual income

The table below shows the distribution of annual income, including bonus and overtime payments for the overall sample and for each sample group. The data showed that annual income was represented at each level measured in the sample overall, although traders were over-represented at the top end of the income scale compared with the other groups.

Table 5.5: Frequencies for annual income for the sample overall and each sample group

Annual income (£1000)	Frequency	Valid %	Frequency	Valid %	Frequency	Valid %
	Sample overall		Chess players		Traders	
< 20	55	23.8	16	40.0	0	0
20 – 49.9	82	35.5	17	42.5	0	0
50- 99.9	20	8.7	7	17.5	3	3.9
100- 499.9	55	23.8	0	0	55	71.4
> 500	19	8.2	0	0	19	24.7
Total	231	100	40	100	77	100
Missing	127		1		0	
	Academics		Mountaineers			
< 20	15	23.1	24	49.0		
20 – 49.9	48	73.8	17	34.7		
50- 99.9	2	3.1	8	16.3		
100- 499.9	0	0	0	0		
> 500	0	0	0	0		
Total	65	100	49	100		
Missing	1		2			
	Fire fighters					
Missing	123					

Whether the job referred to is current or past

The option of reporting experiences and perceptions relating to previous jobs was given to participants to avoid unfair discrimination against people not currently in work in the interest-group samples and the fire fighter applicants.

Table 5.6: Frequencies for job status for sample overall and each sample group

	Frequency	Valid %	Frequency	Valid %
	Sample overall		Fire fighters	
Current	326	86.3	103	85.1
Past	29	13.7	18	14.9
Total	355	100	121	100
Missing	3		2	
	Academics		Mountaineers	
Current	66	100	49	96.1
Past	0	0	2	3.9
Total	66	100	51	100
Missing	0		0	
	Chess players		Traders	
Current	31	77.5	77	100
Past	9	22.5	0	0
Total	40	100	77	100
Missing	1		0	

The results in the above table show that the majority of respondents are referring to their current job. This would be expected given that the sample procedure involved several occupational groups. The results indicate that problems associated with memory and perceptions of previous jobs are not likely to have a significant effect on the results.

The table on the next page shows the distribution of participants across professional groups. This table is used to demonstrate one aspect of the diversity of the sample. In this aspect, the sampling strategy achieved its aim of diversity.

Table 5.7: Frequencies for business type

Business type	Frequency	Valid Percent
Academic/research	81	22.8
Acting/entertainment	2	.6
Education/teaching	9	2.5
Farming	1	.3
Finance	85	23.9
Fire service recruitment	123	34.6
Government	4	1.1
Industry/manufacturing	4	1.1
Law	2	.6
Medical/health professional	4	1.1
Mountain/travel guide	4	1.1
Police/forces/security	4	1.1
Professional gambler/chess	3	.9
Professional services	11	3.3
Real estate	1	.3
Reporter/photographer	4	1.1
Retail/marketing	5	1.5
Services industry	3	.9
Student	1	.3
Transport	3	.9
Missing	4	
Total	358	100

5.3.2 Descriptive statistics: Continuous variables

The following section considers the distribution of continuous variables - age and length of time in the job overall. There were no tenure data for the fire fighters because of the request of the organisation to minimise the biographical section of the questionnaire for reasons of reducing the time taken to complete the measure. The table on the next page presents descriptive statistics for the continuous variables.

Table 5.8: Descriptive statistics for age and tenure

	Age (years)	Length of time in the job overall (years)	Age (years)	Length of time in the job overall (years)
	Overall sample		Fire fighters	
N Valid	354	231	122	0
N missing	4	127	1	123
Minimum	18	0	18	
Maximum	70	37	39	
Mean	32.3814	8.0398	24.7541	
sd	9.8031	7.4717	4.6325	
Skew	1.045	1.514	.653	
Skew z stat.	7.130	9.4625	2.9817	
Kurtosis	1.037	2.129	-.090	
K. z stat.	.259	6.6740	.2069	
	Academics		Mountaineers	
N Valid	65	65	50	50
N missing	1	1	1	1
Minimum	24	.20	22	0
Maximum	64	37	65	30
Mean	40.2308	9.0208	35.6	6.1954
Sd	9.8770	8.2320	9.9775	7.4054
Skew	.292	1.256	.888	1.839
Skew z stat.	.297	4.2289	2.6350	5.4570
Kurtosis	-.575	1.348	.347	2.879
K. z stat.	.586	2.300	.5242	4.3489
	Chess players		Traders	
N Valid	41	39	76	77
N missing	0	2	1	0
Minimum	19	.25	25	1
Maximum	70	35	48	30
Mean	37.5366	7.6603	33.0132	8.6017
sd	11.7688	8.1859	5.0662	6.2900
Skew	.975	1.892	1.013	1.531
Skew z stat.	2.6422	5.0053	3.670	5.5876
Kurtosis	.484	3.353	1.395	2.763
K. z stat.	.6685	4.5250	2.5596	5.1072

Oneway analysis of variance was used to examine whether there were significant differences between sample groups with respect to age and overall tenure.

Table 5.9: Oneway analysis of variance of age and tenure by sample group

		Sum of squares	df	Mean square	F
Age	Between groups	12280.513	4	3070.128	47.998 ***
	Within groups	22323.343	349	63.964	
	Total	34603.856	353		
Tenure	Between groups	262.569	4	65.642	1.180
	Within groups	12577.318	226	55.652	
	Total	12839.886	230		

*** $p < .001$

Age was found to be distributed differentially between groups.

Table 5.9.1: Tukey b analysis results for age by sample group

Sample group	N	Subset for alpha = .05			
		1	2	3	4
Fire fighter	122	24.754			
Trader	76		33.012		
Mountain climber	50		35.600	35.600	
Chess player	41			37.537	37.537
Academic	65				39.769

Harmonic mean sample size = 61.630

Age was found to vary significantly across the different sample groups. The data show that there was variance in terms of age.

Personality data

The personality data were transformed to the standardised z distribution. The transformations were carried out to enable the comparison of data gathered using two measures of personality: the NEO PI-R, used to gather data from the traders, and the Big Five Inventory, used to gather data from the four remaining sample groups. Table 5.10 on the next page shows the descriptive statistics for the personality data.

Table 5.10: Descriptive statistics for personality data

	z score neuro-ticism	z score extra-version	z score openness	z score agree-ableness	z score conscien-tiousness
Overall sample					
N Valid	329	329	329	329	329
N missing	29	29	29	29	29
Minimum	-2.29	-2.90	-2.46	-2.94	-3.75
Maximum	2.86	2.36	2.15	2.69	2.07
Mean	-3.14 E-18	7.53 E-16	-5.61 E-16	1.65 E-16	1.16 E-15
sd	.999	.999	.999	.999	.999
Skew	.427	-.403	.009	-.271	-.655
Skew z stat.	.134	.134	.134	.134	.134
Kurtosis	-.083	-.187	-.632	-.244	.619
K. z stat.	.268	.268	.268	.268	.268
Academics					
N Valid	66	66	66	66	66
N missing	0	0	0	0	0
Minimum	-1.54	-2.90	-2.05	-2.25	-2.71
Maximum	2.86	1.62	1.98	1.24	1.47
Mean	.542	-.469	.102	-.234	-.183
Sd	.856	1.101	1.016	.780	.895
Skew	.100	-.071	-.158	-.244	-.512
Skew z stat.	.295	.295	.295	.295	.295
Kurtosis	-.087	-.675	-.942	-.495	.147
K. z stat.	.582	.582	.582	.582	.582
Chess players					
N Valid	41	41	41	41	41
N missing	0	0	0	0	0
Minimum	-1.87	-2.58	-2.40	-2.42	-3.75
Maximum	2.53	1.62	2.15	1.42	1.64
Mean	.402	-.486	.195	-.387	-.694
sd	1.162	1.034	1.186	1.110	1.321
Skew	-.334	-.179	-.193	-.083	-.351
Skew z stat.	.369	.369	.369	.369	.369
Kurtosis	-.654	-.643	-.663	-.780	-.312
K. z stat.	.724	.724	.724	.724	.724

The table is continued on the next page.

Table 5.10: Descriptive statistics for personality data continued

	z score neuro-ticism	z score extra-version	z score openness	z score agree-ableness	z score conscien-tiousness
Fire fighters					
N Valid	123	123	123	123	123
N missing	0	0	0	0	0
Minimum	-1.87	-1.18	-2.22	-1.90	-1.49
Maximum	1.55	1.78	2.15	1.77	1.64
Mean	-.520	.444	-.232	.542	.447
Sd	.734	.644	.903	.767	.766
Skew	.216	-.150	.372	-.481	-.440
Skew z stat.	.218	.218	.218	.218	.218
Kurtosis	-.415	-.324	-.246	-.068	-.615
K. z stat.	.433	.433	.433	.433	.433
Mountaineers					
N Valid	51	51	51	51	51
N missing	0	0	0	0	0
Minimum	-1.22	-2.27	-1.70	-2.94	-2.36
Maximum	2.86	1.78	2.15	1.42	1.47
Mean	.228	-7.31 E-02	.271	-.693	-.284
Sd	1.008	1.087	.944	.990	.848
Skew	.898	-.170	-.338	-.053	-.116
Skew z stat.	.333	.333	.333	.333	.333
Kurtosis	.072	-.902	-.451	-.282	-.356
K. z stat.	.656	.656	.656	.656	.656
Traders					
N Valid	48	48	48	48	48
N missing	29	29	29	29	29
Minimum	-2.29	-2.09	-2.46	-1.80	-3.24
Maximum	2.73	2.36	2.12	2.69	2.07
Mean	5.07 E-16	-1.98 E-16	-3.26 E-16	8.50 E-16	1.21 E-15
sd	1.000	1.000	1.000	1.000	1.000
Skew	.634	.386	-.309	.514	-.414
Skew z stat.	.343	.343	.343	.343	.343
Kurtosis	1.007	.144	-.127	.354	1.099
K. z stat.	.674	.674	.674	.674	.674

The oneway analysis of variance test was used to assess whether there were significant differences between the sample groups with respect to personality factors. The results are shown in table 5.11 on the next page.

Table 5.11: Oneway analysis of variance of personality factors by sample group

		Sum of squares	df	Mean square	F
z score neuroticism	Between groups Within groups Total	61.903 265.097 327.000	4 324 328	15.476 .818	18.915***
z score extroversion	Between groups Within groups Total	46.681 278.319 327.000	4 324 328	12.170 .859	14.168***
z score openness	Between groups Within groups Total	12.591 314.409 327.000	4 324 328	3.148 .970	3.244*
z score agreeableness	Between groups Within groups Total	59.866 267.134 327.000	4 324 328	14.967 .824	18.153***
z score conscientiousness	Between groups Within groups Total	50.708 276.292 327.00	4 324 328	12.677 .853	14.866***

* $p < .05$, *** $p < .001$

The results show that there are significant differences between each group for all Big Five personality factors. Tukey b post hoc tests were used to examine where significant differences between the groups lay.

Table 5.11.1: Tukey b analysis results for z score neuroticism by sample group

Sample group	N	Subset for alpha = .05		
		1	2	3
Fire fighter	123	-.512		
Trader	48		.006	
Mountain climber	51		.228	.228
Chess player	41		.402	.402
Academic	66			.542

Harmonic mean sample size = 56.745

Table 5.11.2: Tukey b analysis results for z score extroversion by sample group

Sample group	N	Subset for alpha = .05		
		1	2	3
Chess player	41	-.486		
Academic	66	-.469		
Mountain climber	51	-.007	-.007	
Trader	48		.000	
Fire fighter	123			.444

Harmonic mean sample size = 56.745

Table 5.11.3: Tukey b analysis results for z score agreeableness by sample group

Sample group	N	Subset for alpha = .05		
		1	2	3
Mountain climber	51	-.693		
Chess player	41	-.387	-.387	
Academic	66		-.235	
Trader	48		.000	
Fire fighter	123			.542

Harmonic mean sample size = 56.745

Table 5.11.4: Tukey b analysis results for z score conscientiousness by sample group

Sample group	N	Subset for alpha = .05		
		1	2	3
Chess player	41	-.694		
Mountain climber	51		-.284	
Academic	66		-.183	
Trader	48		-.000	
Fire fighter	123			.447

Harmonic mean sample size = 56.745

The analysis of variance revealed that there is evidence of particular personality profiles associated with people in different occupational and special interest groups. Post-hoc tests revealed that the group which consistently emerges as significantly different from the others is the fire fighter sample group. The fire fighters show lower neuroticism, higher extroversion, greater agreeableness and greater conscientiousness scores than the other groups. It is possible that social desirability could be a factor influencing the results because the questionnaire was administered to participants after part of the London Fire and Civil Defence Authority selection process. It is also plausible that self-

selection is a factor. As discussed in Chapter 3, patterns of traits could be associated with different types of risk taking. For example, if people are oriented towards risk taking but also are interested in acting in teams on behalf of others (related to the A scale) they might choose to go into a job such as fire fighting. Other professional or academic groups might involve more specific domain-related risks. Overall, the personality data showed some homogeneity within groups, but heterogeneity across groups.

5.4 Chapter summary

This chapter has described the initial data screening and presented the results of preliminary analysis.

The analysis discussed in this chapter aimed to examine the data, both in terms of the overall sample and the five sample groups (academics, chess players, fire fighters, mountain climbers and traders). The results of the analysis have several implications that will be taken into consideration in the interpretation of the subsequent analysis discussed in the forthcoming chapters. A summary of the key points and implications follows.

1. Two personality scales were used. The NEO PI-R was used to gather data from the traders in the sample. The Big Five Inventory was used to gather data from the remainder of the sample. The NEO PI-R showed slightly lower overall levels of internal reliability that the Big Five Inventory. Two NEO PI-R scales and one Big Five Inventory scale had a Cronbach's alpha of less than .7. The scales have been validated in previous research and development and were not altered to improve the Cronbach's alpha. The results of the analysis using the personality variables are not likely to be affected.
2. There are significantly more men than women in the sample. The imbalance is particularly marked for the chess players, fire fighters and traders, which were almost exclusively male groups.
3. The level of education varies across the sample overall. All sample groups showed a range of educational levels, the higher levels of education being better represented

than lower levels for all sample groups with the exception of the fire fighters. Level of education is not likely to be confounded with sample group effects in subsequent analysis. Seniority was found to be distributed similarly and, likewise, is not likely to be confounded with sample group effects.

4. There was variance in categories of income for all sample groups. However, the traders had higher incomes than the rest of the sample.
5. The majority of people in the non-professional sample groups referred to their current job rather than a previous job. It does not seem likely that there would be problems associated with recall of previous jobs.
6. Distributions of the two continuous demographic variables, age and length of time in the job, did not show significant amounts of skew or kurtosis. Assumptions of normality were not likely to be violated in the analysis that follows.
7. Personality data showed variance across the whole sample and were approximately normally distributed. There were a number of significant differences between the personality characteristics of different sample groups showing some evidence of self-selection into groups.
8. In sum, the data show variance on almost all the key variables that are used in the subsequent analysis to discriminate between groups. There are few data issues that might have a significant negative impact on analysis or interpretation.

Chapter 6

Correlation analyses

6.1 Chapter abstract

Chapter 6 discusses the results of bivariate correlation analyses. All the questionnaire variables were entered into analysis to examine the relationships between items both within and across domains. This type of analysis was used for two reasons. First, correlations indicate where there are relationships between variables, and are a useful complement to the multivariate analysis that follows in Chapter 7. Second, there is a tradition of using correlation analyses in the risk literature. This method has been used in several studies to draw conclusions about the consistency of risk taking. It has, in general, been found that different measures of risk taking and risk-related decision making do not correlate significantly, suggesting that risk taking is domain specific.

The results of the correlation analyses discussed in this chapter are significant in many cases. The results show that the cross-domain items are correlated significantly in almost every case (e.g. the item do you prefer to take or avoid risk with your work/ health/ personal finances). The domain-specific items were associated significantly in many cases. The number and pattern of significant relationships suggests that there are likely to be some common factors that influence decision making in different domains. It does not seem likely that the results are explained by common method variance alone. In addition, there were many significant relationships between the decision preference variables, the biographical and the personality factors. The results provide some indications that some people might be consistent in their decision making and risk preferences, and that personality could be an important influence on decision preferences.

The correlation tables are shown in Appendix 5.

6.2 Introduction to the correlation analyses

One approach to the study of the consistency of risk-related decision choices has been to present participants with a range of measures to assess decision making and to correlate the results. Six studies that have used this approach were discussed in Chapter 2. The studies reviewed were the work of Slovic (1962), Kogan and Wallach (1964), Weinstein and Martin (1969), MacCrimmon and Wehrung (1986), Salminen and Heiskanen (1997) and Smidts (1997). In general, the studies showed that there are some inter-relationships between scores in different measures of risk taking. However the general conclusion of this type of research method has been that the relationships between measures are not strong enough to suggest that there are generalised individual-level risk preferences. The study that took a different approach which showed that this might not true for all individuals is that of MacCrimmon and Wehrung (1986). These authors showed that while the majority of correlations between decision making and risk taking measures might not be significant for a whole sample, when intra-individual data are considered, a different conclusion can be drawn. MacCrimmon and Wehrung found that some people in their sample could be classified as consistent risk seekers and others could be termed consistent risk averters. The relationships between measures of risk-related decision making for the consistent risk seekers and risk averters were strong. The remainder of the sample was not consistent. Relationships between measures for the inconsistent group were weak. It could be that if other research studies had taken a similar approach and used individual-level data to categorise people, a similar set of results might emerge.

Pearson bivariate two-tailed correlation analyses were used to examine the relationships between the questionnaire items. Correlations between items were examined for the whole sample, rather than subdivisions of the sample based upon intra-individual response consistency, for two reasons. First, this strategy was used to describe the relationships between variables within and across domains prior to the multivariate analysis that could assess the relative impact of variables upon risk preferences discussed in the next chapter. Second, the correlation approach enabled the comparison of the results of this study compare with other empirical work that has used the same approach. It is acknowledged that 5% of the correlations could be significant due to

chance alone in this process. However, correlation analyses remain a useful preliminary process to begin to interpret the data prior to multivariate analysis.

The correlation tables are shown in Appendix 5. There are 25 tables. The items are classified into four categories.

1. Biographical and personality data. These data comprise sex, age, highest level of education, tenure (overall length of time in the job), seniority, income and the five factors of personality (neuroticism, extroversion, openness, agreeableness and conscientiousness). The personality data were transformed into standardised z scores to enable the inclusion of both Big Five Inventory data and NEO PI-R data. The rationale for the transformation of raw scores to z scores was described in Chapter 5.

2. Cross-domain item data. These data refer to items that measured the same concept across the three decision domains (work, health and personal finances). The items were the following:
   a. Have the risks mentioned above changed the way you manage risk at work/ with your health/ with your personal finances? (not at all – yes, significantly)
   b. Have these events made you more or less cautious in your behaviour at work/ with your health/ with your personal finances? (more cautious – less cautious)
   c. How do you feel about your job/ health/ personal finances at the moment? (very negative – very positive)
   d. Compared with the last few months, if your current general work/ health/ personal finance situation better or worse than usual? (much worse – much better)
   e. When making important decisions about risks at work/ with your health/ with your personal finances, how frequently do you think though all the payoffs and costs of each alternative? (very rarely – very often)
   f. When making important decisions about risks at work/ with your health/ with your personal finances, how are you influenced by your feelings, or emotions? (very rarely – very often)
   g. How much risk is involved in your job/ lifestyle/ personal finances? (much risk – little risk)

h. Do you prefer to take risks or avoid risks when making decisions at work/ with your health/ with your personal finances? (take risks – avoid risks)

Items (a) and (b) referred to an open-ended item that asked participants about recent risk experiences in each domain. Respondents that had no recent risk events to record, approximately two-thirds of the sample, did not answer questions (a) and (b). The correlations that included these variables have a smaller number of participants.

3. Domain-specific item data. These data are the results of items that were developed to measure domain-specific decision preferences. Work-related domain-specific items considered error risk taking and goal-related decision preferences. Health-related domain-specific items measured health protection and the balance between work and nonwork. Finance-related items assessed preferences regarding use of money and gambling. These items had been structured to reflect a common framework, as described in the method chapter. Each set of items assessed responses relating to a positive aspect of a decision choice; a negative aspect of a decision choice; positive emotions associated with a decision choice; negative emotions associated with decision choice; rated behavioural frequency.

4. Correlations between the data gathered in this study and data gathered from the traders in this sample using a different measure of reported risk taking (Nicholson, Fenton-O'Creevy, Soane & Willman, 2000). The items used to gather data are shown in section 6.11 of this chapter. These correlations were examined to assess whether there were significant associations between the data gathered using the questionnaire developed for this study and data gathered using a separate measure.

The tables show the correlation coefficient and star symbols (*) to represent the level of significance. The number of respondents in each analysis is shown on the second line of each cell. The analyses used the item raw scores.

Tables A5.1, A5.2 and A5.3 show the inter-correlations for the general cross-domain items (work with work; health with health; finance with finance). Table A5.4 shows the results of correlations between work and health items. Table A5.5 shows the

relationships between work and finance items. Table A5.6 presents the correlations for health and finance items. Tables A5.7, A5.8 and A5.9 show the results of inter-correlations for the domain-specific items (work domain-specific items with each other; health domain-specific items with each other; finance domain-specific items with each other). Tables A5.10, A5.11 and A5.12 show the within-domain correlations between the cross-domain type variables and the domain-specific type variables (work cross-domain items with work domain-specific items; health cross-domain items with health domain-specific items; finance cross-domain items with finance domain-specific items). Table A5.13 gives the results for domain-specific work and health items. Table A5.14 shows the correlations between work and finance items. Table A5.15 presents results for the correlations between health and finance items. The remaining tables show the relationships between the decision preference variables, biographical data and personality factors. Table A5.16 shows the relationships between the biographical and personality data. Tables A5.17, A5.18 and A5.19 give the results for correlations between each of the sets of cross-domain items (work, health and finance) with the biographical and personality data. Tables A5.20, A5.21 and A5.22 show the correlations between each of the domain-specific items with the biographical and personality data.

Tables A5.23, A5.24 and A5.25 show the results of correlation analyses between the cross-domain variables for each of the work, health and finance domains and reported risk taking data gathered from a different source. The data from the second measure were gathered only from the traders in the sample who were part of a larger research project.

6.3 Cross-domain item inter-correlations

This section discusses the results presented in tables A5.1, A5.2 and A5.3. The correlations of the cross-domain items show that three items are highlighted as having the greatest number of significant relationships with other items. The three items are preferences for taking or avoiding risk, perception of risk and general positive or negative feelings concerning the work, health or financial situation.

In the work domain there were seven significant correlations. Feeling positive about the work situation was associated with a belief that work was better than usual, that there is risk involved in the job and a preference for taking risks. The perception that there is much risk in the work domain was related to an approach to decision making that involved thinking through the pros and cons of decision alternatives, and to decision making that is not emotional. Conversely, the perception that there is little risk in the work domain was related to a primarily emotional rather than cognitive approach to decision making. Preferences for taking risks were associated with a less cautious approach to risk resulting from recent risk experiences, feeling positive about work and perceptions that work involves risk.

The results of the inter-correlations for the cross-domain work variables are interesting. The results show that, contrary to the suggestion of Sitkin and Pablo (1992), risk perceptions and preferences do not have an inverse relationship. Sitkin and Pablo proposed that a preference for taking risk was associated with a perception that risk is low. They hypothesised that perception is an important factor that motivates an individual to take risk, and differentiates between people who will take risks, because of low levels of perceived risk, and people who will not take risks, because of high perceived risk. The results of this research indicate that preference for taking risk is associated with an acknowledgement that there are risks to be taken. There are two factors that could influence the relationship between these two variables. First, it might be that people have self-selected into environments that suit their risk preferences. Their perceptions of risk are thus similar to their risk preferences. Second, it could be that a key factor that moderates this relationship is positive emotion. If people perceive risks but have generally positive feelings about their work situation, they could be motivated to take risks. Conversely, if the positive emotion is lacking, or there are negative emotions associated with work, perceptions of high risk might lead to risk aversion in the way that Sitkin and Pablo suggested. The importance of positive emotion has been found in the authors' empirical research into the relationship between traders' emotions and risk taking. Results showed that positive affect led to greater risk taking because of increased confidence, knowledge that previous gains could absorb short terms losses and an adjusted reference point whereby traders were seeking higher gains and prepared to take risks to achieve them (Soane, Fenton-O'Creevy, Nicholson & Willman, 2000).

The results from the health domain showed 11 significant correlations. The analyses highlighted the same three key variables of positive emotion, perceptions and preference, however the pattern of results was slightly different. The items concerning the health reference point and its effect on perceptions and reported behaviour were related. Recent experiences of health risks were associated with more cautious approaches to health risk management and to negative feelings about the health domain. General positive affect regarding health was associated significantly with perceived improvements in the health domain, with the perception that there were few risks to health and a preference for avoiding health risks. Preferences for avoiding health risks were also associated with frequent, careful considerations of health decisions and perceptions of little risk. Thinking through the pros and cons of health decisions was related positively to an emotional approach to decision making. This pattern of results is different from the relationships observed for the work domain. In the work domain, positive affect was associated with perceived risk and preferences for taking risk. In the health domain, positive affect was associated with the perceived absence of risk and preferences for avoiding risk. It seems that while risk might be associated with rewards and challenges in the work environment, risks to the health domain might be perceived as threats not challenges or opportunities. An additional interesting difference between the health and work domains is the relationship between the cognitive and emotional aspects of decision making. In the work domain, a cost-benefit approach to decision making was related to unemotional thinking. In the health domain, the results indicate a tendency either to think through decisions in a cognitive and emotional way, or not to use either approach. A similarity with the work domain is that the relationship between risk perception and preference is positive. Again, it seems that people who choose to take risks with their health are aware of the risks.

There were 14 significant inter-correlations between the cross-domain finance-related variables. As in the work and health domains, general affect, perceptions and preferences were the three key variables that showed the greatest number of significant associations. Positive affect concerning the current financial situation was related to perceptions that the situation was better than usual, thinking through the costs and benefits of decision alternatives, unemotional decision making and perceptions of little risk in the personal finance domain. Perception of little risk was also associated with recent improvements in the financial situation, and unemotional decision making.

Preferences for taking financial risks were related to a less cautious approach to financial management as a result of recent risk events, decision making that does not frequently involve a cost – benefit approach and perceptions that there is risk in the finance domain. As with the work domain, the response to recent risk events was a reported decrease in caution applied to finance management, and there was a positive relationship between risk perception and risk preference. This relationship between perception and preference, again, was not as hypothesised by Sitkin and Pablo.

In sum, the cross-domain variables show a number of significant relationships. Of particular importance are the variables measuring risk preference, risk perception and general affect. These variables had significant relationships in each of the work, health and finance domains. These results suggest that these factors could be key components of the decision process and are important to decision making in each domain. The results fit with the proposition of MacCrimmon and Wehrung (1986) that there are likely to be associations between risk taking within domains.

6.4 Relationships between work, health and finance cross-domain variables

This section discusses the results presented in tables A5.4, A5.5 and A5.6. The correlation analyses that considered the relationships of the cross-domain variables with each other showed a number of significant results. The results indicate that there might be individual difference factors that influence decision making in several domains. This hypothesis is discussed further in the next chapter.

The greatest number of cross-domain significant results was between the health and finance domains (19 significant correlations). The work and health domain analyses had 18 significant results. The work and finance results showed 14 significant relationships. In sum, 51 out of 192 correlations were significant across the whole sample. As with the above analyses of the inter-relationships between the cross-domain variables discussed in section 6.3 above, general positive or negative affect about the decision domain, risk perception and risk preference showed a number of significant relationships with each other and different variables. For each domain, preferences are related significantly; preference for taking risk in one domain is associated with preference for taking risk in

the other domains. Perceptions of risk were relatively consistent. Perceptions were related significantly between work and health and between work and finance. Approaches to decision making were also associated. For each cross-domain analysis, there are significant correlations between cost – benefit approaches to decision making and between emotional approaches to decision making. People who tend to approach a decision in terms of costs and benefits in one domain do so in other domains; likewise for emotional approaches to decision making. A fourth variable that showed significant inter-correlations across each domain was general affect. Feeling positive about one domain was associated with feeling positive about other domains, and negative feelings were generalised similarly. The related variable, concerning whether each domain situation was better or worse than usual also showed significant results for each analysis.

In sum, the correlation analyses that examined the relationships between variables that measured the same construct with respect to work, health and personal finances showed that there was a considerable degree of consistency between responses in all cases. There were two exceptions. First, the health and finance risk perceptions were not associated significantly. Second, the variables that measured the effects of recent risk experiences were not significantly related. It is possible that this result was due to the small number of people who answered these questions. The group size in these correlations ranged from 27 – 47. However, the overall results of the analyses were significant for the whole sample. The results suggest that there could be some people within the whole sample who have consistent emotions with respect to different decision domains. The analysis in Chapter 7 explores this issue further.

6.5 Domain-specific variables inter-correlations

The results for tables A5.7, A5.8 and A5.9 are discussed in this section. Table 7 presented the results of the work domain-specific item inter-correlations. The correlation coefficients were significant in 35 out of 45 cases. The two items that had the largest number of significant relationships concerned the risk of making mistakes in order to achieve at work and avoiding the risk of making a mistake as often as possible. Table A5.8 showed that there were 20 significant correlations between health domain-

specific variables. The items that showed the greatest number of significant relationships concerned apprehension about health hazards, prevention of health problems, feeling that spending a lot of time at work is losing out on a full life and frequency of taking work home at the evenings and weekends. The inter-correlations for the finance domain-specific items revealed a total of 30 significant correlations. The item that had significant associations with all other items assessed apprehension about overspending. The gambling items showed a number of significant inter-correlations, which is similar to the finding of MacCrimmon and Wehrung (1986).

In sum, the domain-specific items revealed a number of significant inter-correlations. The themes that were used to structure the items in each domain were associated significantly in several cases. Each set of five items comprised an item framing risk as positive, risk as negative, positive emotions associated with risk, negative emotions associated with risk and a behavioural item. In the work domain, each item type showed significant correlation results, that is the error risk taking positively framed item was associated with the goal achievement positively framed item and so on. In the finance domain the positively framed items, the negatively framed emotion items and the behavioural items had significant correlations. In the health domain only the behavioural items were associated. It could be that in the health domain the two constructs being measured, health protection and work-nonwork balance, were not associated with the same type of risk-related decision preferences as the other items.

6.6 Cross-domain and domain-specific variable correlations

Three sets of correlation analyses were carried out to examine the relationships between the cross-domain and domain-specific variables for the work, health and finance items. Table A5.10 presents the results for the work domain. The item that had the greatest number of significant relationships (8 out of 10) was the variable 'Do you prefer to take or avoid risks when making decisions at work?' It is possible, as Sitkin and Pablo (1992) suggested, risk preference could indeed be a key factor that is the sum of a range of risk-related decision preferences and general risk orientation. However, the variable assessing the level of perceived risk in the work domain only correlated significantly with three other variables showing that perception might not be as important to the

decision process as preference in the work domain. This is contrary to the work of authors Sitkin and Pablo who predicted risk perception is the second key factor in the decision process. The items developed to measure the reference point showed some significant relationships. Response to recent risk events, in terms of whether behaviour was more or less cautious, was associated with five other domain-specific variables. General affect was related to four other variables, three of which concerned emotions (apprehension about making a mistake, apprehension about taking risks to achieve goals and risk being part of the interest and excitement of work). The latter variable concerning positive affect and risk was itself associated significantly with five of the cross-domain variables, including general affect, perception and preference. It seemed that emotions might be an important part of the overall decision process. It could be that emotions are a significant factor in determining the reference point, i.e. whether people perceive themselves to be in the domain of loss or the domain of gain, and their reference point-related risk choices.

The results of the health domain analyses, shown in table A5.11, reveal a different pattern of associations. Three variables emerged as having a number of significant relationships. Feeling apprehensive about health hazards was associated significantly with six out of the eight cross-domain variables. The reported behaviour item concerning trying to prevent health problems was significant in five out of eight correlations. The cross-domain item concerned with whether the health domain was better or worse than usual was associated significantly with six out of ten domain-specific variables. This result is interesting, as the same variable in the work domain showed no significant relationships with the work domain-specific items. Another contrast with the work domain is that the risk preference item was correlated significantly with only five out of ten domain-specific items, which were those concerning health protection. The risk perception item showed significant relationships with the same five items. The relationships between perception and preference items with the domain-specific items were, however, all in the same direction. This showed that preference and perception were not related inversely as Sitkin and Pablo (1992) suggested. In general, the health protection items showed stronger relationships with the cross-domain variables than did the life balance items. It could be that the life balance items did not capture the components of the decision process that relate to risk decisions in the same way that the health protection items did.

The results of the finance domain cross-domain and domain-specific variables are shown in table A5.12. The strongest result to emerge from these analyses is the importance of the risk preference item. This variable correlated significantly with all ten of the domain-specific items. In contrast, risk perception had only three significant relationships. Other key variables included whether people prefer to spend or save money, whether people enjoy spending and whether people take a cost-benefit approach to financial decision making. The latter item, however, was associated only with the variables concerning the use of money and not with the gambling items. In general, the use of money variables had more significant correlation coefficients than the gambling items. The item concerning whether the financial situation is better or worse than usual was only related significantly to three variables. General affect concerning whether the financial situation was positive or negative was associated with four variables. In sum, it seemed that expressed preference was the key variable in these analyses in terms of the frequency of significant associations with other variables.

Overall, the results of the cross-domain and domain-specific correlations for the work, health and finance domains revealed a number of interesting findings. First, reported preference for taking or avoiding risks was found to be the variable that had the greatest number of significant associations overall, particularly in the work and finance domains. It could be that, as Sitkin and Pablo (1992) suggested, preference is the sum of a range of other decision preference variables. Second, emotion-related variables had several significant relationships in each domain showing that emotions are likely to be a important component of the decision process as hypothesised in Chapter 3. Third, the perception of risk did not have as many significant associations with other variables as might have been predicted from the work of Sitkin and Pablo (1992) who proposed that risk perception is the second key factor in determining risk-related choice. The relative impact of the decision preference variables on risk preferences is discussed in the next chapter.

6.7 Inter-relationships between domain-specific variables

Correlation analyses were used to examine the relationships between each set of domain-specific variables. Table A5.13 shows the results for the analyses of the work

domain-specific items and the health domain-specific items. There was a total of 31 significant results out of 100 correlations. The sets of items that had the greatest number of significant inter-relationships were the items concerning goal-oriented risk taking with items concerning health protection. Two items concerning negative emotion showed several significant relationships: apprehension about health hazards and apprehension about risk taking to achieve work related goals.

Table A5.14 presents the results of the correlations between domain-specific finance and health variables. Out of the 100 analyses, there were 35 significant results. The sets of items that had the strongest inter-item relationships were health protection and use of money. At the item level, variables concerning apprehension were shown again to have a number of significant relationships.

The results for the health and finance domain-specific items are given in Table A5.14. There were 35 significant results out of 100 analyses. The two sets of items that had the greatest number of inter-correlations were goal-oriented risk taking and gambling. In general, people who had positive perceptions of gambling were more likely to consider risk taking to achieve goals as acceptable. As with the previous analyses, apprehension was an important factor. In particular, the variable assessing apprehension about spending money emerged as being related significantly to seven other items. Other variables that showed a number of significant results included two variables concerning positive affect: perceived enjoyment of gambling, and risk being part of the excitement and interest of work.

In sum, it seemed that emotional aspects of decision making were important components of work, health and finance decision preferences. The number of significant relationships between variables measuring positive and negative affect indicates that it is possible that there are emotional orientations to decision preferences which are pervasive across domains. In particular, apprehension emerged as an important influence on decision making in each domain. This result is similar to the finding of Maule, Hockey, Bdzola and Clough (1998) that tension was a significant influence on risk perception and risk-related choice. As Kahneman and Tversky (1979) suggested, it could be that losses and their associated negative emotions have a greater impact on the decision processes than positive emotions.

6.8 Biographical and personality data

The relationships between the decision preference variables with biographical and personality data were analysed initially using correlations. These relationships were examined to assess whether there are significant associations between decision preferences and enduring dispositional factors or biographical variables. It was hypothesised in Chapter 3 that personality is an important factor that is associated with whether risk and decision preferences are consistent or not. These analyses enabled the assessment of the overall pattern of relationships prior to multivariate analysis that considered the relative impact of a range of variables, including personality factors, on risk preferences.

Table A5.16 shows the inter-correlations between the biographical and personality data. There are a number of significant relationships between the biographical and personality data. The older part of the sample group comprised more women than men. Overall, the men were better educated. This result was likely to have been skewed by the inclusion of highly educated male traders in the sample. Similarly, the finding that men were better paid was also likely to have been influenced by the trader sample group. Women had higher scores in the neuroticism scale. The neuroticism result is similar to the data used in the Nicholson, Fenton-O'Creevy, Soane and Willman (2000) paper (N = 1822).

Age had a number of significant relationships with other variables. There were inverse relationships between level of education and seniority. Again, this result was probably due to the number of relatively young traders in middle management positions. Age was significantly and positively related to overall tenure. Age also showed some relationships with personality. Age was associated positively with neuroticism and negatively related to extroversion and agreeableness. It is more likely that these relationships are due to the nature and demography of the sample rather than changes in personality over time (Costa & McCrae, 1991).

Level of education was significantly related to all the other variables, with the exception of seniority. This exception could be due to the number of people in jobs where academic qualifications are not a requirement. Relationships with educational level

were positive for tenure, income, extroversion, agreeableness and conscientiousness. Relationships were negative for neuroticism and openness.

Tenure had a negative relationship with seniority. Seniority had a positive relationship with income. Income was also associated with neuroticism (negatively) and conscientiousness (positively).

There were several significant correlations between the five personality factors. These relationships do not cast doubt on the independence of the five factors, discussed by Costa and McCrae (1991). Rather, the results probably reflect the characteristics of this sample group.

6.9 Cross-domain variables, biographical and personality data

Tables A5.17, A5.18 and A5.19 show the results of correlation analyses between the cross-domain variables, biographical and personality data. Table A5.17 presents the analyses for the work domain. The results are significant for 31 out of 88 analyses. Two variables emerge as having many significant relationships. Both the neuroticism scale and the item concerning whether people prefer to take or avoid risk have seven significant relationships. Each of the biographical and the remaining four personality factors has significant relationships with the decision preference variables. All the decision preference variables had significant relationships with the individual difference factors, with the exception of the item asking whether recent risk experiences have changed the way risk at work is managed which was answered only be a subset of respondents. Overall, the results indicate that personality factors have stronger associations with work-related decision making that do biographical variables.

The results of the correlations for cross-domain health variables with biographical and personality factors in Table A5.18 show a different pattern of results. The three variables that show the most significant relationships were general health-related affect, whether health is better or worse than usual and the personality factor of conscientiousness. Neuroticism and agreeableness were, however, also important; both factors have four significant relationships with the decision preference variables. Risk

preference and perception had four significant results out of a total of eleven analyses. Education and sex were associated significantly with four decision variables. The results suggest that personality and biographical factors are likely to be associated with, and perhaps shape, health-related decision preferences. The correlation results suggest that personality is more important to the health-related decision process than biographical factors.

Table A5.19 gives the results of the analyses for the cross-domain finance variables with biographical and personality data. The results show a somewhat different pattern from both the work and health domain analyses, although some of the same key variables emerged as having significant relationships. Overall, there were fewer significant relationships, a total of 26 out of 88. The balance between personality factors and biographical factors was more even than in the other domains. Both types of factors are likely to be important influences on the decision process. The variable that emerged as the most significant was the personality factor of conscientiousness. The decision preference variables that had the greatest number of significant relationships were concerned with general affect about the finance domain and whether the financial situation was better or worse than usual. These factors showed five and six significant results, respectively. The item assessing risk preference had only four significant relationships. In sum, conscientiousness and the finance domain reference point could be important influences on finance-related decision preferences.

In sum, the correlations between the cross-domain variables with biographical and personality factors show that there are significant relationships between the decision variables and individual difference characteristics. The results suggest that personality is likely to be a key factor in determining decision preferences. The correlation data indicate that the general personality profile of a risk taker is low neuroticism, high extroversion, high openness, low agreeableness and low conscientiousness. This result is the same as the results of other work by the author and colleagues (Nicholson, Fenton-O'Creevy, Soane & Willman, 2000). The results also cohere with the work of Weinstein and Martin (1969) who found that extroversion was associated with risk taking, and the work of Zuckerman who has found repeatedly that sensation seeking, a component of extroversion in the Five Factor model of personality, is a predictor of risk taking in several decision domains.

There are some differences between the decision domains in terms of which factors show the strongest relationships with decision preference variables. It seems that in general, there are domain-specific factors that influence decision making in each domain differentially. However, the possibility remains that people who are consistent in their decision preferences across domains are influenced equally in each domain by a common set of personality and biographical factors. In particular, agreeableness and conscientiousness could be significant influences on risk preferences. This result fits in with the work of Bartram, Clough and Williams (1997) would found that risk takers showed a lack of concern for others, which is a component of the agreeableness scale. The concepts of cross-domain risk preferences and domain-specific risk preferences, and the factors that are likely to predict these variables, are discussed further in Chapter 7.

6.10 Correlations between domain-specific variables, biographical and personality factors

The results of the correlations between domain-specific variables, biographical and personality factors are given in Tables A5.20, A5.21 and A5.22. Table A5.20 shows the results for the work domain-specific items. There were 46 significant results out of 110 analyses. These results show that, again, personality has important associations with decision preferences. However the relative importance of the five personality factors is different from the analyses including the cross-domain variables. In this case, openness emerged as having the greatest number of significant relationships (seven). Agreeableness and conscientiousness were also important, having six significant results each. Neuroticism had five significant results. Variables measuring positive and negative affect, as well as cognitive aspects of decision making and reported behaviour also had a number of significant associations with the individual difference characteristics. The item type that had the most significant results was the reported behaviour item.

Table A5.21 presents the results of the health domain-specific, biographical and personality variables. There are 41 significant results. Conscientiousness again emerged

as the personality factor that had the most significant relationships (seven) with decision preference variables. Neuroticism, extroversion and agreeableness each had five significant associations with decision preference variables. There were a number of significant relationships between personality factors and the gambling items, reflecting the work of Slovic (1962). Of the biographical variables, age and level of education had the most significant relationships, four each, with decision variables. The decision variable that had the greatest number of significant relationships was the item 'I feel spending a lot of time at work is losing out on a full life'. The items that framed risk as negative had the greatest number of significant results. Also highlighted were the item concerning the prevention of health problems, and the item that measured the importance of health. As with the results for the cross-domain and biographical variables correlations, the importance of personality factors was noted. Conscientiousness is, in particular, a key variable that seems likely to have a significant effect on health-related decision making. Biographical variation too seems likely to lead to some differences in health decision preferences.

The results for the finance domain-specific item and biographical data correlations are presented in Table A5.22. There were 27 significant results out of 110 analyses. This is a lower total than either the work or health domains. The biographical data showed some significant relationships. The greatest number of correlations from the data were between income and financial decision preferences. There were four significant results out of ten analyses. This result seems to indicate that although income has some bearing on financial decision making, there is a range of other influences. Personality seems to be an additional important factor. As with previous results, conscientiousness was the most significant personality variable, with a total of seven significant relationships. This result is similar to the result of Kowert and Hermann (1997) who found that there was a negative relationship between conscientiousness and risk taking. The decision variable that had the most significant relationships was the item measuring positive affect associated with gambling. The item types that had the most significant correlation coefficients were the items that framed risk as positive and risk as negative.

Overall, the results for the correlations between domain-specific variables, biographical and personality variables confirm the importance of individual difference characteristics, in particular personality, to decision preferences. The results suggest that

personality is likely to have significant effects on the decision process. The correlation analyses described in this chapter do not enable the exploration of causal relationships, however, the results do indicate that there are important associations. The relationship between personality and the consistency of decision preferences is examined in the next chapter.

6.11 Correlations between decision preference data and reported risk taking

The trader sample group was part of a wider research project, described in Chapter 4. The traders were presented with a range of measures developed to assess several aspects of the decision making process. One set of items was designed to measure reported risk taking. The items were developed to measure reported risk behaviour rather than expressed preferences. The items and data from a sample of 1200 managers are discussed in Nicholson, Fenton-O'Creevy, Soane and Willman (2000).

The data from this item were correlated with each of the cross-domain items to examine whether there were any significant relationships between the two measures.

The item used to gather the data for this analysis is shown on the next page.

Seven scales were developed from the items. First, six scales were formed for each facet of the risk taking item by summing the now and past scores. Second, an overall risk taking scale was formed by summing all the now and past scores for each facet of risk taking. This process was used to form the scales following confirmatory factor analysis. The results of the factor analysis showed that there was one key factor that included all the data and a secondary set of factors representing the items from each risk domain. Reliability checks demonstrated that forming scales using the now and past scores for each risk domain was optimal way to scale the data (Nicholson, Fenton-O'Creevy, Soane & Willman, 2000).

Figure 6.1 Items used to measure reported risk taking

We are interested in everyday risk-taking. Please could you tell us if any of the following have ever applied to you, *now* or in your adult *past*?

Please use the scales as follows:
1= never, 2=rarely, 3= quite often, 4= often, 5=very often

	Now					*Past*				
1. Recreational risks (e.g. *rock-climbing, scuba diving*)	1	2	3	4	5	1	2	3	4	5
2. Health risks (*e.g. smoking, poor diet, high alcohol consumption*)	1	2	3	4	5	1	2	3	4	5
3. Career risks (*e.g. quitting a job without another to go to*)	1	2	3	4	5	1	2	3	4	5
4. Financial risks *(e.g. gambling, risky investments)*	1	2	3	4	5	1	2	3	4	5
5. Safety risks *(e.g. fast driving, city cycling without a helmet)*	1	2	3	4	5	1	2	3	4	5
6. Social risks *(e.g. standing for election, publicly challenging a rule or decision)*	1	2	3	4	5	1	2	3	4	5

The results of the correlations are shown in tables A5.23, A5.24 and A5.25. The results show that there are some significant relationships between the cross-domain variables developed for this research and a measure of risk taking that has been shown to be a valid. In particular, preferences for taking or avoiding risk in the health and finance domains were associated significantly with a number of facets of risk taking and the overall scale. Financial risk taking measured using the new scale was significantly related to perceptions that there are risks in the finance domain and preferences for taking risk.

In sum, the cross-domain variable data and data gathered from a new scale of risk taking showed some significant associations. Although there was not a great number of significant correlation coefficients, the results provide some support for the validity of

the items developed for the research in this thesis. An important reason why the results might not be significant is that the risk taking items were not measuring components of the decision process that were measured in this research. Second, the risk taking scale presented risk domains somewhat differently from the work, health and finance domains used in the questionnaire used for this research. Third, the items emphasised behaviour rather than perceptions or preferences.

6.12 Chapter summary

Correlation analyses revealed significant associations between several key variables. The results indicated that there could be some factors that influence decision making across domains, and that the sample might include a number of the participants have consistent approaches to risk and decision making. Risk preferences for each of the three decision domains were related significantly. Perceptions were significantly associated in two out of three analyses. Both cost – benefit and emotional approaches to decision making were related significantly across all domains.

When the results of the inter-domain correlations were considered, the factors that emerged as being consistently important were general perceptions of how much risk is involved in each domain, preferences for taking or avoiding risk in each domain and general affect related to the reference point for each domain, that is whether people feel positive or negative overall. The reference point between the domains of loss and gains could be an emotional variable. It could be that positive and negative emotions associated with reference points might have a significant impact on behaviour. Emotions could act either by increasing confidence such that people feel they can achieve more. In this case, people might feel motivated to maintain their positive mood state, as suggested by Davison, Suppes and Siegel (1956). Emotions could also influence risk preferences by lifting the reference point. In this situation, people are below their reference point and take risks as Kahneman and Tversky (1979) suggested. The result that positive emotion is associated with preferences for taking risks might thus not be contrary to the predictions of prospect theory (Kahneman & Tversky, 1979).

Decision domains were shown to have some important effects on decision processes. It seems likely that a combination of cross-domain decision factors and domain-specific decision factors influence the decision making process and risk preferences. It is possible that the pattern of results could be explained by the sample characteristics. That is, the sample might comprise people with consistent cross-domain approaches to risk that are associated with particular personality profiles, and people with inconsistent approaches to risk who show cross-domain variation in their responses.

An additional important finding of the correlation analyses is that biographical and personality factors are likely to be significant influences on the decision process and decision preferences. The results show some agreement with the work of Slovic (1962) that concluded that risk taking is subjective and multi-dimensional. This does not imply that in all cases, however, situational factors are more important than individual factors given the strength of the relationships between decision preference variables and personality factors. The results do fit in with the work of Weinstein and Martin (1969) who also found that risk taking measures were associated significantly with personality factors, although these authors did not use the Five Factor model of personality. The results do not agree with the Kogan and Wallach's (1964) research that suggested that risk taking is situational and variable. There were many more significant correlation results in this research than in the work of Kogan and Wallach, who found only 17 out of 192 correlations between measures of risk to be significant.

Examination of the correlations between the cross-domain variable data gathered in this research and trader data gathered as part of a wider research project showed that there were some significant associations.

In sum, the results suggest that for some people, approaches to decision preferences could be consistent across domains. For others, it seems likely that there are domain-specific factors that influence choice. It could be that research that has considered one domain such as work-related decisions or financial gambles is likely to have captured only a limited aspect of individual preferences. The relative influence of biographical variables, personality factors and decision preference variables on cross-domain and domain-specific risk preferences is discussed in the next chapter.

Chapter 7

Analysis of risk preferences across and within domains

7.1 Chapter abstract

Chapter 7 presents and discusses the results of the analyses that were carried out to examine the factors that predict both the consistency of risk preference across domains and domain-specific risk preferences. The data indicated that people could be characterised in terms of the consistency of their cross-domain risk preferences, and that there are significant differences between people who have consistent cross-domain risk preferences and people who are inconsistent in their preferences. Hypothesis 1 was confirmed.

Regression was used to analyse the relative impact of biographical data, personality factors and decision preference variables on both the degree of consistency of cross-domain risk preferences and domain-specific risk preferences. The results of the regression analyses confirmed hypotheses 2 and 3. Variance in personality traits and decision making preferences were also associated with the degree of inconsistency of cross-domain preferences. In addition, it was found that participants with consistent cross-domain risk preferences were significantly more risk averse than the inconsistent participants. Within-domain risk preferences were predicted significantly by a range of personality and decision preference variables, however the pattern of relationships differed for the work, health and finance domains.

The results suggested that risk preference is generalisable across domains only for the subset of the population that has a disposition-based risk propensity. For the majority of people, it is proposed that domain-specific risk preferences vary, and can differ across domains. For these people, risk preferences are not generalisable across domains. It is proposed that it is more useful to consider risk propensity is in terms of the consistency of cross-domain risk preferences than to try to generalise risk preferences from one domain to another.

7.2 Aims of the analysis

The aims of this chapter were developed to test the hypotheses, and were threefold.

- To establish whether people can be categorised as consistent and inconsistent in their cross-domain risk preferences.
- To examine the differences between people who are consistent and people who are inconsistent in their cross-domain risk preferences in terms of biographical variables, personality factors and decision preferences. The analysis was carried out in three stages. First, the differences between people who were categorised as having consistent and inconsistent risk preferences were assessed in relation to biographical variables, personality factors and the consistency of cross-domain decision preferences. Second, the differences between the two groups were considered with respect to within-domain decision and risk preferences. Third, the factors that predict the degree of inconsistency were examined through regression.
- To consider whether the influences on risk preferences are the same for each of the work, health and finance domains or not.

7.3 Discussion of hypothesis 1

Hypothesis 1 proposed that risk propensity can be conceptualised and operationalised as cross-domain risk preferences. This hypothesis was tested through the creation of a new variable that was based upon individual level responses to the risk preference item in each of the work, health and finance domains.

The analysis began with the categorisation of individuals in terms of their responses to the risk preference item in each of the work, health and finance domains. The raw data were arranged on a five-point response scale ranging from prefer to take risks to prefer to avoid risks. The SPSS 'recode' function was used to create a new variable that categorised people into one of two groups according to whether people had shown the same response to the risk preference item across the work, health and finance domains or not. Hence each individual was assigned to the consistent group or the inconsistent group. The frequencies for both groups are shown in table 7.1 on the next page.

Table 7.1: Frequencies for consistent and inconsistent groups

	Frequency	%
Consistent group	51	14.2
Inconsistent group	307	85.8

The data confirmed hypothesis 1: people could be categorised into groups on the basis of whether they had consistent cross-domain risk preferences or not.

The data in table 7.1 suggest that the majority of the participants in this sample had inconsistent risk preferences. The implication of this finding is that these people make domain-specific choices about risk. The data were considered further to examine the relationship between consistent and inconsistent group membership and sample group. It could be that some of the participants, for example the mountain climbers, take risks in one domain but not in others. Table 7.2 below shows the sample group derivation of participants in each of the consistent and inconsistent groups.

Table 7.2: Frequencies of participants from each sample group in the consistent and inconsistent risk preference groups

	Consistent group		Inconsistent group	
	Frequency	Percent	Frequency	Percent
Academics	5	9.8	61	19.9
Chess players	3	5.9	38	12.4
Fire fighters	31	60.8	92	30.0
Mountain climbers	7	13.7	44	14.3
Traders	5	9.8	72	23.5
Total	51	100	307	100

The data in table 7.2 show that each sample group is represented in both the consistent and inconsistent risk preferences groups. The proportional distribution of participants from each sample group within the consistent and inconsistent group varies. The academics, chess players and traders had larger numbers of inconsistent participants than consistent. The pattern was the reverse for the fire fighters. The mountain climbers were evenly distributed. This result demonstrates that there was heterogeneity of risk preferences within each sample group, as well as across the whole sample.

7.4 Discussion of hypothesis 2

Hypothesis 2 proposed that whether people are consistent or inconsistent in their cross-domain risk preferences, and that the degree of consistency of cross-domain risk preferences, are influenced by personality factors and the consistency of cross-domain decision preference variables.

7.4.1 Differences between people with consistent and inconsistent risk preferences in terms of biographical variables, personality factors and consistency of cross-domain decision preferences

The first stage of the analysis to test hypothesis 2 considered the differences between the groups in terms of biographical variables, personality factors and decision preference variables. In order to examine the relationship between group membership and the decision preference variables, a new set of variables was developed from the items that measured the five aspects of decision preferences in each of the work, health and finance domains. The purpose of this process was to develop new variables that assessed the consistency of cross-domain responses that could be related to group membership. That is, the issue of whether consistency of risk preferences across domains was associated with consistency in other types of decision preferences was examined. It could be that people who have consistent risk preferences are also consistent in other aspects of decision making. Conversely, it might be that the consistency of risk preferences has no relationship with the consistency of the other decision preference variables. The SPSS 'compute' function was used to create a new variable that was the within-case standard deviation of the scores for the items measuring risk preference in each of the work, health and finance domains. The new variable was a continuous variable ranging from zero to 2.31. A score of zero represented completely consistent responses across each of the work, health and finance domains. The higher the score was, the more inconsistent participants' responses across domains were. Table 7.3, on the next page, gives some examples of raw scores and the new standard deviation variable.

Table 7.3: Sample within-case standard deviations of risk perception items

	Work risk perception score	Health risk perception score	Finance risk perception score	Within case sd
Participant A	2	2	2	0
Participant B	3	5	5	1.15
Participant C	4	1	1	2.31

The aspects of decision preferences measured for each domain are shown below. Descriptive statistics for the newly created variables are shown in Appendix 6. The abbreviation for each variable used in the results tables that follow, and in the tables in the appendices, is given.

1. How do you feel about your job/ health/ personal finances at the moment? The response range was from very negative to very positive. The abbreviation in the results tables for this variable is 'feeling'.
2. Compared with the last few months, is your general work/ health/ finance situation better or worse than usual? The response range was from much worse to much better. The abbreviation in the results tables for this variable is 'better or worse'.
3. When making important decisions about risks at work/ with your health/ with your finances, how frequently do you think through all the payoffs and costs of each alternative? The response range was very rarely to very often. The abbreviation in the results tables for this variable is 'payoffs and costs'.
4. When making important decisions about risks at work/ with your health/ with your personal finances, how frequently are you influenced by your feelings or emotions? The response range was very rarely to very often. The abbreviation in the results tables for this variable is 'emotion'.
5. How much risk is involved in your job/ your lifestyle/ your personal finances? The response range was from little risk to much risk. The abbreviation in the results tables for this variable is 'perceived risk'.

The analyses that follow considered the differences between the people who had consistent cross-domain risk preferences and the people who had inconsistent preferences. Independent samples T tests were used to establish where differences between the two groups lay.

The literature reviewed in Chapters 2 and 3 presented two perspectives on the consistency of risk preferences. Theoretical models of risk propensity, such as the Sitkin and Pablo model (1992) suggested that risk preferences are relatively consistent. Similarly, a personality-based approach to risk preferences suggests that people with particular personality profiles will have particular risk dispositions. For example, the work of Kowert and Hermann (1997) found that aspects of trait neuroticism, openness and agreeableness were associated with particular approaches to risk. It was hypothesised in Chapter 3 that if risk preferences are rooted in personality, they are likely to be consistent across domains for people who have the critical trait characteristics. The hypothesis tested in this stage of the analysis proposed that personality would influence strongly whether people had consistent or inconsistent cross-domain risk preferences.

Cognitive and emotional perceptions of risk and reference points have also been proposed to be potentially important factors following a review of the literature. Where these variables are consistent, it could be that risk preferences too are consistent. Conversely, it could be that people who are inconsistent across domains are influenced by factors such as their domain-specific reference points, and their relative position in the domains of loss and gain, as predicted by Kahneman and Tversky (1979).

Table 7.4, on the next page, shows the results of the independent samples T test analyses used to examine differences between people who had consistent risk preferences and people who had inconsistent risk preferences. The results in Table 7.4 show that there are significant differences between the groups in 6 out of 20 cases at the level of $p < .05$ or above.

A non-parametric test, Chi square, was used to examine the distribution of men and women across the consistent and inconsistent groups rather than a T test analyses. The consistent group comprised 44 (86.3%) men. The inconsistent group comprised 265 (86.3%) men. The significance level of the Chi square test was .993. It was concluded that there are no significant differences between the groups with respect to sex.

Table 7.4: Independent samples T-test to examine differences between people with consistent and inconsistent risk preferences with respect to biographical variables, personality factors and the consistency of cross-domain decision preferences

Equal variances were assumed.

	Mean score of consistent group N = 51	Mean score of inconsistent group N = 307	T value
Age	33.020	32.276	.497
Level of education	4.245	3.356	3.198 **
Tenure	11.675	7.695	2.298 *
Seniority	1.842	1.991	-.503
Income	2.474	2.580	-.341
Z score N	-.310	.005	-2.311 *
Z score E	.109	-.002	.804
Z score O	-.187	.003	-1.386
Z score A	.282	-.005	2.101 *
Z score C	.364	-.006	2.728 **
SD Feeling	.944	.857	1.132
SD Better or worse	.681	.715	-.471
SD Payoffs and costs	.693	.888	-2.088 *
SD Emotion	.795	.798	-.043
SD Perceived risk	1.048	1.035	.147

* $p < .05$, ** $p < .01$, *** $p < .001$

The group with consistent cross-domain risk preferences were significantly better educated, longer tenured, lower in neuroticism, higher in agreeableness and conscientiousness, and had less variation concerning whether they think through the payoffs and costs of choice alternatives compared with the group that had inconsistent risk preferences. These results suggest that a combination of higher levels of education with work experience could be a factor in developing the way that people think. It could be that the effects of education and work experience lead people to have a consistent way of approaching decision making that has developed over time, and is more resistant

way of approaching decision making that has developed over time, and is more resistant to short-term situational variance than the decision making of people with less experience and education. It might also be that people with a personality profile that comprises conscientiousness and agreeableness are more likely to plan their careers and choose organisations that fit with their preferences and dispositions.

The difference between the two groups in terms of personality profiles seems to fit in with the nature of the dispositional factors. The trait of neuroticism is described by Costa and McCrae (1991) as representing emotional stability. A person with a low score in the neuroticism scale is more emotionally stable than a person with a high score. The association of a low neuroticism score with consistent risk preferences could suggest that emotional stability influences the stability of risk preferences. Other personality traits that distinguished the people with consistent risk preferences from people with inconsistent risk preferences were agreeableness and conscientiousness. A high score in the agreeableness trait represents someone is altruistic, co-operative and sympathetic to others. Consistent preferences were associated with this type of profile. A high score in conscientiousness was also associated with consistent risk preferences. It could be that these traits are associated with consistent appraisals of risk situations. For example, a person with a high score in agreeableness would not be likely to take risks that would be detrimental to others and this characteristic could be pervasive in their decision processes leading to greater consistency of preference than someone who does not show the same degree of regard for others. These data, and their relationship with the consistent and inconsistent groups, are returned to in the discussion of the next set of analyses.

The data in table 7.4 also showed that there were significant differences between the groups with respect to the degree of consistency of the variables that assessed whether people though through the payoffs and costs of decisions across the work, health and finance domains. The participants who were consistent across domains tended to have less variability in their approaches compared with the inconsistent participants. This result suggests that people who are inconsistent, sometimes attending to situational information and sometimes not, are more likely to have inconsistent risk preferences.

The results showed that the degree of consistency of whether people are influenced by their emotions, whether they feel positive or negative, or better or worse about their situation, and perceived risk did not differ significantly between the people with consistent and inconsistent risk preferences. This result suggests that the aspects of decision making that were discussed in Chapter 3 are not uniformly important to risk propensity. That is, the data indicated that people could have consistent cross-domain risk preferences without being consistent in other aspects of their decision making. It could be that these aspects of decision preferences are more relevant to risk preferences within each domain than to the consistency of preferences across domains.

In sum, the independent samples T test showed that there were significant differences between people who were consistent in their risk preferences across domains and people who were inconsistent across domains. Differences were apparent in three personality factors and one decision preference variable. In general, it was shown that consistency of risk preferences does not need to be associated with consistency in other types of decision preferences.

7.4.2 Differences between people with consistent and inconsistent risk preferences in terms of domain-specific decision preferences

A second set of T tests were carried out to examine the differences between the consistent and inconsistent groups in terms of the level of risk preferences and the other decision preference variables. For example, to see whether the consistent group were more risk seeking or risk averse than the inconsistent group. The variables in this set of analyses were the items that measured risk preference, cognitive and emotional aspects of the reference point, whether people thought through payoffs and costs, emotional influences on decision making and perceived risk in each of the work, health and finance domains. Table 7.5 on the next page shows the results of the independent samples T test to examine the differences between the consistent and inconsistent groups on the risk and decision variables in each of the work, health and finance domains.

Table 7.5: Independent samples T-test to examine differences between people with consistent and inconsistent risk preferences with respect to risk and decision preferences within the work, health and finance domains

	Mean score of consistent group N = 51	Mean score of inconsistent group N = 307	T value
Work risk preference	4.120	2.893	7.273 ***
Health risk preference	4.143	3.730	2.488 *
Finance risk preference	4.140	3.629	3.099 **
Work feeling	3.041	3.517	-2.838 **
Health feeling	4.059	3.882	1.075
Finance feeling	3.451	3.489	-.240
Work better or worse	3.429	3.308	.827
Health better or worse	3.843	3.427	3.052 **
Finance better or worse	3.196	3.316	-.831
Work payoffs and costs	3.840	3.739	.572
Health payoffs and costs	4.000	3.389	3.286 **
Finance payoffs and costs	4.177	3.879	1.791
Work emotion	2.980	3.019	-.219
Health emotion	3.118	3.272	-.961
Finance emotion	2.863	2.948	-.469
Work perceived risk	2.667	2.814	-.687
Health perceived risk	3.235	3.092	.785
Finance perceived risk	3.529	3.560	-.182

* $p < .05$, ** $p < .01$, *** $p < .001$

The results in table 7.5 show that there are some significant differences between the groups in terms of their risk preferences and decision preferences. The variable that shows the greatest number of significant differences was risk preference, which discriminated between the people with consistent and inconsistent cross-domain risk preferences in each of the work, health and finance domains. The group that had consistent cross-domain risk preferences had significantly stronger preferences for avoiding risk than the inconsistent group in each of the work, health and finance

domains. A frequency count of the number of people who were consistently risk seeking showed that no participants reported themselves as strongly preferring risk, and only 4 participants rated themselves as preferring risk. The distribution of participants into groups on the basis of consistent preferences for seeking or avoiding risk for further analysis was not possible. This result indicates that people in this sample who are consistent are more likely to be risk averse than risk seeking.

The skew towards a preference for risk aversion in each domain, and the association between risk aversion and cross-domain consistency raises two issues. First, this skew could indicate that people who prefer to take risk consistently are not as well represented in the sample as people who are consistently risk averse. It might be that the results of the analysis discussed in this chapter would be different if there were a more even distribution of preferences in the data. Second, it might be that a general tendency towards risk aversion is observed more frequently in the general population than consistent preferences for risk seeking. This pattern of results is similar to the work of MacCrimmon and Wehrung (1986) who found that, when participants were presented with naturalistic decision making tasks, there was a set of individuals who were consistently risk averse, but no individuals who were consistently risk seeking. The data fit with the work of Highhouse and Paese (1996) who found that participants in their research were generally risk averse. The association between consistency and risk aversion was also observed in the risk taking scale data discussed by the author and colleagues that has been referred to previously in this thesis (Nicholson, Fenton-O'Creevy, Soane & Willman, 2000). Participants in this research were asked to report the frequency of their current and past risk taking behaviour in six domains (recreational, health, career, finance, safety, social) using the items presented in Chapter 6, section 11. Within-case standard deviations were calculated for each individual using the same method as that described in this chapter (N = 1650). The result was two new variables describing the degree of consistency for both current reported risk taking and past reported risk taking. These variables showed significant ($p < .01$), positive correlations with every aspect of risk taking. That is, the greater the degree of consistency, the lower the level of reported individual risk taking.

These findings lead to two propositions concerning the nature of risk propensity. First, the data suggest that people who are consistently risk seeking are not commonplace.

Second, it can be suggested that, while risk aversion might be a characteristic way to approach risk situations, risk seeking is domain specific and might often be targeted towards to the achievement of particular goals. In sum, the conceptualisation of risk propensity in terms of the consistency of cross-domain risk preferences might apply more frequently to risk aversion than to risk seeking.

The data in table 7.5 revealed differences between the groups in three decision variables. People who had consistent cross-domain risk preferences felt significantly more negative about their work situation, better about their health situation, and thought through payoffs and costs of health-related decisions more than people who were inconsistent across domains. These results can be interpreted within the framework of risk preferences. Since the consistent group were more risk averse than the inconsistent group, it is possible that risk aversion is associated with the negative emotion concerning the work situation, the caution in the health domain with respect to thinking though payoffs and costs and the positive feelings about health. These data suggest that reference points are complex, and can differ across domains as Tversky and Kahneman (1986) suggested. In the health domain, positive emotions could be associated with the domain of gain and risk aversion, as prospect theory predicts (Kahneman & Tversky, 1979). However, in the work domain, risk aversion and consistency were associated with a negative appraisal of the situation. This could be due to the relative positioning of an individual in the domain of loss. That is, even though a person might consider their situation to be negative it might not be as bad as it could be and thus people could consider themselves to be in the domain of gain and risk averse (Kahneman & Tversky, 1979; Tversky & Kahneman, 1986).

The results in table 7.4 showed that the consistent group had a lower score in neuroticism that the inconsistent group. It was suggested that the emotional stability associated with a low score was an important factor that could lead to consistent risk preferences. These results might seem contrary to the hypothesis that low levels of neuroticism might be associated with preferences for taking risk rather than avoiding risk. The relationship between low neuroticism and risk taking was found in research by the author and colleagues (Nicholson, Fenton-O'Creevy, Soane & Willman, 2000). However, further consideration of the composition of neuroticism shows that the trait comprises six facets in Costa and McCrae's 1991 NEO Personality Inventory (Revised):

anxiety, angry hostility, depression, self-consciousness, impulsiveness and vulnerability. Analysis of facet level data was not possible in this research given the small number of people for whom that type of data was gathered, but it could be that the stability component of trait neuroticism might be more significant than the anxiety component in terms of their relative contribution to relationship between the trait and the consistency of risk preferences. The relationships between personality facets and cross-domain risk preferences could be an issue for future research.

The second set of personality differences between the consistent and inconsistent groups related to agreeableness and conscientiousness. Previous research has found both agreeableness and conscientiousness to be factors that influence risk preferences in other research. For example, Bartram, Clough and Williams (1997) found that low scores in agreeableness were related to risk taking. Kowert and Hermann (1997) demonstrated that low conscientiousness was associated with preferences for risk taking. When the differences between the consistent group and the inconsistent group were considered in terms of scores on risk preference items, it seems that the results of this research fitted in with the work of previous authors. That is, the consistent group who showed tendencies to be risk averse had higher scores in agreeableness and conscientiousness.

7.4.3 Analysis of the degree of inconsistency of risk preferences

The third stage of testing hypothesis 2 considered further the people with inconsistent cross-domain risk preferences. A continuous variable that represented the degree of cross-domain consistency was created using the within-case standard deviation procedure discussed in relation to the first set of analyses to test hypothesis 2. The descriptive statistics for this variable are shown in Appendix 6. In order to examine the influences on the degree of cross-domain consistency, the participants who showed complete consistency across domains, i.e. a standard deviation of zero, were excluded from the analyses discussed in this section. The aim of the analyses was to explore further the participants with inconsistent cross-domain risk preferences. The previous two stages of the analysis in this section have examined the differences between two groups categorised as having consistent or inconsistent risk preferences. The former

group is homogeneous with respect to cross-domain risk preferences – all the participants are consistent. The latter group, however, is heterogeneous. Some people are more inconsistent in their cross-domain risk preferences than others. The analysis in this section considers the factors that are associated with the degree of variability of cross-domain risk preferences.

A multivariate test, linear regression, was used to assess the effects of biographical variables, personality factors and decision preferences on the degree of consistency of risk preferences. The regressions were carried out in several steps. First, the effects of biographical variables and personality factors were examined. This analysis was carried out twice. The fire service version of the questionnaire did not include all the biographical items at the service's request. Hence data concerning only age, sex and level of education were gathered for the fire service sample (N = 123). The remainder of the sample was also measured in terms of overall tenure (total time in the job including at doing the same job in other companies), seniority in the organisation (operationalised in terms of levels to CEO) and income. The regressions were repeated, first, to include either the three biographical variables that were measured for the whole sample, and second, to include the six biographical variables that were assessed for four out of five sample groups. The number of participants was greater when only three biographical variables were included. Second, the effects of the decision preference variables were assessed. Again, these regression analyses were carried out in two stages to both include the six biographical variables and to include the three biographical variables that were measured across the whole sample. Table 7.6, on the next page, shows the results of regression analyses. No outliers were identified in the analyses.

Table 7.6: Regression analyses of biographical, decision preference and personality data on the degree of consistency of cross-domain risk preferences

	Beta weights			
	Model 1	Model 2	Model 3	Model 4
Sex	-.090	-.116	-.057	-.057
Age	.109	-.017	.105	-.025
Education	-.100	-.081	-.068	-.051
Tenure		.066		.119
Seniority		-.073		-.053
Income		.122		.119
Z score N	.145 *	.122	.149 *	.133
Z score E	.114	.174 *	.085	.123
Z score O	.088	.102	.101	.139 †
Z score A	-.080	-.040	-.078	-.039
Z score C	.155 *	.203 *	.136 *	.180 *
SD feeling			-.007	-.048
SD better or worse			.087	.077
SD payoffs and costs			.143 *	.168 *
SD emotion			-.026	-.019
SD perceived risk			.204 **	.219 **
	R = .280 Adj. R^2 = .050 df = 8, 264	R = .334 Adj. R^2 = .053 df = 11, 167	R = .387 Adj. R^2 = .107 df = 13, 259	R = .432 Adj. R^2 = .107 df = 16, 162

† p < .1, * p < .05, ** p < .01

The data in table 7.6 show that the trait of neuroticism was a significant predictor of the consistency of risk preferences in models 1 and 3. The results provide some further evidence that low scores in neuroticism, and associated emotional stability, are associated with cross-domain consistency. Extroversion and openness showed some relationship with the degree of consistency, but the associations were relatively weak. The direction of the relationship indicated that low scores in extroversion and low scores in openness, are likely to predict a greater degree of consistency in cross-domain risk preferences. It could be that having an internal orientation reduces an individual's sensitivity to the social context of risk decisions, particularly when combined with the generally low levels of reactivity associated with a low score in neuroticism, thus leading to increased consistency of preferences across situations. Likewise, a low level of openness which is associated with tendencies for habitual ways of thinking and acting rather than abstract, speculative thinking seems likely to lead to risk preferences that show a greater degree of consistency than someone with a high score in openness.

The trait of conscientiousness showed significance in each of the four models. The results show that a low score in conscientiousness is associated with consistent cross-domain risk preferences. This result might appear contrary to previous research since the consistent group of people had a higher score in this factor than the people who were inconsistent. Previous research has shown that low scores in conscientiousness are associated with risk taking not risk aversion (Bartram, Clough & Williams, 1997), which is the general tendency of the people with consistent risk preferences. However, the association of low scores in the conscientiousness factor and consistent risk preferences in this stage of the analysis could be due to the nature of the trait and the nature of the sample. A high level of conscientiousness could be associated with focused, discriminating risk taking rather than the low levels of discrimination between risk situations that might be characteristic of people with low scores in this trait. When the item level conscientiousness data were considered, the only significant correlation was between the dependent variable and the Big Five Inventory item that asks participants to show their level of agreement with the statement 'Does a thorough job'. It is possible that a person with a high level of conscientiousness might be comfortable taking risks, but only in specific contexts where the individual has considered the nature of the risks and returns, and when they believe that taking a risk is an important aspect of achieving their goals. Overall, people who score highly in a measure of conscientiousness might be more sensitive to the potentially differential demands of their work, health and finance situations. This increased sensitivity could lead to greater cross-domain inconsistency in a similar way that high scores in extroversion could lead to sensitivity to the social context of each domain, and high scores in neuroticism could lead to sensitivity to the differing emotional context of each domain. A second issue is that the people in this analysis did overall show a tendency towards being risk averse rather than risk seeking, and the association with conscientiousness is therefore as expected. If the sample was skewed towards risk seeking, the association with conscientiousness might have been different.

The decision preference variables that had significant relationships with the degree of consistency of risk preferences were the items representing the consistency of thinking through the payoffs and costs of decisions, and consistency of perceived risk. The latter variable was not shown to discriminate significantly between the consistent and inconsistent groups in the T tests, however, the data in table 7.6 shows that it does have

an association with the degree of inconsistency of risk preferences. Less variability in approaches to considering choice alternatives and less variability in levels of perceived risk across domains were associated with consistent risk preferences. It could be that people who have greater cross-domain inconsistency might sometimes pay attention to situational information that influences, and increases the variability of, their risk preferences. The significance of the perception variables fits in with the work of Sitkin and Pablo (1992), in that perception was found to be a key factor that was associated with risk propensity, operationalised here as cross-domain risk preferences. It is possible that changes in risk perception might be associated with varying levels of attention to situational information, although the cross-sectional data do not suggest the direction of the relationship between the two variables. It could be that decision making which considers fully payoffs and costs of decisions increases awareness of risk and raises perceptions. Conversely, it might be that increased levels of perceived risk lead to greater attention to choices in order to minimise risk or maximise returns.

In sum, the results discussed in this section confirmed that personality was a significant factor that influences the degree of consistency of cross-domain risk preferences. The relationship between the level of consistency and the trait of conscientiousness was interesting. It was suggested that people with high levels of conscientiousness will be willing to take risks in some situations, but that people with this profile will be discriminating regarding the risks they choose to accept and those they choose to avoid, in contrast to indiscriminate risk taking that could be associated with low levels of conscientiousness. Decision preference variables are significant predictors of consistency in two cases: people who have less variability in their approaches to considering the payoffs and costs of choice alternatives, and people who have more consistent levels of perceived risk were less likely to have variance in their cross-domain risk preferences. It could be that these are situational factors that are consistently important determinants of risk preferences. Additionally, it might be that people who have consistent risk preferences also have consistent approaches to decision making that are associated with personality-based risk preferences. Such dispositional orientations for risk could lead to the development of habitual methods of information processing, heuristics, that decrease the likelihood that risk-related choices will be considered on a situational basis.

7.5 Discussion of hypothesis 3

Hypothesis 3 proposed that the predictors of domain-specific risk preferences are different for the work, health and finance domains. Support for hypothesis 3 could indicate that risk preferences are not, in most cases, generalisable across domains, and that a more effective way to consider risk propensity would be in terms of the consistency of cross-domain risk preferences, as discussed in relation to hypothesis 2. Lack of support for hypothesis 3 could suggest that risk preferences in different domains have the same underlying influences; risk preferences in one domain could be considered to be equivalent to risk preferences in a different domain. The participants in the analyses discussed in this section were the people who had inconsistent cross-domain risk preferences since these people were identified as having different preferences across domains.

Hypothesis 3 was tested using regression analysis. The dependent variables were the domain-specific risk preference items that asked respondents to rate whether they preferred to take risk or avoid risk with their work, health and personal finances. The aim of these regressions was to assess whether domain-specific risk preferences were predicted by the same factors as cross-domain risk preferences. If the same variables were significant in both sets of regressions, it could be suggested that there is no distinction between domain-specific risk preferences and cross-domain risk preferences. That is, risk preferences in one domain might be generalisable to other domains. If different predictor variables were revealed as explaining a significant amount of variance in the dependent variable, it could be concluded that domain-specific risk preferences are subject to a different range of influences than cross-domain risk preferences. The distinction between the two concepts of the consistency of cross-domain risk preferences and domain-specific risk preferences was a point of interest in this research due to the nature of the two different approaches to risk propensity in the risk literature. As discussed in Chapters 1 and 2, some authors have proposed that risk propensity is concerned with risk preferences in one domain only, for example business decisions, while other authors have conceptualised risk propensity as cross-domain risk preferences. The approach of a number of previous empirical studies into risk preferences and risk propensity was discussed in Chapters 2 and 3. Several authors have operationalised risk propensity in terms of responses to items assessing risk preferences

in only one domain, such as business decision making or choices among hypothetical gambles (e.g. MacCrimmon & Wehrung, 1986).

Twelve regression analyses were carried out. The dependent variables were rated risk preference for each of the work, health and finance domains. Four regressions were carried out for each dependent variable for the same reasons as the previous regressions discussed in this chapter: to include two sets of biographical variables each with and without decision preference predictor variables. The predictor variables were the biographical and personality factors that have been used in the other analyses. The decision preference predictor variables were the same type of variables as in the previous analysis, but the individual items within each domain were used, as in the data shown in table 7.5, rather than newly created continuous variables that assessed the consistency of decision preferences across domains. No outliers were identified during the analyses. Table 7.7 on the next page shows the results for each regression analysis.

The results showed that domain-specific risk preferences were associated with some factors that could influence approaches to risk in each domain, and some domain-specific variables.

The biographical variables were not, in general, significant predictors of domain-specific risk preferences, although there were some relationships. In the work domain, lower levels of seniority were associated with greater preferences for risk taking. Senior participants and managers were more likely to be risk averse. Sex almost reached significance in one regression analysis in the finance domain. Men were shown to prefer to take risks. This result could be due to the number of male traders in the sample whose job comprises risk taking, and the general trend for men to take more risks than women (e.g. Williams & Narendran, 1999). In the health domain, a higher level of education was a significant predictor of preferences for risk taking in one analysis and higher income was a significant predictor of risk aversion in models 2 and 4.

Table 7.7: Regressions of biographical, decision preference and personality factors on work, health and finance risk preferences

	Work domain				Health domain				Finance domain			
	Beta weights				Beta weights				Beta weights			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Sex	-.065	-.095	-.082	-.131	-.036	.064	-.043	.041	.059	-.018	.114 †	.066
Age	-.010	.119	-.002	.105	-.052	-.054	-.082	-.120	-.021	-.017	-.015	-.034
Education	.012	-.015	.029	.019	-.100	-.115	-.067	-.187 *	.024	-.037	.032	-.002
Tenure		-.046		.006		.086		.128		-.063		-.031
Seniority		-.195 *		-.218 *		.034		-.007		-.054		-.059
Income		-.074		-.099		.305 **		.380 ***		-.100		-.032
Z score N	-.072	-.055	-.022	-.002	.175 *	.147	.169 †	.227 *	.094	.158	.042	.053
Z score E	-.214 **	-.255 **	-.150 †	-.204 *	.104	.095	.134 †	.171 *	-.058	-.071	-.104	-.122
Z score O	-.102	-.096	-.116	-.139	-.015	-.024	-.005	-.046	.029	.035	.027	.063
Z score A	.032	-.009	.006	-.026	.064	-.027	.045	-.047	.081	.052	.057	.028
Z score C	.101	.039	.107	.025	.266 ***	.196 *	.180 *	.092	.058	.075	-.033	-.011
Feeling			-.070	.049			.018	.104			-.083	-.212 *
Better or worse			.073	.058			-.111	-.024			.053	.023
Payoffs and costs			.032	.157 †			.136 †	.199 *			.199 **	.219 **
Emotions in dm			-.106	-.090			-.126 †	-.229 *			.074	.067
Perceived risk			.179 *	.193 *			.261 ***	.305 ***			.539 ***	.589 ***
	R = .267 Adj.R^2 = .037 df = 8, 218	R = .385 Adj.R^2 = .080 df =11, 138	R = .342 Adj.R^2 = .062 df = 13, 208	R = .463 Adj.R^2 = .116 df = 16, 128	R = .281 Adj.R^2 = .045 df = 8, 218	R = .372 Adj.R^2 = .070 df =11, 138	R = .407 Adj.R^2 = .114 df = 13, 209	R = .536 Adj.R^2 = .200 df = 16, 131	R = .140 Adj.R^2 = -.016 df = 8, 218	R = .259 Adj.R^2 = -.007 df =11, 138	R = .584 Adj.R^2 = .301 df = 13, 212	R = .655 Adj.R^2 = .361 df = 16, 133

† p < .1, * p < .05, ** p < .01, *** p < .001

The personality data show some interesting relationships with domain-specific risk preferences. The finance domain risk preference variable did not have any significant associations with personality. Only the decision preference variables were significant predictors of finance risk preferences. In the work and health domains, there were a number of relationships between personality and risk preferences. The personality factor that showed the greatest number of significant relationships was extroversion. This variable was significant in each of the work and health domain regressions. In the work domain, a low score in extroversion was associated with a preference for avoiding risk. The relationship between high scores in extroversion and preferences for taking risk are likely to be due to the nature of the extroversion trait, and its association with activity and sensation seeking (Costa & McCrae, 1991). The direction of the relationship between extroversion and risk preference in the health domain was the reverse. A low score in extroversion was associated with a preference for taking health risks. This could be due to the nature of health risks compared with work risks. For example, an introvert might drink and smoke to help them to deal with social situations.

The health domain was the only domain in which the trait of neuroticism had significant relationships with risk preferences such that high levels of neuroticism were associated with preferences for taking risk. The pattern of association could be due to similar reasons as the relationship with extroversion discussed above. Health risks such as smoking and drinking could be perceived to be effective methods for coping with anxiety and strain.

A third personality factor that emerged as a significant predictor of risk preference in the health domain only was conscientiousness. A high score in conscientiousness was associated with a preference for avoiding risk. This relationship is also consistent with the work of Kowert and Hermann (1997) and Nicholson, Fenton-O'Creevy, Soane and Willman (2000). The strongest observed relationship for between conscientiousness and health risk preference was when only personality factors and biographical variables were included in the regression analyses. The association disappeared when all the biographical factors and decision preference variables were added into the regression equation.

The relationships between personality and risk preferences are not consistent either within or across domains. In the regressions that include biographical and personality variables, personality factors have a number of significant relationships with the dependent variable. However, when the decision preference variables are added into the regression equation, the relationships with personality factors are changed. The pattern of these relationships suggests that the decision preference variables could moderate the relationship between personality and risk preference. It might be that personality is a strong influence on preference for taking or avoiding risk that could act by influencing the decision process that shape characteristic approaches to choices that entail risk.

The decision preference variables showed a number of significant associations with risk preferences. The only variable that was consistently significant in each domain was risk perception. Perceived risk was a significant predictor in each of the six regressions in which it was included. In each case, perceptions of little risk were associated with preferences for avoiding risk. The direction of this relationship is the same as for the analyses discussed previously in this chapter and for the results of Williams and Narendran (1999), but contrary to the hypothesis of Sitkin and Pablo (1992). It could be that characteristic risk preferences shape perceptions. That is, people who are willing to take risks in order to achieve their goals such as high returns or sensations associated with risk taking, might be more aware of the risks in their environment and choose to be in situations where there are risks that might be related to the returns that they seek. Alternatively, it could be that participants in this sample have self-selected into environments that suit their risk preferences, as suggested in Chapter 5. The result could be, in part, a result of the method. Weber and Milliman (1997) noted that there might be differences between risk preference and risk perception measured in standardised scenarios versus self-rated Likert scale type items. It could be that if standardised situations had been used in this research against which participants' rated their risk preferences and perceived risk, the relationship between the two variables might be inverse as Sitkin and Pablo suggested.

The variable that measured whether people think through the payoffs and costs of decisions was a significant predictor in three out of six regression analyses, and almost reached significance in two further analyses. In each case, thinking through decision alternatives was associated with a preference for risk aversion. Decision making that did

not involve thorough choice analysis was associated with preferences for taking risk. This result suggests that decisions to take, or accept, risks could be related to decision processes that involve the use of heuristics which preclude careful weighing up of choices in each situation. It is also possible that preferences for taking risks are associated with personality-based dispositions, such as sensation seeking, that lead to habit driven behaviour and the use of heuristics in some situations. In contrast, preferences for avoiding risk could be driven by different trait characteristics that lead individuals to take a cautious approach to making choices and to avoid situations where there is a likelihood of loss.

The variable that asked participants whether their decision processes were influenced by their emotions showed a significant relationship with health risk preferences. People who preferred to take risks reported that they were influenced more frequently by their emotions when making decisions about risks than people who preferred to avoid risks. This was the only set of results that showed a significant association between the emotion variable and risk preferences. The data do not assess whether the emotions were positive or negative, and inferences cannot be drawn concerning the precise nature of the relationship between risk taking and emotions, although the existence of the relationship has been confirmed in a number of studies, several of which were reviewed in Chapter 3. The results could indicate either that people experiencing positive emotions are willing to take risks with their health because of feelings of confidence, or that people with negative affect take health risks such as drinking or smoking to try to alleviate their negative feelings, or to improve their mood. In addition, there could be an association between changeable emotions and inconsistent risk preferences, since the people who were inconsistent in their cross-domain risk preferences were in general more risk taking than those who were inconsistent.

A fourth decision variable that influenced risk preference is the item that assessed the affective component of the reference point. That is, the item that measured whether people felt generally positive or negative about each domain. This variable had a significant impact on risk preference, but only in model 4 of the finance domain. Feeling negative about the finance domain was associated with preferences for risk aversion. The direction of this relationship does not seem to be as Kahneman and Tversky predicted in prospect theory (1979). These authors suggested that being in a

situation of loss could be associated with risk taking in order to try to get into a situation of gain. The results of this research could be explained in terms of a third factor that influences the effects of loss on risk preference: negative emotion. The results of the correlation analyses discussed in Chapter 6 suggested that this reference point variable was associated strongly with other emotional factors. It might be that emotions are an important moderator of the relationship between loss, gain and risk taking. As mentioned in relation to the interviews that were carried with the traders in this research as part of the ESRC project, emotions were an important part of their decision processes. A number of traders reported that when they were in the domain of gain they continued to take risks, rather than becoming risk averse as prospect theory would predict. The result could be explained in terms of the traders' positive emotions and level of confidence. Traders who did not express high confidence levels did not report continued risk taking in the domain of gains. The reverse could account for risk aversion in the domain of losses. Negative emotions associated with losses might lead to the desire to protect the self from further losses rather than the possibility of further loss that might be associated with risk taking. At the individual level, the precise relationship between the point at which people become risk averse or risk seeking could relate to thresholds that determine how much loss an individual is willing to accept. The relationship between feeling negative and risk aversion could also be due to the subjective nature of the reference points. For example, even when people in the domain of loss, their situation could still be better than expected, and thus the individual might be risk averse rather than risk seeking. If this is the case, then an individual might still be acting in accordance with prospect theory.

Overall, the R squared statistics for all the analyses are relatively low, particularly when the predictor variables were biographical and personality factors only. These results suggest that personality does not have a significant impact on the preferences of people who are inconsistent across domains. It seems that personality had a small impact on the domain-specific risk preferences of the participants in these analyses, and that while domain-specific decision preference variables accounted for some of the variance in risk preferences, it seems likely that people who have variable, situation specific risk preferences are influenced by many factors that were not measured in this research. Other factors could include the social context of risk taking and the relationship between risk and return in each risk situation. In contrast, the decision preference

variables in the finance domain accounted for around one third of the variance in risk preferences in models 3 and 4. Personality had no significant association with finance risk preferences. These results suggest that perceived risk and consideration of payoffs and costs of decision alternatives are two key factors that influence finance risk preferences.

In sum, the results suggest that risk preferences measured in one domain might not be generalisable to other domains. As discussed in Chapters 2 and 3 it seems likely that the approach of several authors, who have considered risk propensity in terms of how much risk people are willing to take in business or financial decisions, could be too narrow. In order to measure risk propensity, it would seem more effective to assess risk preferences in several domains than preferences in one domain. If risk preference in only one domain is of particular interest then it should be noted that results might not apply to risk preferences in other domains.

7.6 Further examination of domain-specific decision making

The issue of domain-specific decision making was examined further to assess the influences on some particular aspects of work, health and finance related decision making.

This stage of the analysis considered the relationship between biographical variables, personality factors and a set of scales that were created from the variables that measured risk perceptions and preferences that were specific to each domain. The construction of the domain-specific items was discussed in Chapter 4. In sum, the work domain items assessed error risk taking and risk taking to achieve goals. The health domain items measured health protection and life balance. The finance domain items considered use of money and gambling. There were five items in each section. Principal components analysis was used to examine the factor structure of the ten items in each domain. The component matrix was rotated to maximise the variance between the factors. Cronbach's alpha was calculated for each of the factors. The data are shown in Appendix 7. The process resulted in the creation of five new scales by computing the mean of the relevant items. There was only one scale in the work domain since the

items measuring error risk taking did not form a reliable scale. Some of the items were reverse coded. The items that each scale was derived from are shown in Appendix 7. The inter-correlations between the scales are shown in Appendix 8. The scales were as follows:

1. The work goals scale. This scale assessed the degree to which people were willing to take risks in order to achieve goals at work. A low score indicates taking risk to achieve goals. A high score indicates not taking risk to achieve work goals.
2. The life balance scale. This scale measured whether people give work a priority in their life, or whether they prefer to balance work and nonwork. A low score indicates a work focus. A high score indicates a balance between work and nonwork.
3. The health protection scale. This scale measured whether people value their health and seek to protect their health. A low score suggests people are protective of their health. A high score suggests that people are not protective of their health.
4. The gambling scale. This score assessed whether people like to gamble and get enjoyment out of gambling or not. A low score is associated with a preference for gambling. A high score is associated with a preference for avoiding gambling.
5. The use of money scale. This scale measured preferences for whether money is spent or saved. A low score is associated with preferences for spending. A high score is associated with preferences for caution, and saving rather than spending money.

The new scales were used as dependent variables in regression analyses to examine whether they were associated significantly with biographical variables, personality factors and domain-specific decision preference variables, and whether the same factors predicted decision preferences in different domains. The pattern of relationships between the dependent variables and the predictor variables differs within and across domains. That is, each dependent variable had a different set of predictors. The results are shown two portions. Table 7.8 on the next page shows the results of regression analyses including demographic variables and personality factors. Table 7.9 shows, on the following page, the results of the regression analyses that included the decision preference variables in addition to the demographic variables and personality factors. No outliers were identified.

Table 7.8: Regressions of biographical and personality factors on domain-specific decision scales

	Work goals		Health protection		Life balance		Gambling		Use of money	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Age	.081	.044	-.034	-.058	-.031	.020	.028	.025	-.044	-.043
Sex	-.084	.084	-.150	-.031	-.118 †	-.136	-.015	.286 *	.066	.100
Education	.099	-.068	-.058	-.042	-.027	-.200 *	.075	-.064	.042	-.033
Tenure		.019		-.071		.094		-.223 †		-.046
Seniority		-.008		-.026		-.040		-.065		.032
Income		-.329 ***		-.097		.068		-.086		.108
Z score N	.046	.064	-.096	-.097	-.007	.088	-.127	-.040	-.092	-.094
Z score E	-.149 *	-.204 **	.060	.093	.037	.028	-.149 †	-.177	-.252 ***	-.233 **
Z score O	-.221 ***	-.355 ***	.029	.044	.195 **	.250 **	.065	.041	.021	.013
Z score A	.137 *	.027	-.166 *	-.202 **	.068	-.029	.098	.082	.098	.119
Z score C	.263 ***	.189 **	-.184 **	-.162 *	.106	-.001	.172 *	.155	.181 **	.118
	R = .452 Adj. R^2 = .183 df = 8, 308	R = .618 Adj. R^2 = .344 df = 11, 181	R = .301 Adj. R^2 = .067 df = 8, 308	R = .362 Adj. R^2 = .079 df = 11, 181	R = .291 Adj. R^2 = .061 df = 8, 308	R = .350 Adj. R^2 = .069 df = 11, 181	R = .317 Adj. R^2 = .061 df = 8, 182	R = .452 Adj. R^2 = .116 df = 11, 99	R = .321 Adj. R^2 = .080 df = 8, 308	R = .344 Adj. R^2 = .064 df = 11, 181

† $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 7.9: Regressions of biographical, decision preference and personality factors on domain-specific decision scales

	Work goals		Health protection		Life balance		Gambling		Use of money	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
Age	-.103 *	.036	-.103 †	.076	-.113 †	-.154 †	.014	.302 *	.054	.121
Sex	.048	.018	.011	.047	-.040	.017	.015	.085	.009	.028
Education	.044	-.040	-.039	-.072	-.081	-.210 *	.037	-.014	.067	.025
Tenure		-.024		-.050		.107		-.278 *		-.094
Seniority		-.014		.029		-.020		-.073		.015
Income		-.237 **		-.051		.065		-.065		.072
Z score N	.062	.052	-.017	.002	-.021	.059	-.167 †	-.088	-.081	-.087
Z score E	-.023	-.115	-.007	-.003	.049	.034	-.112	-.147	-.224 ***	-.192 *
Z score O	-.163 **	-.290 ***	.043	.041	.195 **	.261 **	.046	.006	-.019	-.030
Z score A	.119 *	.049	-.112 †	-.119 **	.041	-.021	.053	.068	.083	.110
Z score C	.194 ***	.168**	-.082	-.095	.089	.003	.153 †	.057	.058	.000
Feeling	-.046	-.025	.212 **	.237 **	-.137 †	-.103	-.188 *	-.061	.161 *	.188 *
Better or worse	-.021	.002	-.097	-.162 *	.291 ***	.189 *	.145 †	.097	.073	.018
Payoffs & costs	.027	.034	-.163 **	-.119 †	.006	-.012	-.010	.051	.225 ***	.285 ***
Emotions in dm	.044	.056	.031	.023	.014	.012	-.037	-.127	.000	-.020
Perceived risk	.215 ***	.152 ***	-.303***	-.392 ***	.016	-.022	.082	.168	-.012	-.017
Risk preference	.423 ***	.283***	-.217 ***	-.250 ***	.002	.028	.175 *	.157	.164 **	.157 †
	R = .668 Adj.R^2 = .421 df = 14,294	R = .687 Adj.R^2 = .419 df = 17,170	R = .549 Adj.R^2 = .268 df = 14,295	R = .653 Adj.R^2 = .369 df = 17,172	R = .372 Adj.R^2 = .098 df = 14,295	R = .398 Adj.R^2 = .075 df = 17,172	R = .422 Adj.R^2 = .112 df = 14, 175	R = .555 Adj.R^2 = .181 df = 17,93	R = .495 Adj.R^2 = .209 df = 14, 300	R = .530 Adj.R^2 = .212 df = 17,175

† $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

The set of results that had the greatest number of significant relationships between the predictor variables and the dependent variable was risk taking to achieve goals at work. Taking risks to achieve goals was associated with high scores in the extroversion and openness scales, and low scores in the agreeableness and conscientiousness scales. When income was added into the equation, high income was associated with risk taking and the agreeableness factor became non-significant. This result could be influenced by the traders in the sample who had high incomes, and reported having a risk taking orientation with respect to work goals.

The two health preference scales had different sets of predictors. Seeking a balance between work and nonwork was associated with older age and low openness. It could be that people in this sample who are younger were more focused on their career development. Lack of health protection was related to low scores in the agreeableness and conscientious factors. This suggests that people who are tough minded and laid back are more interested in enjoying life, and perhaps being focused on the present, than in showing concern for protecting themselves from health risks that could seem abstract and in the future. The conscientiousness factor was significant for both gambling and use of money preferences. Again, low scores in conscientiousness were associated with preferences for taking risk. In addition, being male was associated with gambling, and a high score in extroversion was associated with preferring to spend rather than save money.

The relationship between the dependent variables and the trait of conscientiousness was such that risk taking was associated with low levels of conscientiousness. It was noted earlier in the chapter that conscientiousness could be associated with preferences for risk seeking, and was found to predict a greater degree of cross-domain inconsistency. As proposed in section 7.4, a high level of conscientiousness could lead to discriminated, targeted risk taking which the individual has judged to be appropriate for the situation. This is in contrast to risk taking associated with a lack of such judgement, and low levels of conscientiousness. It could be that the scales discussed in this section have measured general aspects of work goal related risk taking and health-protection related risk taking, however, if specific areas of choice about taking or avoiding risks were explored, for example by using a semi-structured interview method, the

association between conscientiousness and targeted risk taking might be revealed more clearly.

Overall, the relationships between personality and risk preferences in each domain are in accordance with the descriptions of each personality factor in Five Factor model of personality. The data show that the amount of variance explained by the biographical variables and personality factors is from about 6% to 18%.

In sum, the data in Table 7.8 indicate two key findings. First, that personality is a significant component of decision preferences in each domain. In particular, a low score in the conscientiousness scale was associated with preferences for risk taking. Second, that the influences on preferences in different domains do show some variance. That is, the conceptualisation and construction of risk preferences within domains seems to be different from the conceptualisation and construction of consistency of risk preferences across domains. The results confirm further that, with the exception of a particular group of people for whom preferences are consistent across domains, risk preferences in one domain cannot be generalised to other domains. It is possible that, in order to assess risk propensity, either a domain-specific approach must be taken and it should be acknowledged that risk preferences might hold only for those domains or particular aspects of risk that were measured, or a method should be used that measures risk preferences in a number of different domains and calculates the degree of cross-domain consistency. Individual preferences both within-domains and across-domains can then be assessed to give a more complete picture of individual level risk preference.

The data in table 7.9 reveal a somewhat different pattern of relationships. The reference point item has significant associations with several dependent variables, as does the emotional aspect of the loss and gain domain. Health protection behaviour was associated with feeling negative about the health situation, while reporting that the situation was better than usual; conversely, health risk taking was associated with feeling positive and thinking that the situation was worse than usual. This result indicates an interesting relationship between emotions and relative reference points. As discussed in Chapter 3, the author's work with traders showed that positive emotions were associated with confidence and risk taking in the domain of losses. It was suggested that positive emotions were related to perceptions of opportunity being

associated with risk taking, rather than awareness of threats and losses. It is possible that the same explanation might be applied here. Feeling better or worse about the health situation was also associated with the balance between work and nonwork. General positive feelings were related to seeking a balance rather than focusing on work alone. This could be due to an increased emphasis on nonwork activities leading to improved mood.

The two finance scales showed some significant relationships with the predictor variables. Gambling was associated with youth, lower tenure, low neuroticism, low conscientiousness, feeling positive about the current finance situation, while reporting that finances were worse than usual. As with the health domain, it seems that the association between being in the domain of loss while experiencing some positive emotions could lead to a preference for gambling, and taking risk, rather than being concerned with risk and loss.

Approximately one fifth of the variance in the use of money scale was explained by the personality and decision preference variables. A preference for spending money rather than saving was associated with high scores in extroversion, feeling negative about the current financial situation, not thinking through the payoffs and costs of financial risk decisions and a preference for taking financial risks.

In sum, the analyses that considered the domain-specific scales showed that personality and decision preference variables were associated significantly with a number of aspects of decision making and risk taking. In some cases, a large proportion of the variance in the dependent variable was accounted for by the combination of the personality factors and decision variables. The direction of the relationships between the dependent and predictor variables was, overall, in line with previous research e.g. Kowert and Hermann (1997). In particular, the scales concerning risk taking to achieve goals at work, health protection behaviour and the use of money showed a number of significant associations with the predictor variables. It is possible that these scales measured aspects of risk taking better than the more complex concepts of the balance between work and nonwork and gambling, which could be associated more strongly with individual and contextual factors that were not measured. Reference points, emotions, risk perception and risk preferences were all shown to be significant factors, as

hypothesised in Chapter 3 following the review of the literature concerning the influences on risk preferences. The results suggest that the approach of Sitkin and Pablo (1992) and its focus on risk preferences and risk perception, combined with the emphasis of prospect theory (Kahneman & Tversky, 1979) on the domains of loss and gain, and the emotions associated with risk (e.g. Hockey and colleagues, 2000) together influence a number of aspects of risk-related decision making.

7.7 Chapter summary

This chapter has discussed the results of analyses developed to test the hypotheses. The results showed that people can be categorised into two groups on the basis of their consistency of risk preferences across domains, and that there are significant differences between the groups in several personality factors and decision preference variables. The people with consistent cross-domain risk preferences were significantly more risk averse than people who were inconsistent. The degree of cross-domain consistency was shown to be influenced by several personality characteristics and decision making preferences. Analyses were also carried out to examine risk preferences within each of the work, health and finance domains. It was concluded that there are important differences between domain-specific risk preferences and cross-domain risk preferences. Whether people prefer to take or avoid risks in one domain is not, in general, likely to be completely generalisable to risk preferences in other domains.

The results suggest that risk preferences are generalisable across domains only for people who have particular personality and decision making profiles that predispose them towards consistent risk preferences. It is possible that the decision making processes that lead to consistent risk preferences are different from the processes that are associated with particular risk preferences in each decision domain.

Overall, the results indicate that cross-domain risk preferences, i.e. risk propensity, and domain-specific risk preferences can be understood and researched using different models and techniques. In addition, the results suggest that consistent risk aversion could be more prevalent than consistent risk seeking. It seems possible that risk seeking is targeted and could be domain-specific for many people. In practical terms, the results

imply that there is considerable individual variance in risk preference. The implications for managers are that risk management strategies need to take into account individual level risk propensity, whether people are consistent or inconsistent in their approaches to risk, and the nature of different risk situations.

Chapter 8

Qualitative data analysis

8.1 Chapter abstract

This chapter presents and discusses qualitative data concerning risk perception, risk preferences and risk behaviour. The quantitative data discussed in the previous chapter showed that while some people are relatively consistent across domains in terms of risk taking or risk aversion, many people make domain-specific choices about which risks to bear and which to avoid. This chapter discusses qualitative data that help to give further insights into why people's choices vary across domains.

The data are gathered from open-ended items. This method does not allow for the examination of causal relationships between variables. Nor was it possible to relate the qualitative data systematically to the quantitative data. Nonetheless, the data illustrate well some of the factors that influence domain-specific risk-related choices. In particular, the data suggested that participants take risks for two key reasons. First, risks were considered in terms of the risk-return trade-off. People were willing to accept risks as part of a goal achievement process. Second, some people were more willing to bear risk than others because they believe, perhaps erroneously, that they can control the risks that they engage in.

8.2 Data gathering

Participants were invited to make comments in response to several open ended items in the questionnaire. The comments made provided both a perspective on risk that was complementary to the quantitative data, and interesting insights into the ways that people choose to seek or avoid risk in different areas of their lives.

There were five qualitative open-ended items in the questionnaire that asked participants to describe each of the following:

- Recent risk and work experiences
- Recent risk and health experiences
- Recent risk and finance experiences
- Risks taken at work
- Risks taken outside of work

For the first three areas, participants were asked to report both positive and negative outcomes of the risk event. All the items in the questionnaire were intended to be sufficiently open-ended to evoke a range of responses.

Due to the restrictions upon the firefighter and trader data gathering discussed in the method section the last two items, those concerning risks taken at work and outside of work, were excluded from the questionnaire. In the questionnaire for the fire fighter sample group, participants were asked what they thought the risks involved in being a fire fighter were. There were no substitute items in the questionnaire for the trader sample group because these participants had also undergone an interview as part of the wider research project.

The frequencies for comments in each category are shown in Table 8.1 on the next page.

Table 8.1 Number of qualitative data points

	Number of people with risk experience	Number of people who commented
Recent risk and work experiences	113	113
Recent risk and health experiences	74	70
Recent risk and finance experiences	67	58
Risks taken at work	N/A	140
Risks taken outside of work	N/A	122

8.3 The qualitative method of data analysis

The aims of this component of the data analysis were to examine the meaning of risk and the ways that participants structured their risk-related perceptions and choices. It seemed possible that the qualitative data could provide interesting information concerning motivations for risk taking, and why risk taking might be domain-specific rather than consistent across domains. The qualitative quotations are considered separately from quantitative data.

The paradigm is loosely contructivist. The framework used is that based upon the work of Guba and Lincoln (1994). These authors proposed that the paradigm is concerned with local and specific constructed realities and findings interpreted using a hermeneutic method. That is, the approach is phenomenological and is concerned with the ways that participants' comments reflect their understanding of risk rather than objective assessments of what constitutes risk. The results were interpreted through a consideration of language in the traditional sense of hermeneutics, but not via a dialectical process as the authors suggested, given that the data in this analysis are written records and did not involve interview-based interactions between the participants and the researcher. The third element of the Guba and Lincoln framework

concerns subjectivist data, that is, the authors suggested that the researcher and the object of research could interact to create results. It is possible that this is an issue relevant to the data considered in this section. Some participants might not have actively or consciously considered the nature of the risks they face prior to being asked the question for the purposes of this research. Overall, the interpretation of data is focused on individual differences and the nature of domain-specific risks and returns, the properties of which are likely to be significant influences on risk-related decision making.

The method described above was adopted because the data are derived from questionnaire comments and while these comments provide much data of interest, there are several reasons why more systematic qualitative analysis is inappropriate. Many of the participants were under considerable time pressure, notably the traders and fire fighters who completed the questionnaire as part of a series of other measures. It is likely that the other participants also had numerous other demands on their time. Participants might have made longer comments had they been in an interview situation. The data do not reflect the full range of data potentially available and it is likely that they do not reflect the full range of possible responses. Hence, coding of data and quantitative analysis of codes did not seem to be appropriate. The data do, however, provide a valuable addition to the quantitative data, an illuminating picture of risk and an illustration of some of the issues analysed using the quantitative method. In particular, these data reveal decision choices that could be important factors in shaping domain-specific risk-related decision making and explaining why many people are not consistently risk seeking or risk averse across decision domains.

8.4 Qualitative data themes

Two key themes were revealed in the data. First were comments concerned with the nature of risk. Second were data related to the nature of risk taking and choices between which risks to take, or accept, and which risks to avoid.

The categorising of data into themes was considered to be an integral part of the analysis, enabling understanding of the data, rather than simply being the precursor of analysis (Huberman & Miles, 1983).

In general, the aim was to examine themes across the whole sample rather than categorising data according to sample group derivation. However, in some instances, differences between sample groups were evident and, where relevant, these differences are noted. Frequencies of each type of comment were not analysed, but some references are made to approximate frequency of different types of comments.

Quotations are presented as they were written in the questionnaire. Small grammatical alterations have been made in some cases to clarify the quotation and to assist the reader, for example the addition of 'I' or 'and'.

8.5 The nature of risk

This section presents data that illustrate perceptions of what constitutes risk. The data showed that risk perception varied across the sample. The data were divided into two sections: risks associated with work and risks outside of work. The diverse nature of the ways that risk is perceived is evident.

8.5.1 Risks associated with work

Participants were asked to list risks that are involved in their work. Comments in this section reflect a range of opinions concerning what is considered to be a risk. Some participants considered physical risks to be the most important aspects of work-related risk.

For example, one participant noted that the most risky aspect of their job was:

> "Glacial fieldwork in the Alps."

The fire fighter participants were aware of the potential physical dangers of the job that they hoped to be accepted into. However the risks noted varied across participants in this group.

> "Smoke inhalation."

> "Heat, smoke, humidity, collapsing buildings."

> "Risk of fatal injury or disablement from burns or falls."

Many participants considered that the combination of physical and psychological risks were what made their work hazardous. Numerous participants mentioned stress as a major risk factor. It was noted that stress could be an equal, or a more significant risk factor than any physical risks that might be associated with their work.

> "Whilst working with the Army I have come "under fire", but I also have worked at a desk for 18 hours per day and with very short deadlines - stress related illness prevalent."

> "Military tasks – weapons, flying, hostile environments, Stress! Professional – assessing suicidal patients, aggressive patients and being accountable."

> "High risks mentally and emotionally, not physical. World wide movement for job is necessary; competition with elite intellectuals; must get funding in order to keep job."

> "Risk of being burnt, injury from falling debris in a fire, mental trauma from direct contact with victims."

> "Taking on substantial academic work in addition to the university work. General positive outcome – to enhance standing in the profession. Negative outcome – high stress level, disruptive of home life."

There were also a number of job-specific risks. These quotations reflected the multi-faceted nature of risk. Comments relating to job-specific risks focused largely on negative aspects of risk.

> "High risk in failing to detect serious illness in patients when overwhelmed with trivial illnesses and unrealistic demands and expectations of a selfish public."

"Risk of falling from political grace and losing my job with no compensation and no employment protection."

"Low volumes of ad hoc work (financial risk). Driving high mileage so injury/death risk."

"I am paid to take risk – shooting seismic data worth millions of dollars at our risk and then selling it to oil companies."

The negative impact for organisations as well as individuals was also noted.

"Taking risk whilst proceeding through this merger phase, knowing that if we made money there was no particular upside for us, however if we lost money the spotlight would be upon us. Risk is a 'free' resource and so a rational trader would take as much risk as possible in order to maximise his/her potential personal gain. For this organisation as a whole this can have a negative effect, i.e. many traders all taking large risk. Some 'gaming' goes on."

The complex nature of risk was also highlighted by several participants from the fire fighter sample group. These people seemed to be clearly aware that they might be involved in an objectively physically demanding and dangerous environment. Yet a number of people included both job characteristics and the role of other people in their list of work-related risks. The comments reflected a sophisticated understanding of risk and risk bearing.

"Risks include serious injury, falling from ladders or buildings, endangering lives of colleagues and/or members of the public due to recklessness, letting others down in situations where the consequences are very serious."

"Risks are no group interaction and not paying attention."

"Poor listening skills, poor team work, poor fitness level and poor communication skills."

In addition to specific risks discussed above, uncertainty was also a potential problem for some participants.

"Dealing with the unknown"

"I may be made redundant at any time, regardless of performance, due to lack of funding."

"The risks are that you do not know what is going to happen."

> "Unfortunately have been on an organised enquiry last 8 months and not on patrol, whereupon it would be inevitable that I would be expected to deal with the unpredictable and the unknown, as have done in the last 12 years."

In sum, the qualitative data reflected a range of perceptions concerning the nature of risk. The results also indicate that the sampling strategy was successful in capturing individuals representing a range of different orientations to risk, and the data illustrate well the multifarious nature of risk. The data also suggested that many people do not make the distinction between risk and uncertainty that is made by some theorists, for example Knight (1921, 1965). Rather, for many people, it seems likely that risk and uncertainty are essentially linked.

8.5.2 Risks outside work

Participants' lists of risks outside of work provided further insights into perceptions of risk. In addition, these data illustrated the range of risky activities that respondents participated in. It was evident that while some respondents were involved in numerous risky activities across several domains, other participants noted that they took no risks in any domains. A third group of participants noted that they took risks in one or two domains only.

An interesting finding was that when asked to list risks taken outside of work, many participants from the climbing sample seemed to be acutely aware not only of the risks of their sport and other sports they participate in, but also of the risks all around them in everyday life, such as driving cars. This could be an example of the positive relationship between perceived risk and risk preferences that was demonstrated in the quantitative data, and was contrary to the Sitkin and Pablo (1992) hypothesis that there is a negative relationship between perception and preference. That is, mountain climbers noted that they chose to take risks, and were aware of the risks that they were taking. As in the section relating to work-specific risks, both psychological and physical risks were mentioned. Some example lists of risks from the mountain climbing participants are shown below.

"Rock climbing, mountaineering, motor cycling, skiing (off piste), driving a car."

"Cycling into town; walking through rush hour traffic."

"Cycling to work at rush hour, motorcycling, snowboarding."

"Driving! Trekking in Himalayas for holidays."

"Taken risks. Negative outcomes. Got jeep stuck, lost a day. Ignored the map, lost a day and 210km of fuel in a remote area. Positive: Went back to make a second attempt on a mountain and got up it. Carried on during a route, dumped food and completed the route with no margin left."

In general, the risk lists showed a smaller number of risks for the other four sample groups. People who were not climbers were more likely to note that they did not take risks outside of work, however a number of people did note the risks to their health as their key nonwork risks.

"Driving too fast, drinking too much (not at the same time!)"

"Lack of sleep, abuse of parties (i.e. alcohol)"

"Moderate smoking, drinking etc. Self-inflicted health risks."

"Smoking (less than 20 per day, but I know this is still a risk)."

"Eating and drinking too much."

"Not drinking enough water"

However for some participants, physical risk taking and risk of other types were part of their nonwork activity. A diverse range of risks was noted.

"Rock climbing, winter mountain walking, extramarital relationships, bike riding in city traffic, eating red meat."

"Cycling in central London; eat too much chocolate; play chess (postal) at international level."

"I take personal risks e.g. creative writing, singing in public. None are physically risky but are psychologically risky."

"Every poker hand I play is risky."

"No, but it depends what you call risky. I drive a car which is obviously slightly risky, but I do not consider it as a risk each time I drive."

"Flying Aeroflot from Latvia to Moscow is probably the only real risk."

"Too intense work, too much pressure, fatigue, weakness, anxiety."

"Risk bike without helmet. Used to do surfing (big waves) and drugs."

"Cycling, running, boozing"

"Investment in volatile shares."

In sum, the data illustrate well the diverse nature of risk and the range of individual risk portfolios. Participants' comments reflected a general high level of awareness of the range of risks involved in everyday life. There were some differences in the risks noted according to the participants' job and the activities they are involved in, for example the mountain climbing sample noted clearly many risks relating to their sport. Interestingly, the climbers were very aware of the risks involved in their everyday environment as well as the mountain environment. However, in general, the main themes of diversity and the importance of both physical and psychological risks were common to participants across the entire sample.

8.6 Consistent approaches to risk

The quantitative data analysis discussed in the previous chapters showed that some participants were consistent in their risk-related decision making. The qualitative data did show similar consistency in some cases. Some participants noted that they do not take any risks in each of the open-ended questions. These data were likely to fit in with the quantitative data that showed that was a number of consistently risk averse participants. Others mentioned risks in responses to each item. However, the number of people who noted risk taking in each domain was considerably smaller than the number who wrote that they took no risks, reflecting the pattern of the quantitative data. For example one participant from the trading sample group wrote the following comments:

Work risk: "The title of my job risk 'risk arbitrage', so each minute of the day is risk taking."

Health risk: "Finding time to alleviate stress."

Financial risk: "Yes, my job."

A different example, from the climbing sample group, is shown below.

Work risk: "In June/July this summer I ran Alpine Mountaineering with a group of students – it had very positive outcomes in terms of group dynamics, success etc. I was involved in running a rock-climbing day for junior school class – again very positive outcomes for the children in terms of self-esteem. For me the success of seeing children achieve was a very positive outcome."

Health risk: "I ran an Alpine Mountaineering course which clearly involved possible risk to my health. All the outcomes were positive (similar to earlier statement)."

Financial risk: "One of our two cars had come to the end of its life and we had to outlay an amount of money that wasn't planned in order to buy a replacement. However, it has so far had a positive outcome in terms of less servicing of the car and greater driving comfort."

A third example is an academic who noted risks in all three areas.

Work risk: "I was given some consultancy work which interfered with existing work plans. I risk asking the head of school if I could not do it. Outcome – I had to do it."

Health risk: "Took up homeopathy for a neck problem. No positive outcome i.e. significant pain remains."

Financial risk: "Booked a holiday using an extended Visa allowance causing the need for more overdraft."

The above sets of comments reflect both a diverse range of risks within and across participants, and the notion of consistency. The people who made these comments were aware that they took risks, and chose to do so, in several areas of their life. Although the method of data collection did not enable matching of qualitative and quantitative data, the results of the qualitative data analysis do fit in with the results of the quantitative analysis. The data also gave some interesting insights into why risk choices might be inconsistent and domain-specific. These data are discussed below.

8.7 Domain-specific risk taking

An important issue throughout the research described in this thesis has been why some people take more risks than others. Quantitative analysis identified personality traits that are associated significantly with individual differences in risk seeking and risk aversion. Personality was found to be one key factor in explaining why there are individual differences in risk preferences. However, there are many other important factors that explain variance in risk taking, and could be associated with domain-specific choices about risk. The quotations in this section are from participants who were inconsistent in their cross-domain risk preferences.

Perception of risk is one factor that could influence domain-specific choices. As noted in the above section, perceptions of risk in this sample were shown to vary widely. The data presented in this section indicate that some people take risks because they perceive the level of risk to be acceptable. An issue described by a number of respondents in this research was the difference between what they term as risk taking and what they believe to be gambling. For some participants, the management of risk and some level of skill or ability differentiate risk from gambling. These data illustrate again the relationship between risk preferences and risk perception. Some participants indicated that they did not want to take risk, and that they did not perceive themselves to be risk takers because they considered themselves to be sufficiently knowledgeable and skilful to control the risk situation. There are several quotations to illustrate this point, several of which were from traders for whom risk management is a daily activity.

> "The nature of this business implies that risk have to be taken, along with the chance of being wrong. My focus is to be sure that we are aware of the risks involved (e.g. currency risk), to neutralise the risks we do not want and that the risk-return profiles are work it."

> "I do not gamble because:
> i) I used to gamble a lot when I started in this industry
> ii) My job is essentially a form of gambling, so gambling as a pastime holds little allure
> iii) My risk priorities have changed since I married and had children
> iv) Most gambling involves a negative risk-return profile i.e. casinos, horse racing. It is therefore imprudent. I prefer calculated risk."

> "I do not gamble because I have enough of weighing up risk/return at work. I may have sporting bets with friends only."

Traders were not the only participants to think they were in some way controlling the risks that they were taking. The perception that risks could be controlled through the application of learned skills and abilities featured in several quotations. A number of the fire fighting sample participants believed that, although there were numerous risks associated with their chosen profession, risks could be controlled.

> "We have a lot of training on the camp, for example a hot fire once a week, which improves our skills at fighting fires."
>
> "The risks shouldn't be that great because of the amount of training given."
>
> "The risks are fairly high, but they can be minimised through good training."

The importance of procedures was also mentioned as an element of risk control.

> "The risks of fire fighting are the same as any other job so long as the rules aren't broken."

However some participants had a different approach to risk management which reflected less concern with trying to control risks, or perceptions that risks cannot or need not be actively controlled.

> [The risks involved in fire fighting are] "Serious injury or death caused by negligence, or just being unlucky."
>
> "Unfortunately I gamble, and sometimes the losses can be almost as big as the wins."

Another example was the comment of one participant noted that they rode horses, "but not riskily!" It seems that this too could be an example of an unrealistic appraisal of risk. However skilful a rider the participant may be, there are many factors outside of their control.

The comments in this section represent an interesting aspect of risk taking, namely the issue of whether risk taking is controlled or whether it is more akin to gambling and subject to luck, or to the whims of others. The quotations could indicate that there are

two types of people who have different risk preferences and risk behaviour. It could be that some people want to, and try to, exert control over their choices and in doing so reduce risk. Others, perhaps those with a more risk seeking profile, will accept and bear greater levels of risk. An alternative explanation is to consider the range of beliefs concerning the controllability of risk. The data showed that some participants indicated that they believed they were reducing the risks involved in their activities, such as mountain climbing and fire fighting, through learning and skill development. It could be that some people succeed in reducing their risk exposure, for example by ensuring that climbing or fire fighting equipment are in good order and that their use is understood. It might also be the case that many people have erroneous beliefs about the degree of control that they can exert over risk.

Previous research has shown that a common source of cognitive bias is the illusion of control (Langer, 1975). This bias is the tendency to believe or act as if one can control events that are influenced by factors outside of the individual's control. Langer has demonstrated that the illusion of control is both pervasive and powerful. Research into the illusion of control has been carried out by the author of this thesis with colleagues. The research is described in Fenton-O'Creevy, Nicholson, Soane and Willman (1999). The traders in the ESRC study were administered a series of computer-based tasks. Participants were asked to control a moving index. Participants made a number of bets and predictions concerning how successful they would be and were asked how confident they were that they had controlled the moving index. The index was in fact random and participants had no control over its movements. Yet, the data showed that many participants believed that they had successfully moved the index. The illusion of control was found to be pervasive, despite traders' widespread beliefs in their ability to make rational decisions. Illusion of control was significantly and negatively associated with managers' ratings of performance in terms of ability to manage risk and individual contribution to desk profits. Other research has demonstrated that illusion of control and unrealistic beliefs of control lead to reduced risk perception and greater risk taking (Gollwittzer & Kinney, 1989). It seems possible that a number of the participants' comments illustrated above represented unrealistic control beliefs.

In sum, it is clear that perceptions of risk and involvement in risky activities vary widely. However, the reasons why some people take risks are not uniform. While for

many people risk might be a worthwhile burden in order to achieve goals, for others unrealistic beliefs about their ability to control risks could be a factor. Such beliefs have been shown to lead to reduced perceptions of risk and increased risk taking. The combination of variance concerning perceived risk associated with domain-specific choices and unrealistic control beliefs could be an important explanation of inconsistent risk behaviour and domain-specific choices.

8.8 The risk-return trade-off

In addition to the issue of control beliefs and risk taking discussed above, two further reasons why people might choose to take risks were discussed in Chapter 1. It was noted that some people might take risks because they are seeking sensations, such as the excitement associated with bungy jumping, while others take risks because they believe there is an associated between risk and rewards. The trade-off between risks and their associated returns is an important factor that can explain why some people take more risks than others, and why some people might take one type of risk but not other types. The qualitative data showed that many participants make deliberate and considered choices about the risks that they will engage in and are willing to bear in order to attain the returns, or meet goals. These data also illustrate the domain-specific nature of some people's risk taking. In many cases, the data concerning risk taking featured the notion of balance between risks of difference types. Descriptions of the relationship between risks and returns illustrated the ways that participants weigh up alternatives and choose which risks to take, and which to avoid.

A number of comments reflected the diverse nature of risks within each domain that need to be balanced. For example, career, financial, social and reputation risks were issues of concern to respondents. The following quotations illustrate some of the trade-offs participants have made.

Some participants considered risk and return within a relatively confined area of their life, for example work.

"One 'quite' large risk after my first week working in London with my new team... financially not so huge but 'needed' to be correct in front of my new team. Credibility risk!"

"Given up a permanent job to be employed on a fixed term contract. Positive outcomes so far – work closer to home. Job should open up wider career possibilities."

"Large back book position in a security. Trade still on, currently having a positive outcome on my career as the trade is very large giving me plenty of exposure to senior management."

A different approach to risk and return was reflected in comments that acknowledged the impact of individual risk choices on other people.

> "Risk assessment in mental health practice is far from being a science. Assessing the suicidal or homicidal may involve determining clinical/ demographic/ predisposing factors but the final judgement is heuristic, a gut feeling. Every time a patient 'at risk' leaves my office there is still that chance. This risk may lead me to overestimate the risk and err on the side of caution, or underestimate the risk and 'take the chance'."

> "Try to minimise the risk as others' health depends on my decisions. However been so exhausted recently that I've taken greater risks in giving telephone advice to try to manage workload effectively and (hopefully) appropriately. The difficulty of telephone advice is that you can never completely be sure that the information you've given is correct and so any judgement you make could be on a shaky promise."

> "I have to keep a balance of preparing classes that are demanding enough to achieve the expected learning of the students in a way that is attractive. The main risks are making it too demanding that they can't reach me or to make it too much fun that they don't concentrate and miss the points."

The potential benefits of helping other people through taking risk were a significant part of the trade-off for some participants. Particularly striking were comments made by the fire service recruits who noted the trade-off between negative consequences, including death for themselves, and the positive consequences for other people.

> "I am prepared to risk my life by applying skills that I have been taught to help people who cannot [help themselves] either by injury, fear or because they are simply unable."

> "All you know is that when you're putting out a fire you may have to save someone's life which may put your life in danger as well."

"A train had broken down on the Liverpool Street – Southend lined. I had to go across all the lines and mend the train while trains carried on moving past me at 75 mph +. The positive outcome was that the downtime of the train was reduced and people got to work quickly."

"I had to remove valuable property from a burning house with an unstable ceiling. Positive outcomes – although the homeowner lost the house, he was able to keep hold of valuable personal and sentimental possessions."

"I take risks everyday in my work, however I feel this is justified by my interest in the work, knowing I am doing something for somebody else, love of the job and financial reward."

The majority of participants were more concerned with individual-level costs and benefits. The work-nonwork issue and the balance between the costs and benefits associated with work were an important trade-offs for some participants.

"I decided to resign a permanent position so to seek a better paid temporary or permanent position. The negative aspect of this is no job security. Positive is better paid and more job satisfaction. So far the outcome has been fairly balanced. A long term positive outcome will depend on getting longer (than 2 week) work assignments."

"Worked long hours - 11-12 hours per day and 3-4 hours' travel. Live 62 miles from office. Leave home at 5.30am. Arrive office 7.00am. Leave office between 6-7pm. Arrive home 8-8.30pm. Positive outcome - gets things done at work. Negative outcome - insufficient time with wife of 28 years. Children have left home. Have needed a tooth filling for last year - still unfilled."

These comments concerning important issues such as job satisfaction could be one reason why the data gathered by the quantitative measure of work and nonwork discussed in Chapter 7, which did not assess job satisfaction, did not capture much of the variance on the scale.

For some people, career and financial gains were a worthwhile outcome of risky activities. These people could be examples of the targeted, focused conscientious risk taking that was discussed in Chapter 7.

"I went to Minsk, Belarus, pretending to be a representative of a soft drinks company, when actually I was a market research analyst, quite risky as it's a repressive regime. Then I went to Kalmykia, Russia, risking dodgy Russian planes, cars and buses and interviewing a local dictator, also encouraging people

to tell me what they don't like about him. Both trips had significant positive outcomes – money and career advancement. However, my article about Kalmykia had some very hostile reactions."

Stress was a major risk factor for many of the participants, and methods of dealing with stress could involve tradeoffs that might have both positive and negative consequences.

"I don't really view rock climbing as being too risky. Sometimes worry that I occasionally over use alcohol to relax from work/stress."

The trade-off that generated the largest volume of data within this theme, however, was that between mental health and either physical, financial or career wealth. Priorities differed among participants.

"Quitting my job and making a formal complaint about my boss
- loss of income
- loss of opportunities
- increased hostility

but, better mental health"

"Everyday working 12 hours +, not enough sleep, worrying over career progression Job pressures cause too much drinking and smoking plus stress related disorders - insomnia, psoriasis, feel trapped within job environment."

"I suffer occasionally from chronic fatigue and I had to decide whether or not to cancel a trip abroad. I felt quite tired already and knew that making the trip might cause a relapse. But, I did not want to disappoint others, so I went. I'm glad I did – I was indeed quite unwell when I returned, but no lasting damage – which was all that I could have reasonably hoped for."

"Last year I asked for 14 months unpaid leave so that I could travel (and go on a mountaineering expedition to Greenland). This risk paid off – I came back to a pay rise and promotion!"

"Quitting my job (and therefore a certain career path) to launch something from scratch with no relevant qualifications or previous experience. The effects of this decision will not be fully felt until next year, as I will have been living off savings plus freelance work. The short term effect has been positive – I love working from home, the change of routine and the challenge of completely new problems."

"Taking a picture of a convicted murderer at court. I was threatened but got the picture. Positive aspects were climbing onto a very narrow windowsill to get a better view – again, got the picture. Photos of a real killer! Very negative – threatening behaviour. Photos of public order/fight – I was kicked and assaulted and my camera was stolen, I lost the film."

Trade-offs between different risks and returns seemed to be particularly important to the participants who valued highly sport and its potential associated outcomes.

> "Went climbing in Wales. Have had a serious back injury which if I'd fallen or done 'too much' would have been aggravated. I didn't injure myself or worsen my back condition as I stayed within my limits. It was a very positive experience. Also, did a 10 mile sponsored walk and soft abseil. Both could have been risky to my back, but I took precautions of wearing my back brace and pacing myself. I therefore gained confidence."

"(1) Working through cold/flu attack. Risk - give up work vs. make myself ill. Outcome - 2 weeks illness and lots of dosh. (2) Continuing to do physical work when I have serious back trouble. Risk - make back worse vs. find a boring job. Outcome - enjoy work but fairly constant back pain and osteopathy bills to pay."

"I regularly rock climb - significant improvements in mental well being. Climbed to 21,500 ft in the Himalayas - much more relaxed and less stressed afterwards."

"Every time I climb I am taking a risk, but so far, the outcome has always been positive, as I am still alive. The rewards always outweigh the risks."

"Going climbing always improves my mental health although I risk physical injury."

> "Resigned from a stressful job, therefore was unemployed with financial commitments. Spent 3 months looking for a more suitable job and it paid off. I valued my health more than work."

> "Rock climbing, ice climbing, mountaineering, cycling to work – would be considered risky by others – but are essential to me and being happy."

The relationship between physical and mental health was viewed differently by one participant, who was prepared to let their mental health decline in order to improve their physical health and appearance.

"I have embarked on a slimming course in the last few months. This involves taking slimming tablets. I have lost 22lbs and intend to lose another 13lbs. I feel better physically but it seems to affect me mentally i.e. temporary depression, absent-minded etc. But overall, generally better."

A different aspect of the risk-return trade-off noted by respondents was the relationship between having money and consuming money. These comments came from both lower income participants and high earning financial traders.

> "I have taken a job with less hours and less pressure (i.e. university research), less job security and less money in order to preserve my physical and mental health."
>
> "Nine months ago I borrowed a lot of money to buy a car. The pleasure I received from the car outweighed the risk involved and was a positive outcome."
>
> "Wasting far too much money on exotic cars which I feel is positive for me. As long as my personal finances are in order I feel happy indulging in my vices - feeling good is positive for developing my career."
>
> "Purchased some land and am in the process of building my 'dream home' thus tying up all of my personal finances. The positive aspect is that I feel 'hungry' to earn more money. The negative side is that initially I felt more insecure."
>
> "I worked on roofs which is a risk but I had bills to pay and I needed the money."
>
> "Giving all my savings (£3000) to a friend desperately in need of it. No outcome except I have no money. Feel sometimes upset that it's gone (negative) and sometimes happy that it has been spent in a good cause (positive)."

In sum, the data presented in this section provided information concerning the ways that participants make risky choices and prioritise outcomes. For example, some respondents placed psychological well being above financial wealth and physical health. Although the qualitative data were limited by the method, that is the use of open-ended questionnaire items rather than interviews, they revealed important information about risk-related decision making. The differences between risks and their associated returns seem to be key influences on the decision making process. It is likely that these factors are significant in explaining the domain-specific nature of much risk taking, and in illustrating how people can be inconsistent in their risk preferences across domains yet make clear domain-specific choices.

8.9 Discussion of qualitative data

The qualitative data provide an interesting insight into the way that risk is perceived and the choices that people make regarding which risks to take and which to avoid. The data suggest that there is considerable variance across individuals in the ways that risk is conceptualised, understood and engaged with. An example of this point concerns the lists of work and nonwork risks that participants noted. Some participants reported that they like to avoid risks both at work and outside of work. They did not note day-to-day activities as risky. Other participants, notably the mountain climbers, took a different approach. These people often included everyday events such as driving in their list of risks. It seemed that people who actively and willingly engaged in risk activities had greater awareness of the ambient risk environment than people who did not consider themselves to be risk takers.

The quantitative data analysis discussed in the previous chapters showed that some people were consistently risk seeking or risk averse. A number of people reported consistent cross-domain approaches to risk. Comments from some respondents indicated that they took risks in each of the work, health and finance domains assessed. A number of other participants responded similarly, but with the reverse approach to risk. These people reported taking no risks in any of the three domains. The majority of the sample was, however, inconsistent. The qualitative data added to the picture of domain-specific risk preferences discussed in Chapter 7. That is, it seems likely that while many people are not consistent in their cross-domain preferences, they make choices about which domains they will take risks in.

The qualitative data also provided information concerning people's motivation for taking risks. In particular, the relationship between risk and return was discussed. The data showed that people make conscious choices about the risks they are willing to take, or bear, in order to achieve valued outcomes. The data illustrated well the way that tradeoffs are made within and across risk domains to enable the realisation of particular goals. A commonly cited example was changing jobs. It was acknowledged that a new job could bring financial loss, particularly in the case of people setting up their own business, social risk such as moving to a new city, and a disruption to career progression. However, respondents felt that these risks were worthwhile if the hoped-for

benefits materialised. In particular, comments focused on reduced stress and improvements in psychological well being. A similar pattern of decision making was observed in the comments of people who engaged in risky sports. These people reported participating in sports that could lead in injury and possibly death in order to gain psychological benefits such as excitement, exhilaration and the feeling of meeting a challenge. The data implied that a theory of risk could benefit from including an understanding of the positive aspects of risk rather than just the negative aspects, as discussed in Chapter 1, and the notion of tradeoffs between risk and return that motivate risk taking.

The combination of the nature of risk, subjective perceptions of risks, and individual difference factors, including personality, that influence risk preferences is likely to explain the frequency of domain-specific risk taking compared with the relatively low frequency of consistent cross-domain approaches to risk. The data are cross-sectional and cannot provide causal explanations, however some inferences can be drawn. For some people, it seems possible that their risk-related decision making focuses on domain-specific risk issues. It could be that risks, and their associated costs and benefits, are arranged hierarchically, although this proposition is not tested in this research. For example, psychological well being might be considered the most important aspect of life and activities that involve risks will be taken to achieve the ultimate goal state. Risk in itself might not be an element of the decision process involved in choosing whether to participate in such activities. Rather, risk is the part of the process necessary to attain the outcome. These people might have consistent approaches to risk-related decision making such that they will take risks in some domains where they desire the returns, but not others where the outcomes are not valued. Alternatively, it could be that people do not have a consistent approach to domain-specific risk. These people will take risk when they believe it to be worthwhile. Their motivations and goals could be susceptible to the influence of situational factors. Thus their risk behaviour could appear to be inconsistent.

In addition, the data reveal an influence on risk taking that is different from goal-directed behaviour. This influence is the illusion of control (Langer, 1975). The data showed that a number of respondents make what they believe to be a choice between risk taking and gambling. While they might be comfortable with taking risks, they do

not perceive themselves to be gamblers. These data raise an issue about the perceived controllability of risks and its subsequent influence on risk perception and risk taking. Risks thought to be uncontrollable can be perceived to be being greater than those that might be controlled (Slovic, Fischhoff & Lichtenstein, 1980). However, the illusion of control has been shown to lead to reduced perceptions of risk and increased risk taking. It could be that some people are successful in their attempts to control risk, and reduce the overall level of risk in their decision making and behaviour. However it might be that people believe that they have more control that they in fact do have. Thus an alternative motivation for risk taking behaviour is an unrealistic belief in the amount of control over the risk situation, and a belief that the risk being taken is not as great as objective data could indicate.

8.10 Chapter summary

The qualitative data support the findings of the quantitative analysis and provided some additional information about risk-related decision making and behaviour. It can be seen from the qualitative data that there are several factors influencing respondents' perceptions of what constitutes risk and their risk-related choices. Several of participants reported having relatively consistent approaches to risk across each of the three domains measured (work, health and finance). Both risk seeking and risk averse preferences were represented, as in the quantitative data results. However, many respondents reported taking risks in one or two decision domains but not in all three. The data indicated that domain-specific risk taking is often motivated by goal-directed behaviour. Participants noted that they were willing to take, or accept, some risks in order to achieve certain goals. It is possible that, for some people, the types of risk and goals they focus on is consistent in the sense that their risk taking is targeted towards the attainment of goals in particular domains, but their risk preferences might not be consistent across domains. Alternatively, other people might take risks in some domains but not others because of the influence of variable, situational factors. These people's risk taking is domain-specific and inconsistent.

In sum, the qualitative data provide a useful insight into the nature of domain-specific decisions about risk and the tradeoffs people make between risk and return.

Chapter 9

Summary, implications and conclusions

9.1 Chapter abstract

This chapter presents the implications of the research and the overall conclusions. Three implications are discussed. First, the implications for the understanding of the concept of risk propensity are reviewed. It is suggested that the cross-domain approach is a useful framework for understanding risk preferences and propensity to take or avoid risks. Second, the implications for the ways that risk preferences and behaviour are understood in terms of the factors that motivate risk taking are reviewed. Third, the inferences for the management of risk in organisations are discussed.

In the next section of this chapter, the results of this research were summarised to illustrate the main relationships between personality, decision preferences and risk propensity. The summary of the results and its derivation are discussed.

The final section discusses the limitations of the study. It is suggested that the conceptualisation of risk propensity, the factors within and across domains that are associated with risk propensity, the measurement of each of these variables, and the sampling strategy could all have had an impact upon the results of the study. Future research directions are proposed.

9.2 Summary of the research

The research presented in this thesis had three aims.

- To examine whether risk preferences are consistent across different decision domains.
- To assess the influence of biographical variables, personality factors, and cognitive and emotional decision preference variables on both the consistency of cross-domain risk preferences, and on domain-specific risk preferences.
- To consider the implications for the relationship between cross-domain and within-domain risk preferences.

The research aims shaped the development of the research in terms of both the conceptualisation and the measurement of risk propensity. The analyses presented and discussed in Chapter 7 showed that the aims of the research had been fulfilled. The results showed that people can be categorised as consistent or inconsistent across the domains of work, health and finance, and that there are significant differences between the groups in terms of personality characteristics and decision preferences. It was concluded that some people have consistent cross-domain risk preferences that are based in personality and characteristic decision preferences. The data showed that participants with consistent cross-domain risk preferences were risk averse when compared with the people who had inconsistent preferences across domains. It was suggested that consistent risk seeking is observed relatively infrequently. It seems possible that many people will choose to take, or accept, risks in the domains that offer the returns that the individual values rather than indiscriminately taking risks in all domains.

The following section of this chapter discusses the implications of the research. A summary of the key factors that are associated with risk propensity is then presented.

9.3 Implications of the research

The findings of the research have implications for the conceptualisation and measurement of risk preferences. First, the results suggest that the operationalisation of risk propensity could have an impact on the understanding of the concept. If risk preferences are to be measured in line with the Sitkin and Pablo definition of risk propensity, as a general tendency to take or avoid risks, then it seems that the degree of consistency of preferences across domains is the critical factor to measure rather than risk preferences in only one or two domains. There has been little empirical work published that has considered individual-level consistency of risk preferences in more than one decision domain. One exception is the work of Weber and Milliman (1997), which was discussed in Chapter 2. The research presented in this thesis fits in with the conclusion of Weber and Milliman that there is likely to be a personality-based construct of risk preference which is consistent across situations and decision domains, although the construct might not apply equally well to all individuals. Second, the results suggest that risk preferences in one domain could have some shared causes and some different causes from risk preferences in other domains. Risk preferences measured in one domain are not likely to give an accurate picture of risk preferences in all situations, unless the individual being measured has a personality-based approach to risk decisions, i.e. a consistent propensity towards risk. The majority of people, however, are inconsistent in their domain-specific risk preferences. These people will take risks in situations where they consider it worthwhile to accept a risk in order to attain a goal. Research that has operationalised risk propensity in terms of responses to decisions of one type only, such as hypothetical gambles, is likely to have captured some people with consistent risk preferences in their sample, however the risk preferences of many participants will not be generalisable to other domains. A summary representation of the main influences on risk preferences is discussed in the next section.

The research has implications concerning the understanding of risk behaviour. In Chapter 1, two factors that can motivate risk taking were mentioned. The first motivation was the personality characteristic of sensation seeking, a facet of extroversion, that has been shown in numerous works by Zuckerman to be a significant predictor of risk taking in a number of decision domains. It seems that, for people with

strong needs for sensation, a choice might be made to take a risk because of the positive feelings and emotions, such as excitement, that risk taking entails. A second motivation for risk taking, also discussed in Chapter 1, was the relationship between risk and return. An important factor in decision making concerning whether to take, or accept, a risk, can be the expectations concerning the outcomes of risky behaviour. Frequently, people might take a chance because they believe or hope that a positive outcome will ensue. The data discussed in this study suggested that both of these motivations are likely to be important factors in understanding risk preferences and risk behaviour. Although sensation seeking was not measured directly, extroversion was found to be a significant predictor of domain-specific preferences for taking risks. The qualitative data reviewed in Chapter 8 demonstrated that people made choices about the risks that they would take in order to yield the returns they desired. For example, a number of the participants from the mountain climbing sample wrote about how they were aware of the dangers of climbing, yet the psychological benefits of their achievements were the reward for their risk. These data gave an interesting insight into the domain-specific nature of risk taking.

A third motivation for risk taking was revealed by the analyses discussed in Chapter 7. This motivation is concerned with particular ways of approaching decision making. It was shown that whether people consistently think through the payoffs and costs of decision alternatives when making choices about risk was a significant factor associated with the degree of consistency of cross-domain risk preferences. The data showed that people who showed greater variability across domains tended to have greater variability in their approaches to thinking through the payoffs and costs of decisions than the consistent group. It could be that differing degrees of attention to situational information, and other types of situational influence, lead to greater inconsistency of risk preferences across domains. In addition, since the inconsistent participants were more risk taking than the people who had consistent cross-domain preferences and reported less attention to the payoffs and costs of choice alternatives, it might also be that the use of inconsistent, and at times heuristic, approaches to decision making could imply that there is a third factor that motivates risk taking which uses a different mechanism from either sensation seeking or the calculation of risk and return. It seems that some risk taking could be the result of using heuristics. That is, people could take risks because they are in effect blinkered by a lack of sensitivity to the differing

characteristics of risk situations, and they might not be aware of the risks they are taking. The relationship between cognitive biases, which are inappropriately applied heuristics (Bazerman, 1994), and risk taking was discussed in Chapter 8 in relation to the data that suggested illusion of control could be a factor influencing decision making. The research of Gollwittzer and Kinney (1989) demonstrated that people who believe they are more in control of events than objective data would suggest were more likely to take risks than people who had a more realistic appraisal of risk. This relationship between the use of heuristics and risk taking could have important implications for the understanding of risk propensity and for the management of risk taking. It could be that people who use heuristics might sometimes take risks that they are not aware of engaging in because they have not considered the pertinent situational information.

The consistency of risk preferences and the degree of consideration of payoffs and costs of choice alternatives raises an interesting issue about the understanding of risk preferences and risk behaviour with respect to the expected utility theory approach discussed in Chapter 1. In one respect, the data supported the proposition of the theory that there is a general tendency towards risk aversion. The data do not suggest that people are entirely rational in their decisions about risk. It does not seem likely that people are seeking to maximise the utility of each risk decision if they take heuristic approaches to their choices, particularly if decisions are influenced by cognitive biases. The issue of cross-domain consistency also raises the question of whether it is rational to take the same approach to risk decisions in each situation. It could be that sensitivity to the differing demands of situations is more rational than taking the same type of decisions all the time. However, it would seem to be more rational to be continuously risk averse, as the data indicate might be the case, than to be continuously risk seeking. For example, it would be more sensible to drive at 30mph on all roads than at 70mph. In sum, the data illustrated the subjective and individual nature of risk preferences and risk-related decision making.

In addition to the conceptual implications of the research, there are three implications for managers in risk sensitive and safety critical industries. First, the relationship between personality and risk preference suggests that there are stable individual differences for some people that influence whether those people have consistent tendencies to take or avoid risks. The application of appropriate placement tools could

be an important element in the risk management process to ensure an optimal fit between the risk profile of an individual and the risk profile of their job. Second, there is an issue concerning the communication of risks within organisations. Weber and Milliman (1997) noted that if behaviour is associated with perceptions then cognitive processes need to be targeted by risk management programmes. Conversely, if preferences are associated with behaviour, then emotions should be targeted. This research suggests that perceptions, preferences, cognitions and emotions are all important components of risk-related decision making. A successful risk management programme could aim to appeal to each of these factors, as well as providing support or appropriate incentives and control for people with strong dispositional risk orientations.

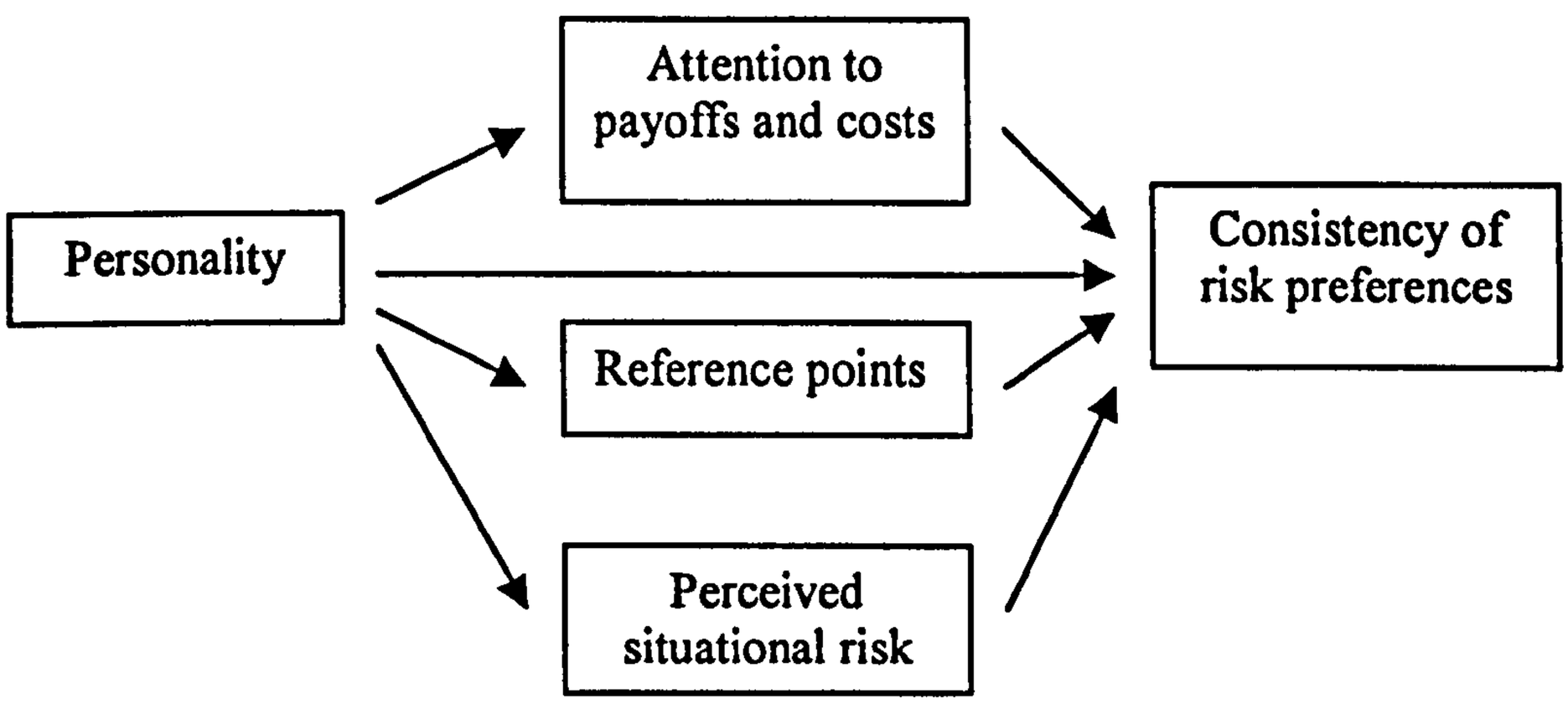
Third, the finding that risk preferences differ across domains implies that risk management strategies are not likely to be effective if they are static and rigid. A flexible approach to risk management that takes into account both the differences between individuals and the differences between risks in different domains could have a greater chance of managing risk effectively than an approach that assumes little variance across individuals or situations. In addition, insight into whether people have domain-specific but consistent risk preferences or domain-specific, inconsistent risk preferences could provide managers with valuable information concerning individual-level potential for risk seeking and risk aversion. Interviews with the traders in the sample carried out as part of the wider data collection process illustrated that need for a greater understanding of individual-level tendencies to take or avoid risk. For example, one trader reported being risk averse. He was aware that he did not like to take risk and that he needed encouragement and support from his manager in order to be comfortable taking the types of risk necessary to generate financial returns. A second example is a trader who reported taking too much risk when he was in a situation where he felt confident and had experienced gains. He was aware that this was a habitual approach to risk that was sub-optimal for both his own profit and loss account, and for the organisation. This trader was a senior manager who had considerable autonomy and had the responsibility for training new traders. The inexperienced traders on this desk reported wanting to trade in the same style as their manager. Shortly after the research project was completed, this trader was fired for losing a huge amount of money. A risk management strategy that recognised his tendency to take sometimes inappropriate

volumes of risk and enabled peers to discuss his trading strategy could have proved useful.

9.4 A summary of the relationships between personality, decision variables and risk preferences

The results of this research led to the development of a summary representation of the factors that are associated with risk propensity, shown in figure 9.1, below.

Figure 9.1: A representation of factors associated with risk preferences



The summary of the data shown above is derived from the results of this research. The representation was developed from the data which suggested that the concept of risk propensity encompasses a range of risk preferences that vary from consistent across situations to domain-specific risk preferences that can be inconsistent and situationally variable. Although the stability of individual level cross-domain consistency and inconsistency was not measured, it is possible that, for some people, risk preferences are also consistent over time. People who have the profile that is associated with consistent preferences, for example low neuroticism and low openness, and who experience significant life events that lead to changes in a few key aspects of personality or significant risk-related events that lead to the development of enduring changes in risk-related decision processes, could be relatively consistent in their risk preferences across

situations, yet not have stable risk preferences over time. It is also likely that, for many people, risk seeking declines with age. It could be possible that a person might have a consistent propensity towards risk, but the direction of preferences could change from risk seeking to risk aversion over a lifetime. Where risk preferences are not consistent across domains, it is possible that people could have domain-specific risk preferences that are relatively consistent. For example, a mountain climber might prefer consistently to take risks associated with climbing mountains and to avoid risks associated with their personal finances. For other people, however, risk preferences could be inconsistent both across domains and across time.

It is proposed that there are four variables that influence risk propensity, as conceptualised in terms of the degree of consistency of risk preferences. The first variable is personality. The data showed that people who had low scores in the traits of neuroticism, extroversion, openness and a high score in agreeableness were associated with consistent approaches to risk. It was suggested in the discussion of these results that this pattern of traits could lead to emotional stability, low levels of sensitivity to the changing demands and characteristics of risk situations, and hence a relatively consistent set of risk preferences that can be considered to be an individual propensity towards risk. It needs to be acknowledged that the sample did not include many participants who were consistently risk seeking. The majority of people with consistent risk preferences were risk averse. It could be that the shape of the personality profile of the consistent risk seeker is different. However, it is suggested that the principle of a trait-based set of influences on risk propensity applies whether an individual has a propensity to seek risk or to avoid risk.

In this summary representation, personality is proposed to influence risk preferences in three ways. First, evidence from the regression analyses indicated that both personality traits and decision preferences predict risk preferences. It could be that there is a direct relationship between personality and risk preferences. That is, personality traits shape whether people prefer to take or avoid risks by providing a foundation for basic characteristics that enable people to enjoy or tolerate risk and uncertainty, or the reverse, for example through the presence or absence of trait anxiety and sensation seeking. The work of Nicholson, Fenton-O'Creevy, Soane and Willman (2000) showed that the profile of a risk seeker was high scores in extroversion and openness combined

with low scores in neuroticism, agreeableness and conscientiousness. Where situations allow the enactment of personality-based preferences, it is possible that people will act in accordance with their preferences. The idea that a particular set of personality characteristics influences the consistency of risk preferences is similar to the work of Baumeister and Tice (1988) into metatraits. The authors describe a metatrait as "the trait of having versus not having a trait. It refers to whether a given trait dimension or construct can be used to describe a particular personality...Untraited individuals may be susceptible to fluctuating states and situational manipulation" (p 571).

The conceptualisation is based upon the work of Allport (1937) and Bem and Allen (1974) who suggested that traits do not all describe people equally well. Baumeister and Tice suggested that people can be described as traited or untraited. For example, if a person is assessed using a personality questionnaire and their results show strong directional preferences for each trait, they can be described as having metatraits. Alternatively, if a person shows no strong tendencies for any trait they can be described as untraited. The former person can be hypothesised to behave strongly in accordance with their personality traits. The latter can be expected to show cross-situational variance. The corollary is that traited individuals are more likely to have consistent risk preferences and untraited individuals are more likely to have inconsistent risk-related decision processes.

There has been little subsequent development of the work of Baumeister and Tice. The theory has not been applied to the research described in this thesis in its entirety. However, the theory of metatraits is one potentially useful way to approach issues concerning personality structure. The work of Baumeister and Tice was not developed in association with a particular model of personality, however the theory can be applied to highlight differences between people who are have strong sets of personality traits and people who do, for example by considering inter-item variance. The differences between people with respect to personality traits could be associated with consistent, trait-based approaches to risk or inconsistent, situation-based risk preferences.

There are two other ways that personality could influence risk preferences, as represented in figure 9.1. Personality could influence risk preferences by leading individuals to self-select into environments and jobs that suit their risk dispositions.

Hence, a person who does not like risk might choose a job with little uncertainty in a structured, hierarchical organisation. In addition, it is possible that personality influences risk preferences via the decision making process. The three decision preferences variables in the study that were shown to be associated with risk propensity were attention to payoffs and costs, reference points and perceived risk. The relationships between personality, decision preferences and risk taking are discussed below.

The data in this research showed that people with consistent risk preferences tended to think through the payoffs and costs associated with decision choices. These people were risk averse when compared with the participants with inconsistent cross-domain preferences. It could be that consistently risk averse people have a cautious approach to risk and wish to consider information carefully before making choices, even though their choices tend to be the same in different situations. This proposition is similar to the work of Zuckerman (1979a) who found that people who were low in sensation seeking and risk averse were more likely to consider risk information than people with high sensation seeking tendencies. The process of thinking through information led them to support their preferences for avoiding risk. People who were inconsistent in their cross-domain choices tended to be less consistent in their approach to situational information and, overall, to be less likely to think through the payoffs and costs of decision alternatives. It was proposed that in addition to having some trait-based dispositions towards risk, these people might also have heuristics that are associated with their preferences towards risk. These heuristics could take several forms. For example, the people with inconsistent preferences preferred to take risks significantly more than the consistent group. These people could have a different set of underlying dispositions, e.g. sensation seeking, that influence characteristic approaches to risk taking, but which only engage with some risk situations, e.g. sports, not work. It might also be that heuristics take the form of cognitive biases such as illusion of control (Langer, 1975). That is, people believe they are more in control of a situation than objective information would suggest, and take more risk than might be appropriate while perhaps not being aware that they are doing so. Another potentially relevant form of cognitive bias is optimistic bias (Weinstein, 1980), that is the tendency to believe that positive events are more likely to be encountered than average. Zuckerman (1979a) suggested that sensation

seeking people pay selective attention to information that relates to their optimistic, opportunity focused ideas about risk.

The data from this study showed that cognitive and emotional aspects of the reference point between loss and gain are related to inconsistent risk preferences. It seems that whether people believe themselves to be in a situation of loss or gain, and the associated negative or positive affect, influences whether they will prefer to take a risk or avoid a risk. It is suggested that if people have consistent perceptions and emotions associated with whether they are in situations of loss or gain, their risk preferences are more likely to be consistent than people with varying reference points. It could be that personality shapes relatively consistent perceptions of loss and gain. For example, the Costa and McCrae (1991) NEO PI-R measure of personality assesses optimism and pessimism, which could affect reference point-related perceptions. The precise relationship between the domains of loss, gain and whether people take or avoid risks is complex, and not represented in this model. However, it is proposed that inconsistent reference points are associated with inconsistent risk preferences. Reference points could influence preferences in the ways that prospect theory (Kahneman & Tversky, 1979) proposed. That is, loss can lead to risk seeking and gain can lead to risk aversion. Qualitative data from this research, and the research of other authors, indicated that a factor that could moderate the relationship between loss, gain and preferences is emotion. It could be that when people are in the domain of gain and are experiencing positive affect they take risks perhaps because they are more confident, or because they feel that they have some slack that can absorb some degree of loss. Mittal and Ross (1998) also found that positive affect could increase risk taking. The nature of these relationships could be a subject of future research.

The third factor that is proposed to influence risk preferences is perceived risk. The results of the analyses showed that consistent risk preferences were associated with consistent risk perceptions. The results of the data analysis showed that people who preferred to take risk perceived there to be risk in their environment. In contrast, people who preferred to avoid risk perceived there to be little risk in their environment. This is contrary to the prediction of Sitkin and Pablo (1992) that risk perception and risk preferences are related inversely, i.e. people who take risks do so because they perceive low levels of risk and vice versa. The positive relationship between risk perception and

risk preference observed in this research could be due to selection into environments that fit in with personality-based risk preferences. People with preferences for low levels of risk might choose to be in environments where they perceive the risks to be low, and the reverse could be true for people who prefer high levels of risk.

Further, the data showed that people who have inconsistent risk preferences were likely to have inconsistent risk perceptions. Variable risk perceptions could be associated with a number of variables. It might be that people without strong directional personality-based risk preferences are more influenced by situational factors than traits, and thus their perceptions vary according to the characteristics of each risk situation. It could be that risk perception might be dependent upon the cognitive and emotional appraisals of loss and gain, and upon the evaluation of the choice alternatives associated with each risk decision. Again, the precise nature of the relationships between the variables that influence risk perception and increase the inconsistency of perception could be an area for future research. It is clear, however, that there are several decision preference variables that are associated with consistent and inconsistent risk preferences, and that these factors are likely to moderate the relationship between personality and risk preferences. In addition, although not tested in this research, it is possible that the strength of the relationship between personality and decision making preferences varies according to the nature of the individual's personality profile. That is, people without the trait pattern that is associated with consistent risk propensity could have weaker associations between personality and decision making preferences.

9.5 Limitations and directions for future research

The conclusions and implications of this research must be considered within the context of the limitations of the study. There are three key issues that could have influenced the results: the conceptualisation of risk propensity, the measure and the sample.

9.5.1 The conceptualisation of risk propensity

In this research, risk propensity was conceptualised as the degree of consistency of cross-domain risk preferences. It was suggested that people with consistent preferences across different decision domains, whether their preferences were for taking risk or avoiding risk, have a general risk propensity. Conversely, people who have inconsistent preferences across domains have domain-specific risk preferences which might constitute consistent preferences within particular domains, but which are not consistent across domains. These people do not have a generalisable risk propensity. It has been suggested in the above section of this chapter that risk propensity, or lack thereof, is influenced by personality, attention to payoffs and costs of choice alternatives, cognitive and emotional aspects of loss and gain, and perceived risk. The conceptualisation of risk propensity used in this thesis was developed both from a review of the relevant theoretical and empirical works of other authors, and from the data gathered in this research.

The approach to risk propensity taken in this work raises two issues. First, it could be that this conceptualisation of risk propensity has focused on the issue of cross-domain consistency rather than the issue of the direction of risk propensity, that is, whether people prefer to take or avoid risks, or are consistently moderate. It could also be that the focus on risk preferences, although suggested by Sitkin and Pablo (1992) to be an expression of risk propensity, rather than reported or actual risk behaviour has captured preferences for risk that might not be enacted. The data indicated that risk preferences, and the degree of consistency of risk preferences, are associated with biographical and personality factors that are known to be valid constructs. However, it seems that the use of the constructs of risk preferences and their degree of consistency has been a useful way to capture risk propensity and individual-level variation therein. It could be that the relative number of consistent risk seeking, risk averse and inconsistent people is relatively representative of the population. Moreover, since the relationship between risk propensity and personality was demonstrated, it seems likely that people will act in accordance with their propensity is at least some situations. This issue is discussed further in the next section. Second, it could be that the pattern of relationships between the variables and risk propensity shown in figure 9.1 is different from that represented. For example, it could be that the level of perceived risk influences the direction and

degree of consistency of risk preferences, rather than the other way round, particularly for those people who do not have strong trait bases for their risk propensity. The representation of the research results in figure 9.1 does have a conceptual basis in the work of other authors, notably Sitkin and Pablo (1992), however the direction of relationships could be an issue for future research.

9.5.2 The measure

The development of the measure has been discussed in detail in the method chapter. The measure was developed using standard procedures for questionnaire design. Measures that have been used previously formed the bases for items as far as possible. An established short measure of personality was incorporated in the questionnaire to measure personality effectively.

A new measure was developed for use in this research for two reasons. First, although there are some measures that purport to measure risk propensity, the majority of measures have focused on risk preferences or reported risk taking in only one decision domain, as discussed in Chapter 2. The research that has considered risk preferences in more than one domain has tended to use different measures in different domains e.g. Weber and Milliman (1997). The aim of this research was to measure the same constructs across different domains to examine both cross-domain risk preferences and domain-specific risk preferences. The second reason for the development of a new measure was to enable the measurement of a particular set of constructs. The foundation for the measure was the work of Sitkin and Pablo. Operationalisation of their model of risk propensity in published works has varied with respect to the factors measured that have been suggested to predict risk propensity, as discussed in Chapter 5. This measure was developed to incorporate the key factors of risk preferences and risk perception that are in the Sitkin and Pablo (1992) model, emotional and cognitive aspects of reference points that relate to whether an individual is in the domain of loss or gain from the work of Kahneman and Tversky (1979) which is also cited by Sitkin and Pablo (1992), emotional and cognitive approaches to decision making, domain-specific aspects of decision making, as well as biographical variables and personality factors. The combination of these variables was an attempt to develop an effective way to fulfil the

aims of the research. The relationships between the new variables, biographical and personality factors indicated that the measure had some degree of validity. The data gathered using the measure did support the hypotheses derived from previous theoretical and empirical work.

Although there were reasons for the construction of the questionnaire that was used in this research, the development of a new measure can be problematic. First, the measure focuses on the concept of risk preference. The choice of risk preference as the key variable was driven by the work of Sitkin and Pablo. It is possible that, while risk preference is a valid concept that is subject to individual differences and associated with personality, the relationship between risk preference and risk behaviour is variable and at times weak. In some contexts it is likely that there are strong constraints upon individual behaviour. For example, many employees are expected to comply with stringent rules concerning acceptable and unacceptable behaviour. There might be little opportunity for the exercise of individual preferences within the context of managerial and organisational control systems. It could be argued that management systems can be strong enough to minimise any individual level variability in risk preferences. It is possible that in some departments of some organisations this might be true. However, there have been enough high profile risk management disasters, such as the collapse of Barings bank, to suggest that risk management systems fail and that for every headline disaster there could be many more similar smaller-scale situations known only to insiders. In addition, the results of analyses showed that there was significant variability in the risk preference variables, and that a significant predictor of risk preference was personality. As mentioned in the above section, the relationships between risk preference and personality suggest that there are also likely to be relationships between risk preference and risk behaviour in some situations.

A second issue is the relationship between the data gathered using the measure developed for this research and the data from other previously used measures of risk preference. As discussed above, the questionnaire was derived from several theoretical and empirical sources. A practical consideration when developing a survey instrument of this kind is that the questionnaire should not appear to participants to be too long. It was hoped that this aim was achieved. However, the addition of items that have been used in other authors' published work could have enabled additional analysis. It was

noted in Chapters 2 and 3 that many authors have not considered the consistency of individual-level risk preferences. Rather, there has been a tendency to consider sample data at the aggregate level to conclude that risk preferences are variable. It was suggested in the literature review that if individual level data had been analysed, it might have been possible to identify individuals with consistent risk preferences. Future research could use the key work, health and finance items developed for this research as well as items that have been used in published research, such as the well-cited Asian flu problem of Tversky and Kahneman (1986). This would enable the relationship between consistent and inconsistent risk preferences and framing effects to be examined and discussed in relation to published research.

Third, the variables that were measured in this research were limited to several key concepts derived largely from the work of Sitkin and Pablo (1992) and Kahneman and Tversky (1979). There was only one item to measure each of the key concepts in each domain. While the results showed that the measure was able to discriminate between people with different preferences, it is very likely that each construct comprises a number of sub-components. The development of scales to measure each key construct could be a way of achieving finer discrimination between individuals and more effective prediction of cross-domain and domain-specific risk preferences.

Fourth, the measure focused on the three decision domains of work, health and personal finances. These domains were chosen both to reflect three important areas in participants' lives and to capture variability in risk preferences. Future research could take a similar approach, taking into the account the issues noted above, and assess risk preferences in more domains, for example social risk taking.

9.5.3 The sample

The distribution of risk preferences within the sample was skewed. The sample did not include as many people who had consistent preferences to take risk as people who had consistent preferences for avoiding risk. This pattern of results fits in with other research (e.g. MacCrimmon & Wehrung, 1986; Nicholson, Fenton-O'Creevy, Soane & Willman, 2000). However, it is not clear whether the sample in this research is

representative of the population, and there are more people with consistently risk averse preferences than with risk seeking preferences, or whether the sampling strategy did not capture enough people with consistent preferences for risk taking. It could be that the personality and decision preference profile of people with consistent risk preferences developed in this research does not apply equally well to people with consistent preferences for taking risk rather than those who are consistently risk averse.

Future research could extend the sampling strategy to encompass participants from a wider range of industry and special interest groups. A larger number of participants from a more diverse population could better enable the assessment of the distribution of risk preferences than the current sample.

9.6 Summary of the research conclusions

The research that has been described in this thesis led to the development of the following eight concluding points.

- Both the degree of consistency of cross-domain risk preferences and the direction of domain-specific risk preferences are subject to individual level variation that is associated with personality traits and characteristic risk-related decision processes.
- People with low trait neuroticism, extroversion and openness, and high trait agreeableness are more likely to have consistent cross-domain risk preferences than people without this personality profile.
- Conscientiousness was associated with consistent cross-domain risk preferences, but is also likely to lead to targeted, focused risk taking in some situations, for example where the individual has chosen to accept a risk in order to attain a goal.
- Variation in risk preferences in the work, health and finance domains is associated with differences in the factors that influence risk preferences in each domain.
- Domain-specific risk preferences are not generalisable from one domain to another for people who do not have a consistent risk propensity.
- Individual level variation in both consistency of cross-domain risk preferences and domain-specific risk preferences suggests that risk management processes should

take account of both individual risk preferences and the variable nature of risk situations.

- A summary for representing the factors associated with consistent and inconsistent decision preferences was developed. It was proposed that the influences on risk propensity are personality, the consistency degree of attention to situational information, the consistency of position in relation to cognitive and emotional reference points, and the consistency of perceived risk in each situation.
- Future research could expand upon this work through the development of a more comprehensive questionnaire measure and wider sampling.

9.7 Chapter summary

Chapter 9 has reviewed the implications of the research. It was suggested that there are implications for the conceptualisation and measurement of risk propensity, and that the concept of the degree of consistency of cross-domain risk preferences is a useful way to approach risk propensity. It was noted that for many people, risk preferences are not consistent across domains. Rather, these people have domain-specific risk preferences that are not generalisable from one domain to another, although the domains in which they choose to take risks might be relatively consistent. Awareness of individual-level risk propensity could be a useful part of the risk management process.

A representation of the key the influences on risk propensity was presented. It was suggested that risk propensity is associated with personality, the consistency of the degree of attention to situational information, the consistency of cognitive and emotional aspects loss and gain, and the consistency of perceived risk.

Several limitations of the study were acknowledged. Limitations included the three domains that were measured and the relatively small number of items used to measure each of the constructs in the questionnaire. However, it was noted that the questionnaire has enabled the aims of the research to be met. The addition of more items and more domains could be an avenue for further research into the nature of risk propensity. The chapter ends with a summary of the research conclusions.

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Appendix 1

Scales from which domain specific variables were developed

Error risk taking items

These items were used to form the items in the work section of the questionnaire.

The error risk taking scale from Rybowiak, Garst, Frese and Batinic (1996, unpublished; 1999 published) comprises the following items.

1. If one wants to achieve at work, one has to risk making mistakes.
2. It is better to take the risk of making mistakes than to "sit on one's behind".
3. To get on with my work, I gladly put up with things that can go wrong.
4. I'd prefer to err than to do nothing at all.

Answers are in the form of a five-point Likert scale. Participants rated how applicable each statement was to them. The response range was from 'totally' to 'not at all'.

Health protection items

These items were used to form the items in the health section of the questionnaire.

The Moorman scale (1990) measures health motivation, that is, motivation to perform health behaviours. Items are answered on a Likert scale ranging from 1, none of the time to 7, all of the time.

1. I try to prevent health problems before I feel any symptoms.
2. I am concerned about health hazards and try to take action to prevent them.
3. I try to protect myself against health hazards I hear about.
4. I don't worry about health hazards until they become a problem for me or someone close to me.
5. There are so many things that can hurt you these days, I'm not going to worry about them.
6. I often worry about the health hazards I hear about, but don't do anything about them.
7. I don't take any action against health hazards I hear about until I know I have a problem.

8. I'd rather enjoy life than try to make sure I'm not exposing myself to a health hazard.

Lifebalance items

These items were used to form items in the health section of the questionnaire.

The Moorman and Matulich (1993) Lifebalance scale comprises three items. Items are answered on a Likert scale ranging from 1, none of the time to 7, all of the time.

1. Get enough rest and sleep.
2. Reduce stress and anxiety.
3. Maintain a balance between "work" and "play".

Appendix 2a

Questionnaire information for participants

Risk Questionnaire

Aims of this research

- To understand why people take some risks but not other risks.
- To study perceptions of risks and how these perceptions affect behaviour.

About the questionnaire

- This questionnaire asks you about risks related to your job, your health and your personal finances. The questionnaire will take about 10-20 minutes to complete.
- In this questionnaire, "risk" means a choice where there are possible negative outcomes you prefer to avoid.
- There are no right or wrong answers and there are no trick questions.
- Most of the questions ask you to show your opinion by circling a number. For example, if you think there is a lot of risk in your job, you would answer as follows:

9. How much risk is involved in your job?	*Much risk*	(1)	2	3	4	5 *Little risk*

What happens to the answers?

- This questionnaire is completely confidential. Only the researchers will see your answers.
- No individuals will be identified in any reported results of this questionnaire and no information will be passed on to anybody else in a way which would identify any individual participants.

Thank you very much for your help.

You can detach and keep this sheet. If you require further information, please contact:

Emma Soane
Research Officer,
London Business School,
Sussex Place,
London.
NW1 4SA
0171 262 5050

Appendix 2b

Biographical and demographic information items for the academic, chess player and mountain climber sample groups

General Information

This section asks for some basic information about you. The information will not be used for any other purpose or passed on to anyone not involved in this research project.

1. Are you (please circle): Male Female

2. How old are you? _____

3. Please circle the appropriate number showing your highest level of education.

GCSE/O-Level	6
A-level	5
Diploma/HND	4
Degree	3
Masters	2
PhD	1

4. What is your job title? _____

5.What is the business of the company you work for?_____

6. How long have you held this job, or this type of post, including with other companies if applicable?_____

7. How many levels are there between you and the most senior person in your branch? For example, if you report to a supervisor who reports to the senior manager, there are 2 levels.

_____

8. In your view, what are the risks involved in your job?_____

_____

_____

9. Are there any activities you participate in outside work that you think are risky? For example, rock climbing, smoking more than 20 cigarettes a day.

_____

_____

_____

10. What was your annual income over the last year, including any bonuses and overtime (in £ sterling)? Please circle one number.

Less than 20,000	5
20,000 - 29,999	4
30,000 - 39,999	3
40,000 - 49,000	2
More than 50,000	1

Appendix 2c

Biographical and demographic information items for the fire fighter sample group

General Information

1. Your candidate number :

2. Your age:

3. Are you (please circle): Male Female

4. Please circle the number which shows your highest level of education only.

GCSE/O-Level	6
A-level	5
Diploma/HND	4
Degree	3
Masters	2
PhD	1

5. In your view, what are the risks involved in working as a fire fighter?

Appendix 2d

Biographical and demographic information items for the trader sample group

General Information

1. Are you (please circle): Male Female

2.Your age_____

3. Please circle the appropriate number showing your highest level of education.

GCSE/O-Level	6
A-level	5
Diploma/HND	4
Degree	3
Masters	2
PhD	1

4. Job title_____

5. How long have you been working for your present employer?_____

6. How long have you held this job, or this type of post, including with other employers if applicable?_____

7. How many different employers/companies have you worked for in your career? (Please exclude casual jobs)_____

8. How many times in your career have you made a radical shift between job functions/areas? (Write "0" if you have worked in the same area throughout your career, or the appropriate number)_____

9. How likely are you to make a major career change in the next three years? Please circle one number

Very likely	5
Quite likely	4
Not sure	3
Quite unlikely	2
Very unlikely	1

10. How many levels are there between you and your CEO? (For example, if you report to the CEO, put 1,if your manager reports to the CEO put 2 etc.)_____

11. What is your annual income, including bonuses and overtime (in £ sterling)? Please circle one number

<20,000	6
20,000 - 49,999	5
50,000 - 99,999	4
100,000 - 299,000	3
300,000 - 499,000	2
>500,000	1

Appendix 2e

Risk questionnaire

Risk and Work

This section asks you questions about your work and work-related attitudes and behaviours. A risk is carrying out a decision which could result in a negative outcome.

1. Have you taken any risks in the last few weeks and months at work which had significant negative or positive outcomes? Please note the risks and their outcomes in the space below. Use the extra space at the end of this section if needed.

If you had no risks to note, please go to question 4.

2. Have the risks mentioned above changed the way you manage risk at work?	*Not at all*	1	2	3	4	5 *Yes, significantly*
3. Have these events made you more or less cautious in your behaviour at work?	*More cautious*	1	2	3	4	5 *Less cautious*
4. How do you feel about your job at the moment?	*Very negative*	1	2	3	4	5 *Very positive*
5. Compared with the last few months, is your current general work situation:	*Much worse*	1	2	3	4	5 *Much better*
6. When making important decisions about risks at work, how frequently do you think through all the payoffs and costs of each alternative?	*Very rarely*	1	2	3	4	5 *Very often*
7. When making important decisions about risks at work, how frequently are you influenced by your feelings, or emotions?	*Very rarely*	1	2	3	4	5 *Very often*
8. How much risk is involved in your job?	*Much risk*	1	2	3	4	5 *Little risk*

9. Do you prefer to take risks or avoid risks when making decisions at work?

Take risks 1 2 3 4 5 *Avoid risks*

10. This section asks you about your attitudes and behaviour concerning making mistakes at work.

a) To achieve at work, I have to risk making mistakes.

Strongly disagree 1 2 3 4 5 *Strongly agree*

b) When making an important decision, I would rather wait and see than risk making a mistake.

Strongly disagree 1 2 3 4 5 *Strongly agree*

c) I feel apprehensive that I might make a mistake at work.

Strongly disagree 1 2 3 4 5 *Strongly agree*

d) To get on with my work, I am happy to put up with things that can go wrong.

Strongly disagree 1 2 3 4 5 *Strongly agree*

e) I avoid the risk of making a mistake as often as possible.

Strongly disagree 1 2 3 4 5 *Strongly agree*

11. This section asks you about your attitudes and behaviours in relation to meeting your personal targets at work.

a) I do whatever it takes, including taking risks, to achieve targets.

Strongly disagree 1 2 3 4 5 *Strongly agree*

b) I prefer not to reach targets than to take risks.

Strongly disagree 1 2 3 4 5 *Strongly agree*

c) I feel apprehensive when I take risks to achieve work-related goals.

Strongly disagree 1 2 3 4 5 *Strongly agree*

d) Risk is part of the excitement and interest of my work.

Strongly disagree 1 2 3 4 5 *Strongly agree*

e) I meet almost all my goals at work without significant risk to me or the organisation I work for.

Strongly disagree 1 2 3 4 5 *Strongly agree*

Risk and Health

This section asks you questions about your health and health-related attitudes and behaviours. Here, a risk is a carrying out a decision which could have a negative outcome.

1. Have you taken any risks in the last few weeks and months with your health which had significant negative or positive outcomes? Please note the risks and their outcomes in the space below. Use the extra space at the end of this section if needed.

If you had no risks to note, please go to question 4.

2. Have the risks mentioned above changed the way you manage health risks?	*Not at all* 1	2	3	4	*Yes, significantly* 5
3. Have these events made you more or less cautious about your health?	*More cautious* 1	2	3	4	*Less cautious* 5
4. How do you feel about your health at the moment?	*Very negative* 1	2	3	4	*Very positive* 5
5. Compared with the last few months, is your current general state of health:	*Much worse* 1	2	3	4	*Much better* 5
6. When making important decisions about risks to your health, how frequently do you think through all the pros and cons of each alternative?	*Very rarely* 1	2	3	4	*Very often* 5
7. When making important decisions about risks to your health, how frequently are you influenced by your feelings, or emotions?	*Very rarely* 1	2	3	4	*Very often* 5
8. How much risk to your health does your lifestyle involve?	*Much risk* 1	2	3	4	*Little risk* 5
9. Do you prefer to take risks or avoid risks when making decisions about your health?	*Take risks* 1	2	3	4	*Avoid risks* 5

10. This section asks you about your health protection-related attitudes and behaviours.

a) To do what I want to in life, I have to expose myself to things which can be health hazards.

Strongly disagree 1 2 3 4 5 *Strongly agree*

b) My health is too important to me to put it at risk voluntarily.

Strongly disagree 1 2 3 4 5 *Strongly agree*

c) I am apprehensive about health hazards and take action to prevent them.

Strongly disagree 1 2 3 4 5 *Strongly agree*

d) I'd rather enjoy life than spend time trying to avoid health hazards.

Strongly disagree 1 2 3 4 5 *Strongly agree*

e) I try to prevent health problems before I feel any symptoms.

Strongly disagree 1 2 3 4 5 *Strongly agree*

11. This section asks you about the time you spend at work and leisure.

a) The best way to get my work done is for work to have top priority in my life.

Strongly disagree 1 2 3 4 5 *Strongly agree*

b) I feel spending a lot of time at work is losing out on a full life.

Strongly disagree 1 2 3 4 5 *Strongly agree*

c) I am apprehensive if I know I need to spend a lot of time doing things unrelated to work in the evenings or at weekends.

Strongly disagree 1 2 3 4 5 *Strongly agree*

d) I get satisfaction from working long hours.

Strongly disagree 1 2 3 4 5 *Strongly agree*

e) I rarely take work home in the evenings or at weekends.

Strongly disagree 1 2 3 4 5 *Strongly agree*

Risk and Personal Finances

This section asks you questions about your personal finances and your personal finance-related attitudes and behaviours. Here, risk means carrying out a financial decision which could have a negative outcome.

1. Have you taken any risks in the last few weeks and months with your personal finances which had significant negative or positive outcomes? Please note the risks and their outcomes in the space below. Use the extra space at the end of this section if needed.

If you had no risks to note, please go to question 4.

2. Have the risks mentioned above changed the way you manage your personal finances?	*Not at all* 1	2	3	4	*Yes,significantly* 5
3. Have these events made you more or less cautious about your financial management?	*More cautious* 1	2	3	4	*Less cautious* 5
4. How do you feel about your current financial situation?	*Very negative* 1	2	3	4	*Very positive* 5
5. Compared with the last few months, is your current general financial situation:	*Much worse* 1	2	3	4	*Much better* 5
6. When making important decisions about personal finance risks, how frequently do you think through all the payoffs and costs of each alternative?	*Very rarely* 1	2	3	4	*Very often* 5
7. When making important decisions about risks to your personal finances how frequently are you influenced by your feelings, or emotions?	*Very rarely* 1	2	3	4	*Very often* 5
8. How much risk is involved in your personal finances?	*Much risk* 1	2	3	4	*Little risk* 5

9. Do you prefer to take risks or avoid risks when making decisions about your personal finances?

Take risks 1 2 3 4 5 *Avoid risks*

10. This section asks you about your attitudes and behaviours with regard to use of your money.

a) I take opportunities to enjoy my money now, rather than in the future.

Strongly disagree 1 2 3 4 5 *Strongly agree*

b) I prefer to always leave a good proportion of my money in my account, or save it, than risk or spend much of my money.

Strongly disagree 1 2 3 4 5 *Strongly agree*

c) I feel apprehensive if I know I'm likely to overspend.

Strongly disagree 1 2 3 4 5 *Strongly agree*

d) I enjoy spending most of my disposable income.

Strongly disagree 1 2 3 4 5 *Strongly agree*

e) I systematically divide my income into spending and saving money.

Strongly disagree 1 2 3 4 5 *Strongly agree*

11) This section asks you about gambling-related attitudes and behaviours.
If you <u>never</u> gamble please tick the box [ ]
Then continue to the next set of questions.
If you do gamble with your own money, this question asks about gambling such as betting on racing, or making investments where there is uncertainty about the risk and reward ratio.

a) Gambling is an opportunity for me to have fun.

Strongly disagree 1 2 3 4 5 *Strongly agree*

b) Gambling is just a waste of money.

Strongly disagree 1 2 3 4 5 *Strongly agree*

c) I feel apprehensive when I gamble.

Strongly disagree 1 2 3 4 5 *Strongly agree*

d) I enjoy the excitement of gambling.

Strongly disagree 1 2 3 4 5 *Strongly agree*

e) Whenever possible, I avoid gambling with my money.

Strongly disagree 1 2 3 4 5 *Strongly agree*

I see myself as someone who....

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please circle a number next to each statement to indicate the extent to which you agree or disagree with that statement.

	Strongly disagree				*Strongly agree*
1. Is talkative.	1	2	3	4	5
2. Tends to find fault with others.	1	2	3	4	5
3. Does a thorough job.	1	2	3	4	5
4. Is depressed, blue.	1	2	3	4	5
5. Is original, comes up with new ideas.	1	2	3	4	5
6. Is reserved.	1	2	3	4	5
7. Is helpful and unselfish with others.	1	2	3	4	5
8. Can be somewhat careless.	1	2	3	4	5
9. Is relaxed, handles stress well.	1	2	3	4	5
10. Is curious about many different things.	1	2	3	4	5
11. Is full of energy.	1	2	3	4	5
12. Starts quarrels with others.	1	2	3	4	5
13. Is a reliable worker.	1	2	3	4	5
14. Can be tense.	1	2	3	4	5
15. Is ingenious, a deep thinker.	1	2	3	4	5
16. Generates a lot of enthusiasm.	1	2	3	4	5
17. Has a forgiving nature.	1	2	3	4	5
18. Tends to be disorganised.	1	2	3	4	5
19. Worries a lot.	1	2	3	4	5
20. Has an active imagination.	1	2	3	4	5
21. Tends to be quiet.	1	2	3	4	5

	Strongly disagree				*Strongly agree*
22. Is generally trusting.	1	2	3	4	5
23. Tends to be lazy.	1	2	3	4	5
24. Is emotionally stable, not easily upset.	1	2	3	4	5
25. Is inventive.	1	2	3	4	5
26. Has an assertive personality.	1	2	3	4	5
27. Can be cold and aloof.	1	2	3	4	5
28. Perseveres until the task is finished.	1	2	3	4	5
29. Can be moody.	1	2	3	4	5
30. Values artistic, aesthetic experiences.	1	2	3	4	5
31. Is sometimes shy, inhibited.	1	2	3	4	5
32. Is considerate and kind to almost everyone.	1	2	3	4	5
33. Does things efficiently.	1	2	3	4	5
34. Remains calm in tense situations.	1	2	3	4	5
35. Prefers work that is routine.	1	2	3	4	5
36. Is outgoing, sociable.	1	2	3	4	5
37. Is sometimes rude to others.	1	2	3	4	5
38. Makes plans and follows through with them.	1	2	3	4	5
39. Gets nervous easily.	1	2	3	4	5
40. Likes to reflect, play with ideas.	1	2	3	4	5
41. Has few artistic interests.	1	2	3	4	5
42. Likes to co-operate with others.	1	2	3	4	5
43. Is easily distracted.	1	2	3	4	5
44. Is sophisticated in art, music or literature.	1	2	3	4	5

Thank you very much for your help.

Appendix 3

Advertisements for the research

Mountain climbers advert

Risk taking research participants wanted

Would you like to take part in a study of risk taking? Emma Soane, from London Business School and the University of Sheffield, is looking into why some people take more risks than others. The study considers what factors in peoples' psychological make-up and experience go into risk seeking or risk avoidance. Your participation would be greatly appreciated.

Would you like to be involved? All you have to do is fill in a questionnaire which takes about 15 minutes. The questionnaire will be sent to you, along with a reply paid envelope for you to return it. Contact Emma Soane on 0171 262 5050 ext 3707, or email esoane@lbs.ac.uk leaving your name, address and mentioning 'mountain climbing research' in your message. Watch this space for the results.

Chess players advert

Why do you take some risks but not others?

I'm doing research into why some people take a lot of risks, some people avoid risks and some people are in between. I'm looking for chess players to take part to see whether you take risks in some areas of your life but not others.

What does it involve?

Completing a questionnaire that is anonymous and voluntary.

How do I take part?

Contact Emma Soane on 0171 262 5050 ext. 3707, or email esoane@lbs.ac.uk saying that you want to take part in the chess research

Appendix 4

Descriptive statistics

Table A4.1: Descriptive statistics for work cross-domain variables

	N	Mean	SD	Skew	Skew	Kurtosis	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Std. deviation	Statistic	Std. deviation
1. Have the risks mentioned above changed the way you manage risk at work?	114	2.667	1.348	.079	.226	-1.316	.449
2. Have these events made you more or less cautious in your behaviour at work?	141	2.716	.959	-.192	.204	-.288	.406
3. How do you feel about your job at the moment?	351	3.450	1.099	-.288	.130	-.611	.260
4. Compared with the last few months, is your current general work situation better or worse?	354	3.325	.946	-.003	.130	-.409	.259
5. When making important decisions about risks at work, how frequently do you think through all the payoffs and costs of each alternative?	356	3.753	1.161	-.790	.129	-.241	.258
6. When making important decisions about risks at work, how frequently are you influenced by your feelings, or emotions?	358	3.014	1.180	-.120	.129	-.967	.257
7. How much risk is involved in your job?	358	2.793	1.421	.204	.129	-1.245	.257
8. Do you prefer to take or avoid risks when making decisions at work?	357	3.064	1.185	.201	.129	-.933	.257

Table A4.2: Descriptive statistics for work domain-specific variables

	N	Mean	SD	Skew	Skew	Kurtosis	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Std. deviation	Statistic	Std. deviation
1. To achieve at work, I have to risk making mistakes.	358	3.123	1.371	-.138	.129	-1.248	.257
2. When making an important decision, I would rather wait and see than risk making a mistake.	358	2.807	1.137	.223	.129	-.768	.257
3. I feel apprehensive that I might make a mistake at work.	358	2.631	1.183	.195	.129	-1.012	.257
4. To get on with my work, I am happy to put up with things that can go wrong.	358	3.196	1.200	-.265	.129	-.939	.257
5. I avoid the risk of making a mistake as often as possible.	358	3.581	1.330	-.506	.129	-.985	.257
6. I do whatever it takes, including taking risks, to achieve targets.	358	3.050	1.134	-.203	.129	-.948	.257
7. I prefer not to reach targets than to take risks.	358	2.427	1.132	.408	.129	-.720	.257
8.I feel apprehensive when I take risks to achieve work-related goals.	358	3.034	1.110	-.314	.129	-.768	.257
9. Risk is part of the excitement and interest of my work.	356	2.986	1.381	-.091	.129	-1.229	.258
10. I meet almost all my goals at work without significant risk to me or the organisation.	354	3.441	1.256	-.473	.130	-.857	.259

Table A4.3: Descriptive statistics for health cross-domain variables

	N	Mean	SD	Skew	Skew	Kurtosis	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Std. deviation	Statistic	Std. deviation
1. Have the risks mentioned above changed the way you manage health risks?	75	2.293	1.292	.588	.277	-.947	.548
2. Have these events made you more or less cautious about your health?	79	2.646	.920	-.038	.271	.543	.535
3. How do you feel about your health at the moment?	356	3.907	1.088	-.740	.129	-.297	.258
4. Compared with the last few months, is your current general state of health better or worse?	358	3.486	.913	.286	.129	-.488	.257
5. When making important decisions about risks to your health, how frequently do you think through all the pros and cons of each alternative?	357	3.476	1.246	-.339	.129	-.973	.257
6. When making important decisions about risks to your health, how frequently are you influenced by your feelings, or emotions?	356	3.250	1.063	-.385	.129	-.457	.258
7. How much risk to your health does your lifestyle involve?	357	3.112	1.210	.070	.129	-1.062	.257
8. Do you prefer to take risks or avoid risks when making decisions about your health?	356	3.787	1.087	-.532	.129	-.603	.258

Table A4.4: Descriptive statistics for health domain-specific variables

	N	Mean	SD	Skew	Skew	Kurtosis	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Std. deviation	Statistic	Std. deviation
1. To do what I want to in life, I have to expose myself to things which can be health hazards.	358	2.997	1.327	-.132	.129	-1.205	.257
2. My health is too important to me to put it at risk voluntarily.	358	3.307	1.216	-.118	.129	-1.099	.257
3. I am apprehensive about health hazards and take action to prevent them.	358	3.575	1.036	-.355	.129	-.538	.257
4. I'd rather enjoy life than spend time trying to avoid health hazards.	358	3.293	1.103	-.210	.129	-.654	.257
5. I try to prevent health problems before I feel any symptoms.	358	3.562	1.181	-.532	.129	-.590	.257
6. The best way to get my work done is for work to have top priority in my life.	358	2.913	1.279	-.055	.129	-1.155	.257
7. I feel spending a lot of time at work is losing out on a full life.	358	3.399	1.255	-.404	.129	-.918	.257
8. I am apprehensive if I know I need to spend a lot of time doing things unrelated to work in the evenings or at weekends.	357	2.213	1.178	.638	.129	-.584	.257
9. I get satisfaction from working long hours.	357	2.493	1.191	.317	.129	-.865	.257
10. I rarely take work home in the evenings or at weekends.	351	3.057	1.461	-.044	.130	-1.386	.260

Table A4.5: Descriptive statistics for finance cross-domain variables

	N	Mean	SD	Skew	Skew	Kurtosis	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Std. deviation	Statistic	Std. deviation
1. Have the risks mentioned above changed the way you manage personal finances?	62	3.387	1.486	-.578	.304	-1.095	.599
2. Have these events made you more or less cautious about your financial management?	68	2.485	.938	-.012	.291	-.335	.574
3. How do you feel about your current financial situation?	358	3.483	1.034	-.322	.129	-.571	.257
4. Compared with the last few months, is your current general financial situation better or worse?	358	3.299	.954	-.084	.129	.009	.257
5. When making important decisions about personal finance risks, how frequently do you think through all the pros and cons of each alternative?	357	3.922	1.101	-.897	.129	.021	.257
6. When making important decisions about risks to your personal finances, how frequently are you influenced by your feelings, or emotions?	358	2.936	1.199	-.042	.129	-.972	.257
7. How much risk is involved in your personal finances?	358	3.556	1.118	-.425	.129	-.627	.257
8. Do you prefer to take risks or avoid risks when making decisions about your personal finances?	357	3.700	1.095	-.571	.129	-.396	.257

Table A4.6: Descriptive statistics for finance domain-specific variables

	N	Mean	SD	Skew	Skew	Kurtosis	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Std. deviation	Statistic	Std. deviation
1. I take opportunities to enjoy my money now, rather than in the future.	358	3.173	1.079	-.215	.129	-.581	.257
2. I prefer to always leave a good proportion of my money in my account, or save it, than risk or spend much of my money.	358	3.101	1.150	-.153	.129	-.799	.257
3. I feel apprehensive if I know I'm likely to overspend.	358	3.564	1.164	-.574	.129	-.529	.257
4. I enjoy spending most of my disposable income.	358	2.902	1.239	.071	.129	-1.022	.257
5. I systematically divide my income into spending and saving money.	358	2.953	1.333	-.034	.129	-1.154	.257
6. Gambling is an opportunity for me to have fun.	219	3.196	1.366	-.284	.164	-1.123	.327
7. Gambling is just a waste of money.	220	3.286	1.360	-.202	.164	-1.180	.327
8. I feel apprehensive when I gamble.	213	3.070	1.232	-.242	.167	-.837	.332
9. I enjoy the excitement of gambling.	215	3.251	1.193	-.480	.166	-.698	.330
10. Whenever possible, I avoid gambling with my money.	218	3.014	1.369	.105	.165	-1.238	.328

Appendix 5

Inter-item correlation tables

Table A5.1: Inter-correlations of cross-domain work variables

The first line in each cell of all the correlation tables that follow is the Pearson correlation coefficient.
The second line in each cell of every table is the number of respondents in each analysis.

	1	2	3	4	5	6	7
1. Have the risks mentioned above changed the way you manage risk at work?							
2. Have these events made you more or less cautious in your behaviour at work?	-.103 113						
3. How do you feel about your job at the moment?	-.180 111	.017 138					
4. Compared with the last few months, is your current general work situation better or worse?	-.143 113	-.045 140	.513*** 351				
5. When making important decisions about risks at work, how frequently do you think through all the payoffs and costs of each alternative?	.044 113	-.048 140	.078 350	-.005 353			
6. When making important decisions about risks at work, how frequently are you influenced by your feelings, or emotions?	.175 114	.065 141	-.016 351	-.021 354	-.040 356		
7. How much risk is involved in your job?	.045 114	.121 141	-.141** 351	-.001 354	-.134* 356	.132* 358	
8. Do you prefer to take or avoid risks when making decisions at work?	.004 114	-.314*** 141	-.120* 350	.011 353	.087 355	-.067 357	.150** 357

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.2: Inter-correlations of cross-domain health variables

	1	2	3	4	5	6	7
1. Have the risks mentioned above changed the way you manage health risks?							
2. Have these events made you more or less cautious about your health?	-.368** 74						
3. How do you feel about your health at the moment?	-.240* 75	.226* 79					
4. Compared with the last few months, is your current general state of health better or worse?	.171 75	.076 79	.499*** 356				
5. When making important decisions about risks to your health, how frequently do you think through all the pros and cons of each alternative?	.071 75	.011 79	.276*** 355	.296*** 357			
6. When making important decisions about risks to your health, how frequently are you influenced by your feelings, or emotions?	.213 74	-.052 78	-.033 354	-.036 356	.189*** 356		
7. How much risk to your health does your lifestyle involve?	-.033 74	-.012 78	.111* 355	.026 357	.063 356	-.069 355	
8. Do you prefer to take risks or avoid risks when making decisions about your health?	.052 75	-.158 79	.117* 354	.071 356	.259*** 355	-.060 354	.322*** 355

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.3: Inter-correlations of cross-domain finance variables

	1	2	3	4	5	6	7
1. Have the risks mentioned above changed the way you manage personal finances?							
2. Have these events made you more or less cautious about your financial management?	-.338** 62						
3. How do you feel about your current financial situation?	-.137 62	.332** 68					
4. Compared with the last few months, is your current general financial situation better or worse?	-.123 62	.198 68	.498*** 358				
5. When making important decisions about personal finance risks, how frequently do you think through all the pros and cons of each alternative?	.272* 62	-.190 68	.213*** 357	.124* 357			
6. When making important decisions about risks to your personal finances, how frequently are you influenced by your feelings, or emotions?	-.024 62	-.207 68	-.205*** 358	-.022 358	-.055 357		
7. How much risk is involved in your personal finances?	.006 62	.038 68	.244*** 358	.162** 358	.077 357	-.182** 358	
8. Do you prefer to take risks or avoid risks when making decisions about your personal finances?	.341** 62	-.307* 68	-.017 357	.050 357	.263** 356	-.081 357	.482*** 357

* p < .05, ** p < .01, *** p < .001

Table A5.4: Correlations between cross-domain work and health variables

	1. Have the risks mentioned above changed the way you manage health risks?	2. Have these events made you more or less cautious about your health?	3. How do you feel about your health at the moment?	4. Compared with the last few months, is your current general state of health better or worse?	5. How frequently do you think through all the pros and cons of each alternative?	6. How frequently are you influenced by your feelings, or emotions?	7. How much risk to your health does your lifestyle involve?	8. Do you prefer to take risks or avoid risks when making decisions about your health?
1. Have the risks mentioned above changed the way you manage risk at work?	.099 40	-.086 42	-.085 114	.026 114	.114 114	.062 114	.037 114	-.022 114
2. Have these events made you more or less cautious in your behaviour at work?	.094 42	.062 47	-.186* 141	-.209* 141	-.362*** 140	-.084 140	.177* 141	-.044 141
3. How do you feel about your job at the moment?	-.252* 74	.319** 78	.171** 349	.103 351	-.082 350	-.015 349	-.007 350	.009 349
4. Compared with the last few months, is your current general work situation better or worse?	-.013 75	.268* 79	.250*** 352	.213*** 354	.012 353	-.008 352	-.021 353	.002 352
5. When making important decisions about risks at work, how frequently do you think through all the payoffs and costs of each alternative?	.080 75	.161 79	.017 354	.039 356	.203*** 355	.064 354	.042 355	.063 354
6. When making important decisions about risks at work, how frequently are you influenced by your feelings, or emotions?	.162 75	.020 79	-.063 356	-.045 358	-.059 357	.321*** 356	.048 357	-.029 356
7. How much risk is involved in your job?	.083 75	.111 79	.007 356	-.061 358	-.042 357	.070 356	.292*** 357	-.077 356
8. Do you prefer to take or avoid risks when making decisions at work?	-.038 75	-.013 79	.156** 355	.244*** 357	.330*** 356	-.069 355	.178** 356	.284*** 355

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.5: Correlations between cross-domain work and finance variables

	1. Have the risks mentioned above changed the way you manage personal finances?	2. Have these events made you more or less cautious about your financial management?	3. How do you feel about your current financial situation?	4. Compared with the last few months, is your current general financial situation better or worse?	5. How frequently do you think through all the pros and cons of each alternative?	6. How frequently are you influenced by your feelings, or emotions?	7. How much risk is involved in your personal finances?	8. Do you prefer to take risks or avoid risks when making decisions about your personal finances?
1. Have the risks mentioned above changed the way you manage risk at work?	-.015 36	-.088 38	-.127 114	-.099 114	-.044 114	.106 114	-.040 114	-.053 113
2. Have these events made you more or less cautious in your behaviour at work?	-.025 39	.041 45	.074 141	-.046 141	-.058 141	.013 141	-.044 141	-.124 140
3. How do you feel about your job at the moment?	-.001 60	-.137 66	.223*** 351	.181** 351	-.011 350	.055 341	.045 351	-.045 350
4. Compared with the last few months, is your current general work situation better or worse?	-.148 61	.025 67	.090 354	.121* 354	.007 353	.055 354	.109* 354	.039 353
5. When making important decisions about risks at work, how frequently do you think through all the payoffs and costs of each alternative?	-.023 62	.023 68	.039 356	.069 356	.227*** 355	.006 356	-.144** 356	-.048 355
6. When making important decisions about risks at work, how frequently are you influenced by your feelings, or emotions?	.046 62	-.167 68	-.114* 358	-.096 358	-.023 357	.343*** 358	-.006 358	-.007 357
7. How much risk is involved in your job?	-.005 62	-.012 68	-.103 358	-.155** 358	-.034 357	.030 358	.157** 358	.142** 357
8. Do you prefer to take or avoid risks when making decisions at work?	.333** 62	-.158 68	-.053 357	-.022 357	.236*** 356	-.088 357	.094 357	.397*** 356

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.6: Correlations between cross-domain health and finance variables

	1. Have the risks mentioned above changed the way you manage personal finances?	2. Have these events made you more or less cautious about your financial management?	3. How do you feel about your current financial situation?	4. Compared with the last few months, is your current general financial situation better or worse?	5. How frequently do you think through all the pros and cons of each alternative?	6. How frequently are you influenced by your feelings, or emotions?	7. How much risk is involved in your personal finances?	8. Do you prefer to take risks or avoid risks when making decisions about your personal finances?
1. Have the risks mentioned above changed the way you manage health risks?	.164 27	.231 28	-.213 75	-.247* 75	.124 75	.030 75	-.055 75	-.043 74
2. Have these events made you more or less cautious about your health?	-.236 28	.050 33	.105 79	.022 79	.101 79	-.072 79	.224* 79	-.069 78
3. How do you feel about your health at the moment?	.128 62	.033 68	.153*** 356	.164** 356	.114* 355	.039 356	.132* 356	.182** 355
4. Compared with the last few months, is your current general state of health better or worse?	.321* 62	-.046 68	.056 358	.222*** 358	.069 357	.008 358	.094 358	.160** 357
5. When making important decisions about risks to your health, how frequently do you think through all the pros and cons of each alternative?	.172 62	-.332** 67	.001 357	-.021 357	.238*** 356	-.011 357	.067 357	.185*** 356
6. When making important decisions about risks to your health, how frequently are you influenced by your feelings, or emotions?	-.039 62	-.137 67	-.119* 356	-.079 356	-.024 355	.262*** 356	-.002 356	.045 355
7. How much risk to your health does your lifestyle involve?	.049 62	-.011 68	.026 357	-.022 357	.076 356	-.117* 357	.089 357	.131* 356
8. Do you prefer to take risks or avoid risks when making decisions about your health?	.235 62	.036 68	.040 356	.004 356	.238*** 355	-.060 356	.059 356	.242*** 355

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.7: Inter-correlations of domain-specific work-related variables

	1	2	3	4	5	6	7	8	9
1. To achieve at work, I have to risk making mistakes.									
2. When making an important decision, I would rather wait and see than risk making a mistake.	-.235 *** 358								
3. I feel apprehensive that I might make a mistake at work.	.113 * 357	.157 ** 358							
4. To get on with my work, I am happy to put up with things that can go wrong.	.283 *** 358	-.073 358	-.085 358						
5. I avoid the risk of making a mistake as often as possible.	-.213 *** 358	.282 *** 358	.156 ** 358	-.163 ** 358					
6. I do whatever it takes, including taking risks, to achieve targets.	.250 *** 358	-.140 ** 358	-.066 358	.176 ** 358	-.200 *** 358				
7. I prefer not to reach targets than to take risks.	-.233 *** 358	.310 *** 358	.068 358	-.128 * 358	.201 *** 358	-.392 *** 358			
8.I feel apprehensive when I take risks to achieve work-related goals.	.051 358	.260 *** 358	.374 *** 358	.039 358	.201 *** 358	-.090 358	.256 *** 358		
9. Risk is part of the excitement and interest of my work.	.301 *** 356	-.242 *** 356	-.069 356	.160 ** 356	-.146 ** 356	.295 *** 356	-.260 *** 256	-.292 *** 356	
10. I meet almost all my goals at work without significant risk to me or the organisation.	-.284 *** 354	.289 *** 354	-.052 354	-.070 354	.280 *** 354	-.142 ** 354	.254 *** 354	.197 *** 354	-.331 ** 354

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.8: Inter-correlations of domain-specific health-related variables

	1	2	3	4	5	6	7	8	9
1. To do what I want to in life, I have to expose myself to things which can be health hazards.									
2. My health is too important to me to put it at risk voluntarily.	-.437 *** 358								
3. I am apprehensive about health hazards and take action to prevent them.	-.139 ** 358	.337 *** 358							
4. I'd rather enjoy life than spend time trying to avoid health hazards.	.249 *** 358	-.320 *** 358	-.317 *** 358						
5. I try to prevent health problems before I feel any symptoms.	-.012 358	.182 ** 358	.344 *** 358	-.215*** 358					
6. The best way to get my work done is for work to have top priority in my life.	-.030 358	.021 358	.099 358	-.049 358	.027 358				
7. I feel spending a lot of time at work is losing out on a full life.	.145 ** 358	.011 358	-.147** 358	.075 358	-.103 358	-.303*** 358			
8. I am apprehensive if I know I need to spend a lot of time doing things unrelated to work in the evenings or at weekends.	.005 357	-.007 357	-.029 357	-.016 357	-.049 357	.254*** 357	.061 357		
9. I get satisfaction from working long hours.	.063 357	-.076 357	.090 357	-.068 357	.130* 357	.370*** 357	-.318*** 357	.106* 356	
10. I rarely take work home in the evenings or at weekends.	-.053 351	.014 351	-.010 351	.023 351	.129* 351	-.320*** 351	.315*** 351	-.176** 350	-.335*** 351

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.9: Inter-correlations of domain-specific finance-related variables

	1	2	3	4	5	6	7	8	9
1. I take opportunities to enjoy my money now, rather than in the future.									
2. I prefer to always leave a good proportion of my money in my account, or save it, than risk or spend much of my money.	-.493*** 358								
3. I feel apprehensive if I know I'm likely to overspend.	-.268*** 358	.420*** 358							
4. I enjoy spending most of my disposable income.	.512*** 358	-.550*** 358	-.323*** 358						
5. I systematically divide my income into spending and saving money.	-.267*** 358	.321*** 358	.183*** 358	-.276*** 358					
6. Gambling is an opportunity for me to have fun.	.187** 219	-.088 219	-.141* 219	.065 219	-.117 219				
7. Gambling is just a waste of money.	-.055 220	.063 220	.155* 220	-.067 220	.040 220	-.354*** 219			
8. I feel apprehensive when I gamble.	.011 213	.056 213	.313*** 213	.146* 213	.049 213	-.287*** 213	.172* 213		
9. I enjoy the excitement of gambling.	.194** 215	-.125 215	-.209** 215	.132 215	-.062 215	.679*** 215	-.390*** 215	-.241*** 213	
10. Whenever possible, I avoid gambling with my money.	-.131 218	.229** 218	.278*** 218	-.130 218	.167* 218	-.518*** 218	.517*** 218	.363** 213	-.537*** 215

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.10: Correlations between work-related cross-domain variables and domain-specific variables

	1. Have the risks mentioned above changed the way you manage risk at work?	2. Have these events made you more or less cautious in your behaviour at work?	3. How do you feel about your job at the moment?	4. Compared with the last few months, is your current general work situation better or worse?	5. How frequently do you think through all the payoffs and costs of each alternative?	6. How frequently are you influenced by your feelings, or emotions?	7. How much risk is involved in your job?	8. Do you prefer to take or avoid risks when making decisions at work?
1. To achieve at work, I have to risk making mistakes.	-.197* 114	.147 141	.105* 351	.044 354	.034 356	.072 358	-.088 358	-.250*** 357
2. When making an important decision, I would rather wait and see than risk making a mistake.	.118 113	-.251* 141	-.093 351	-.022 354	.153** 356	.092 358	.081 358	.309*** 357
3. I feel apprehensive that I might make a mistake at work.	-.038 114	.004 141	-.117* 351	-.046 354	.013 356	.116* 358	.000 358	.067 357
4. To get on with my work, I am happy to put up with things that can go wrong.	.002 114	.001 141	.020 351	.004 354	-.012 356	-.026 358	-.039 358	-.143** 357
5. I avoid the risk of making a mistake as often as possible.	-.074 114	-.189* 141	-.047 351	.030 354	.125* 356	-.114* 358	.046 358	.311*** 357
6. I do whatever it takes, including taking risks, to achieve targets.	-.067 114	.234** 141	.096 351	.054 354	-.024 356	-.015 358	-.027 358	-.337*** 357
7. I prefer not to reach targets than to take risks.	.075 114	-.238** 141	-.103 351	-.048 354	-.010 356	.056 358	.015 358	.384*** 357
8.I feel apprehensive when I take risks to achieve work-related goals.	.110 114	-.067 141	-.127* 351	.015 354	.071 356	.130* 358	.154** 358	.244*** 357
9. Risk is part of the excite-ment and interest of my work.	-.191* 114	.077 141	.203*** 351	.005 354	.177** 355	-.061 356	-.406*** 356	-.410*** 355
10. I meet almost all my goals at work without significant risk to me or the organisation.	.062 112	-.257** 139	-.019 349	.031 352	-.018 353	.051 354	.313*** 354	.225*** 353

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.11: Correlations between health-related cross-domain variables and domain-specific variables

	1. Have the risks mentioned above changed the way you manage health risks?	2. Have these events made you more or less cautious about your health?	3. How do you feel about your health at the moment?	4. Compared with the last few months, is your current general state of health better or worse?	5. How frequently do you think through all the pros and cons of each alternative?	6. How frequently are you influenced by your feelings, or emotions?	7. How much risk to your health does your lifestyle involve?	8. Do you prefer to take risks or avoid risks when making decisions about your health?
1. To do what I want to in life, I have to expose myself to things which can be health hazards.	-.184 75	.151 79	.043 356	-.057 358	-.067 357	.045 356	-.377*** 357	-.221*** 356
2. My health is too important to me to put it at risk voluntarily.	.218 75	-.043 79	-.013 356	.037 358	.220*** 357	-.026 356	.320*** 357	.353*** 356
3. I am apprehensive about health hazards and take action to prevent them.	.297** 75	-.170 79	.172** 356	.254*** 358	.531*** 357	.069 356	.148** 357	.321*** 356
4. I'd rather enjoy life than spend time trying to avoid health hazards.	-.264* 75	.102 79	.002 356	-.097 358	-.229*** 357	.087 356	-.134* 357	-.285*** 356
5. I try to prevent health problems before I feel any symptoms.	.061 75	.086 79	.364*** 356	.261*** 358	.400*** 357	.036 356	.117* 357	.107* 356
6. The best way to get my work done is for work to have top priority in my life.	.087 75	-.098 79	-.023 356	.137** 358	.067 357	.015 356	-.001 357	.020 356
7. I feel spending a lot of time at work is losing out on a full life.	.097 75	-.092 79	-.244*** 356	-.246*** 358	-.142** 357	.080 356	-.064 357	-.006 356
8. I am apprehensive if I know I need to spend a lot of time doing things unrelated to work in the evenings or at weekends.	.039 75	-.108 79	-.076 355	.045 357	.005 356	.050 355	-.072 356	.014 355
9. I get satisfaction from working long hours.	-.085 75	.203 79	.138** 355	.228*** 357	.090 356	-.016 355	-.060 356	.001 355
10. I rarely take work home in the evenings or at weekends.	.000 75	-.171 79	-.022 349	-.106* 351	-.085 350	-.025 349	.064 350	-.078 349

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.12: Correlations between finance-related cross-domain variables and domain-specific variables

	1. Have the risks mentioned above changed the way you manage personal finances?	2. Have these events made you more or less cautious about your financial management?	3. How do you feel about your current financial situation?	4. Compared with the last few months, is your current general financial situation better or worse?	5. How frequently do you think through all the pros and cons of each alternative?	6. How frequently are you influenced by your feelings, or emotions?	7. How much risk is involved in your personal finances?	8. Do you prefer to take risks or avoid risks when making decisions about your personal finances?
1. I take opportunities to enjoy my money now, rather than in the future.	.167 62	-.163 68	-.211*** 358	-.140** 358	-.237*** 357	.074 358	-.078 358	-.212*** 357
2. I prefer to always leave a good proportion of my money in my account, or save it, than risk or spend much of my money.	.141 62	.000 68	.254*** 348	.192*** 358	.299*** 357	-.109* 358	.179** 358	.231*** 357
3. I feel apprehensive if I know I'm likely to overspend.	.209 62	-.111 68	-.006 358	.039 358	.339*** 357	.036 358	.064 358	.331*** 357
4. I enjoy spending most of my disposable income.	.047 62	.027 68	-.245*** 358	-.144** 358	-.245*** 357	.149** 358	-.058 358	-.176** 357
5. I systematically divide my income into spending and saving money.	-.007 62	.050 68	.082 358	.049 358	.217*** 357	-.074 358	.046 358	.159** 357
6. Gambling is an opportunity for me to have fun.	.046 44	.042 48	.080 219	-.001 219	-.085 218	.049 219	-.082 219	-.247*** 219
7. Gambling is just a waste of money.	-.073 44	-.159 48	-.018 220	.070 220	.002 219	-.071 220	.171* 220	.212** 220
8. I feel apprehensive when I gamble.	.302 42	-.194 46	-.295*** 213	-.106 213	.055 212	.015 213	-.064 213	.251*** 213
9. I enjoy the excitement of gambling.	-.020 42	.134 46	.053 215	-.060 215	-.081 214	.066 215	-.087 215	-.209** 215
10. Whenever possible, I avoid gambling with my money.	-.076 44	-.126 48	.015 218	.123 218	.106 217	-.070 218	.225** 218	.325*** 218

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.13: Correlations between domain-specific work variables and domain-specific health variables

	1. To do what I want to in life, I have to expose myself to things which can be health hazards.	2. My health is too important to me to put it at risk voluntarily.	3. I am apprehensive about health hazards and take action to prevent them.	4. I'd rather enjoy life than spend time trying to avoid health hazards.	5. I try to prevent health problems before I feel any symptoms.	6. The best way to get my work done is for work to have top priority in my life.	7. I feel spending a lot of time at work is losing out on a full life.	8. I am apprehensive if I know I need to spend a lot of time doing things un-related to work in the evenings or at weekends.	9. I get satisfaction from working long hours.	10. I rarely take work home in the evenings or at weekends.
1. To achieve at work, I have to risk making mistakes.	.142** 358	-.085 358	-.115* 358	.100 358	-.119* 358	.017 358	.136* 358	.040 357	-.051 357	-.016 351
2. When making an important decision, I would rather wait and see than risk making a mistake.	-.056 358	.031 358	.185*** 358	-.167** 358	.106* 358	.029 358	-.119* 358	.055 357	.141** 357	-.060 351
3. I feel apprehensive that I might make a mistake at work.	.128* 358	-.122* 358	-.005 358	-.067 358	-.014 358	-.016 358	.054 358	.150** 357	-.040 357	.004 351
4. To get on with my work, I am happy to put up with things that can go wrong.	.069 358	-.082 358	-.016 358	.033 358	-.056 358	-.033 358	.123* 358	-.047 357	-.063 357	.057 351
5. I avoid the risk of making a mistake as often as possible.	.037 358	.052 358	.212*** 358	-.069 358	.156** 358	.058 358	-.057 358	-.007 357	-.001 357	.086 351
6. I do whatever it takes, including taking risks, to achieve targets.	.067 358	-.123* 358	-.141** 358	.152** 358	-.040 358	.098 358	.043 358	.042 357	.029 357	-.083 351
7. I prefer not to reach targets than to take risks.	-.018 358	.069 358	.177** 358	-.114* 358	.019 358	-.029 358	-.044 358	.025 357	-.034 357	-.061 351
8.I feel apprehensive when I take risks to achieve work-related goals.	.169** 358	-.028 358	.122* 358	-.113* 358	.125* 358	-.016 358	.161** 358	.162** 357	.000 357	-.068 351
9. Risk is part of the excitement and interest of my work.	.085 356	-.093 356	-.142** 356	.106* 356	-.114* 356	.155** 356	-.039 356	-.030 355	.047 356	-.041 350
10. I meet almost all my goals at work without significant risk to me or the organisation.	-.050 354	.067 354	.103 354	-.076 354	.185*** 354	-.034 354	-.023 354	-.025 353	.031 354	.070 348

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.14: Correlations between domain-specific finance variables and domain-specific health variables

	1. To do what I want to in life, I have to expose myself to things which can be health hazards.	2. My health is too important to me to put it at risk voluntarily.	3. I am apprehensive about health hazards and take action to prevent them.	4. I'd rather enjoy life than spend time trying to avoid health hazards.	5. I try to prevent health problems before I feel any symptoms.	6. The best way to get my work done is for work to have top priority in my life.	7. I feel spending a lot of time at work is losing out on a full life.	8. I am apprehensive if I know I need to spend a lot of time doing things un-related to work in the evenings or at weekends.	9. I get satisfaction from working long hours.	10. I rarely take work home in the evenings or at weekends.
1. I take opportunities to enjoy my money now, rather than in the future.	.118* 358	-.214*** 358	-.142** 358	.256*** 358	-.116* 358	-.013 358	.121* 358	.046 357	-.131* 357	.044 351
2. I prefer to always leave a good proportion of my money in my account, or save it, than risk or spend much of my money.	-.053 358	.170** 358	.139** 358	-.180** 358	.181** 358	.086 358	-.012 358	-.030 357	.090 357	.036 351
3. I feel apprehensive if I know I'm likely to overspend.	.025 358	.083 358	.199*** 358	-.149** 358	.164** 358	.054 358	-.063 358	.083 357	.122 * 357	-.039 351
4. I enjoy spending most of my disposable income.	.080 358	-.201*** 358	-.052 358	.212*** 358	-.060 358	-.069 358	.050 358	-.032 357	-.069 357	.052 351
5. I systematically divide my income into spending and saving money.	-.116* 358	.121* 358	.176** 358	-.181** 358	.181** 358	.029 358	-.181 358	.018 357	.039 357	-.036 351
6. Gambling is an opportunity for me to have fun.	.094 219	-.189** 219	-.181** 219	.211** 219	-.274*** 219	-.036 219	.150* 219	-.040 218	-.063 218	.022 216
7. Gambling is just a waste of money.	-.027 220	.147* 220	.028 220	-.095 220	.132 220	.083 220	.024 220	.020 219	.127 219	-.105 217
8. I feel apprehensive when I gamble.	.048 213	-.110 213	.212** 213	-.124 213	.168* 213	.032 213	.053 213	.020 212	.004 212	.003 210
9. I enjoy the excitement of gambling.	.041 215	-.116 215	-.132 215	.179** 215	-.262*** 215	-.099 215	.137* 215	-.092 214	-.061 214	.050 212
10. Whenever possible, I avoid gambling with my money.	.040 218	.085 218	.118 218	-.145* 218	.242** 218	.118 218	.019 218	-.030 217	.096 217	-.042 215

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.15: Correlations between domain-specific work variables and domain-specific finance variables

	1. I take opportunities to enjoy my money now, rather than in the future.	2. I prefer to always leave a good proportion of my money in my account, or save it, than risk or spend much of my money.	3. I feel apprehensive if I know I'm likely to overspend.	4. I enjoy spending most of my disposable income.	5. I systematically divide my income into spending and saving money.	6. Gambling is an opportunity for me to have fun.	7. Gambling is just a waste of money.	8. I feel apprehensive when I gamble.	9. I enjoy the excitement of gambling.	10. Whenever possible, I avoid gambling with my money.
1. To achieve at work, I have to risk making mistakes.	.097 358	-.045 358	-.026 358	-.057 358	-.123* 358	.092 219	-.006 220	-.066 213	.142* 215	-.121 218
2. When making an important decision, I would rather wait and see than risk making a mistake.	-.023 358	.103 358	.226*** 358	.018 358	.094 358	-.142* 219	.113 220	.210** 213	-.155* 215	.170* 218
3. I feel apprehensive that I might make a mistake at work.	.004 358	-.008 358	.221*** 358	.031 358	.032 358	-.039 219	.034 220	.246*** 213	-.094 215	.062 218
4. To get on with my work, I am happy to put up with things that can go wrong.	.024 358	-.037 358	-.075 358	.007 358	-.055 358	.097 219	-.065 220	-.021 213	.090 215	-.053 218
5. I avoid the risk of making a mistake as often as possible.	-.033 358	.105* 358	.157** 358	.035 358	.073 358	.029 219	.081 220	.101 213	-.024 215	.173* 218
6. I do whatever it takes, including taking risks, to achieve targets.	.066 358	-.073 358	-.138** 358	.029 358	-.047 358	.100 219	-.042 220	-.056 213	.165* 215	-.001 218
7. I prefer not to reach targets than to take risks.	-.052 358	.074 358	.180** 358	-.010 358	.175** 358	-.067 219	.098 220	.149* 213	-.147* 215	.268*** 218
8.I feel apprehensive when I take risks to achieve work-related goals.	-.031 358	.043 358	.276*** 358	.009 358	.081 358	-.161* 219	.096 220	.204** 213	-.176* 215	.219*** 218
9. Risk is part of the excitement and interest of my work.	.051 356	-.095 356	-.144** 356	-.011 356	-.144** 356	.165* 218	-.162* 219	-.111 212	.257*** 214	-.251*** 217
10. I meet almost all my goals at work without significant risk to me or the organisation.	.024 354	.082 354	.070 354	.029 354	.197*** 354	-.169* 216	.140* 217	.115 210	-.236** 212	.294*** 215

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.16: Inter-correlations of biographical and personality data

	1	2	3	4	5	6	7	8	9	10
1. Sex										
2. Age	.187*** 354									
3. Education	-.286*** 350	-.382*** 346								
4. Tenure	-.097 231	.577*** 229	.223** 231							
5. Seniority	-.167* 230	-.268*** 227	.060 230	-.139* 227						
6. Income	-.340*** 231	-.101 228	.278*** 231	.122 228	.337*** 227					
7. Z score N	.227*** 329	.209*** 325	-.278*** 321	-.057 202	-.008 201	-.204** 202				
8. Z score E	-.033 329	-.268*** 325	.345*** 321	-.011 202	.069 201	.053 202	-.442*** 329			
9. Z score O	.011 329	.115* 325	-.191** 321	-.047 202	-.041 201	-.087 202	-.017 329	.145** 329		
10. Z score A	-.078 329	-.199*** 325	.347*** 321	.124 202	.008 201	.088 202	-.414*** 329	.279*** 329	-.022 329	
11. Z score C	-.032 329	-.089 325	.202*** 321	.105 202	.009 201	.172* 202	-.409** 329	.231** 329	.004 329	.422*** 329

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.17: Correlations between cross-domain work variables, biographical and personality variables

	Sex	Age	Education	Tenure	Seniority	Income	Z score N	Z score E	Z score O	Z score A	Z score C
1. Have the risks mentioned above changed the way you manage risk at work?	.077 114	.043 112	.104 111	-.011 77	-.006 78	-.168 138	-.078 101	.097 101	-.096 101	.093 101	-.001 101
2. Have these events made you more or less cautious in your behaviour at work?	.151 141	.328*** 138	-.342*** 137	.073 82	-.236* 83	-.105 84	.183* 129	-.045 129	.043 129	-.199* 129	-.168 129
3. How do you feel about your job at the moment?	.059 351	.015 347	-.086 343	-.099 225	-.010 225	.130 225	-.146** 322	.177** 322	.080 322	-.032 322	.077 322
4. Compared with the last few months, is your current general work situation better or worse?	.027 354	-.132* 350	.058 346	-.138* 228	-.077 228	-.003 228	-.155** 325	.134* 325	.036 325	.096 325	.082 325
5. When making important decisions about risks at work, how frequently do you think through all the payoffs and costs of each alternative?	-.091 356	-.095 352	.057 348	-.049 230	.086 230	.238*** 230	-.114* 327	-.033 327	.162** 327	.074 327	.077 327
6. When making important decisions about risks at work, how frequently are you influenced by your feelings, or emotions?	.271*** 358	.048 354	-.047 350	-.024 231	-.138* 230	-.263*** 231	.242*** 329	.038 329	-.041 329	-.095 329	-.119* 329
7. How much risk is involved in your job?	.230*** 358	.095 354	-.189*** 350	.004 231	-.042 230	-.462*** 231	.136* 329	-.180** 329	-.094 329	-.090 329	-.083 329
8. Do you prefer to take or avoid risks when making decisions at work?	-.056 357	.000 354	.123* 349	.140* 231	-.153* 230	-.123 231	-.114* 328	-.107 328	-.133* 328	.154** 328	.185** 328

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.18: Correlations between cross-domain health variables, biographical and personality variables

	Sex	Age	Education	Tenure	Seniority	Income	Z score N	Z score E	Z score O	Z score A	Z score C
1. Have the risks mentioned above changed the way you manage health risks?	.093 75	-.116 74	.033 74	-.078 62	.041 63	-.077 64	.085 69	.232 69	.051 69	.110 69	.013 69
2. Have these events made you more or less cautious about your health?	-.059 79	-.102 77	-.226* 78	-.171 66	-.007 67	-.159 68	-.050 73	-.119 73	.050 73	-.110 73	-.126 73
3. How do you feel about your health at the moment?	-.124* 356	-.298*** 352	.306*** 348	-.051 230	-.042 229	-.124 230	-.463*** 327	.253*** 327	.014 327	.262*** 327	.385*** 327
4. Compared with the last few months, is your current general state of health better or worse?	-.114* 358	-.218*** 354	.330*** 350	-.023 231	-.020 230	-.068 231	-.267*** 329	.159** 329	-.044 329	.251*** 329	.248*** 329
5. When making important decisions about risks to your health, how frequently do you think through all the pros and cons of each alternative?	-.094 357	-.089 353	.224*** 349	.132* 230	.056 229	.003 230	-.155** 328	.085 328	.124* 328	.216*** 328	.278*** 328
6. When making important decisions about risks to your health, how frequently are you influenced by your feelings, or emotions?	.121* 356	-.070 352	-.032 348	-.083 230	.080 229	-.099 230	.203*** 327	.051 327	.110* 327	.005 327	-.098 327
7. How much risk to your health does your lifestyle involve?	.192*** 357	.090 353	-.068 349	-.026 231	.010 230	-.136* 231	.075 328	-.125* 328	-.020 328	.040 328	.114* 328
8. Do you prefer to take risks or avoid risks when making decisions about your health?	.017 356	.009 352	.027 348	.130* 230	.024 229	.141* 230	-.037 327	.011 327	-.005 327	.136* 327	.241*** 327

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.19: Correlations between cross-domain finance variables, biographical and personality variables

	Sex	Age	Education	Tenure	Seniority	Income	Z score N	Z score E	Z score O	Z score A	Z score C
1. Have the risks mentioned above changed the way you manage personal finances?	-.085 62	-.183 61	-.035 62	-.132 50	-.198 49	-.261 50	-.090 57	-.118 57	.039 57	-.027 57	.072 57
2. Have these events made you more or less cautious about your financial management?	-.306* 68	.070 66	.004 68	.110 56	.107 55	.332* 56	.031 63	-.051 63	-.039 63	.014 63	-.057 63
3. How do you feel about your current financial situation?	-.116* 358	.065 354	-.080 350	.039 231	.168* 230	.351*** 231	-.192*** 329	.091 329	.042 329	.021 329	.281*** 329
4. Compared with the last few months, is your current general financial situation better or worse?	-.116* 358	-.116* 354	.106* 350	.059 231	.104 230	.276*** 231	-.113* 329	.134* 329	.064 329	.049 329	.150** 329
5. When making important decisions about personal finance risks, how frequently do you think through all the pros and cons of each alternative?	-.149** 357	.016 353	.010 349	.099 231	.070 230	.100 231	-.109 328	-.014 328	.111* 328	.148** 328	.206*** 328
6. When making important decisions about risks to your personal finances, how frequently are you influenced by your feelings, or emotions?	.096 358	-.142*** 354	.140** 350	-.108 231	-.021 230	-.090 231	.002 329	.191** 329	-.060 329	.024 329	-.129* 329
7. How much risk is involved in your personal finances?	-.024 358	.001 354	-.006 350	.038 231	-.017 230	-.045 231	.033 329	.035 329	-.027 329	.072 329	.146** 329
8. Do you prefer to take risks or avoid risks when making decisions about your personal finances?	.050 357	.021 353	.061 349	.046 231	-.149* 230	-.215** 231	.010 328	-.062 328	-.010 328	.135* 328	.140* 328

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.20: Correlations between domain-specific work variables, biographical and personality variables

	Sex	Age	Education	Tenure	Seniority	Income	Z score N	Z score E	Z score O	Z score A	Z score C
1. To achieve at work, I have to risk making mistakes.	.024 358	.029 354	-.207** 350	-.059 231	-.031 230	.066 231	.174** 329	-.003 329	.193*** 329	-.184** 329	-.199*** 329
2. When making an important decision, I would rather wait and see than risk making a mistake.	.046 358	-.149** 354	.198*** 350	-.029 231	-.084 230	-.226** 231	-.009 329	-.006 329	-.138* 329	.142* 329	.156** 329
3. I feel apprehensive that I might make a mistake at work.	.124* 358	-.084 354	-.088 350	-.186** 231	.062 230	-.120 231	.237*** 329	-.197*** 329	-.033 329	-.007 329	-.129* 329
4. To get on with my work, I am happy to put up with things that can go wrong.	.010 358	.023 354	-.151** 350	-.026 231	.056 230	.080 231	.088 329	.021 329	.065 329	-.165** 329	-.105 329
5. I avoid the risk of making a mistake as often as possible.	-.070 358	-.145** 354	.215*** 350	.082 231	.047 230	.034 231	-.109* 329	.011 329	-.192*** 329	.212*** 329	.266*** 329
6. I do whatever it takes, including taking risks, to achieve targets.	.033 358	-.042 354	-.097 350	-.098 231	-.070 230	-.051 231	-.016 329	.074 329	.180** 329	-.059 329	-.066 329
7. I prefer not to reach targets than to take risks.	-.064 358	-.054 354	.176** 350	.079 231	-.041 230	-.039 231	-.070 329	-.031 329	-.196*** 329	.169** 329	.149** 329
8.I feel apprehensive when I take risks to achieve work-related goals.	.157** 358	-.035 354	.034 350	-.029 231	-.135* 230	-.269*** 231	.194** 329	-.133* 329	-.093 329	.005 329	.001 329
9. Risk is part of the excitement and interest of my work.	-.132* 356	-.042 352	.041 348	-.018 229	.194** 229	.439*** 229	-.074 327	.136* 327	.171** 327	-.068 327	-.081 327
10. I meet almost all my goals at work without significant risk to me or the organisation.	.104 354	-.154** 350	.111* 346	-.003 228	-.069 227	-.313*** 227	-.125* 325	.040 325	-.167** 325	.167** 325	.246*** 325

* p < .05, ** p < .01, *** p < .001

Table A5.21: Correlations between domain-specific health variables, biographical and personality variables

	Sex	Age	Education	Tenure	Seniority	Income	Z score N	Z score E	Z score O	Z score A	Z score C
1. To do what I want to in life, I have to expose myself to things which can be health hazards.	.007 358	-.065 354	-.034 350	-.051 231	-.101 230	-.156* 231	-.054 329	-.012 329	.039 329	-.090 329	-.080 329
2. My health is too important to me to put it at risk voluntarily.	.127* 358	.138** 354	.025 350	.132* 231	-.024 230	.063 231	.012 329	-.006 329	.004 329	.157** 329	.189** 329
3. I am apprehensive about health hazards and take action to prevent them.	-.072 358	-.078 354	.191*** 350	.048 231	.044 230	-.019 231	.137* 329	.086 329	.099 329	.309*** 329	.271*** 329
4. I'd rather enjoy life than spend time trying to avoid health hazards.	-.018 358	-.072 354	-.069 350	-.185** 231	.057 230	-.101 231	.047 329	.109* 329	.023 329	-.133* 329	-.156** 329
5. I try to prevent health problems before I feel any symptoms.	-.038 358	-.164** 354	.137* 350	.021 231	.019 230	-.101 231	-.289*** 329	.166** 329	.039 329	.217*** 329	.268*** 329
6. The best way to get my work done is for work to have top priority in my life.	-.049 358	-.162** 354	.066 350	-.009 231	.047 230	.170* 231	-.013 329	.108 329	.070 329	.079 329	.115* 329
7. I feel spending a lot of time at work is losing out on a full life.	.178** 358	.116* 354	-.233*** 350	-.077 231	-.081 230	-.086 231	.285*** 329	-.179** 329	-.110* 329	-.231*** 329	-.206*** 329
8. I am apprehensive if I know I need to spend a lot of time doing things unrelated to work in the evenings or at weekends.	-.003 357	-.088 353	.018 349	-.031 231	-.120 230	-.035 231	.188** 328	-.132* 328	-.038 328	-.043 328	-.124* 328
9. I get satisfaction from working long hours.	-.015 357	-.088 353	-.009 349	-.007 230	-.046 230	-.069 230	-.123* 328	.199* 328	.144** 328	.078 328	.070 328
10. I rarely take work home in the evenings or at weekends.	-.089 351	-.026 347	.112* 344	.040 230	.099 230	.133* 230	-.031 322	.002 322	-.186** 322	-.040 322	-.058 322

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.22: Correlations between domain-specific finance variables, biographical and personality variables

	Sex	Age	Education	Tenure	Seniority	Income	Z score N	Z score E	Z score O	Z score A	Z score C
1. I take opportunities to enjoy my money now, rather than in the future.	.049 358	-.057 354	-.006 350	-.026 231	-.028 230	-.117 231	.039 329	.191** 329	.022 329	-.093 329	-.135* 329
2. I prefer to always leave a good proportion of my money in my account, or save it, than risk or spend much of my money.	-.077 358	.038 354	.003 350	.014 231	.050 230	.135* 231	-.043 329	-.101 329	-.094 329	.054 329	.127* 329
3. I feel apprehensive if I know I'm likely to overspend.	.051 358	.089 354	.056 350	.074 231	-.007 230	-.121 231	.053 329	-.115* 329	-.016 329	.105 329	.120* 329
4. I enjoy spending most of my disposable income.	.097 358	-.154** 354	.113* 350	.006 231	-.055 230	-.180** 231	.028 329	.222*** 329	-.054 329	-.036 329	-.091 329
5. I systematically divide my income into spending and saving money.	.014 358	-.079 354	.139** 350	.005 231	.060 230	.011 231	-.215*** 329	.082 329	-.011 329	.259*** 329	.271*** 329
6. Gambling is an opportunity for me to have fun.	.009 219	.044 216	-.142* 218	.104 140	.113 140	.229** 141	.182* 194	-.010 194	-.045 194	-.151* 194	-.186** 194
7. Gambling is just a waste of money.	.016 220	-.003 217	.064 219	-.073 140	-.155 140	-.054 141	-.145* 195	.021 195	.057 195	.183* 195	.128 195
8. I feel apprehensive when I gamble.	-.021 213	-.089 210	.085 212	-.195* 137	.039 137	-.161 138	-.088 188	-.048 188	.049 188	.095 188	-.008 188
9. I enjoy the excitement of gambling.	.006 215	.075 212	-.062 214	.186* 139	.056 139	.219** 140	.121 190	.028 190	-.082 190	-.139 190	-.248** 190
10. Whenever possible, I avoid gambling with my money.	.048 218	-.110 215	.075 217	-.095 140	-.050 140	-.163 141	-.112 193	.016 193	-.053 193	.190** 193	.233** 193

* p < .05, ** p < .01, *** p < .001

Table A5.23: Correlations between work cross-domain variables and reported risk taking

	Recreation risk	Health risk	Career risk	Financial risk	Safety risk	Social risk	Overall risk
1. Have the risks mentioned above changed the way you manage risk at work?	-.059 26	-.242 26	-.030 26	.240 26	-.191 26	-.061 26	-.102 26
2. Have these events made you more or less cautious in your behaviour at work?	.156 30	.215 30	.103 30	-.356 † 30	-.226 30	-.021 30	-.071 30
3. How do you feel about your job at the moment?	-.080 72	-.168 72	.199 † 72	.004 72	.102 72	-.019 72	-.010 72
4. Compared with the last few months, is your current general work situation better or worse?	-.256 * 72	-.065 72	.076 72	-.030 72	.059 72	-.092 72	-.113 72
5. When making important decisions about risks at work, how frequently do you think through all the payoffs and costs of each alternative?	-.037 72	-.096 72	.109 72	-.108 72	-.030 72	-.045 72	-.074 72
6. When making important decisions about risks at work, how frequently are you influenced by your feelings, or emotions?	-.025 72	.122 72	-.054 72	.185 72	-.117 72	-.268 * 72	-.039 72
7. How much risk is involved in your job?	-.131 72	-.067 72	.004 72	.108 72	.039 72	.007 72	-.023 72
8. Do you prefer to take or avoid risks when making decisions at work?	-.019 72	-.260 * 72	.014 72	-.165 72	-.141 72	.074 72	-.164 72

† $p < .01$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table A5.24: Correlations between health cross-domain variables and reported risk taking

	Recreation risk	Health risk	Career risk	Financial risk	Safety risk	Social risk	Overall risk
1. Have the risks mentioned above changed the way you manage health risks?	.035 12	-.037 12	-.271 12	-.538 † 12	.238 12	-.319 12	-.219 12
2. Have these events made you more or less cautious about your health?	-.054 16	-.180 16	.163 16	-.034 16	-.133 16	.025 16	-.113 16
3. How do you feel about your health at the moment?	-.223 † 72	-.331 ** 72	-.051 72	-.150 72	-.107 72	-.090 72	-.301 * 72
4. Compared with the last few months, is your current general state of health better or worse?	.056 72	-.050 72	-.228 * 72	-.257 * 72	-.150 72	-.156 72	-.221 † 72
5. When making important decisions about risks to your health, how frequently do you think through all the pros and cons of each alternative?	-.017 71	-.080 71	.096 71	-.195 71	-.102 71	.087 71	-.079 71
6. When making important decisions about risks to your health, how frequently are you influenced by your feelings, or emotions?	.081 71	.038 71	.183 71	.146 71	.203 † 71	-.057	.176 72
7. How much risk to your health does your lifestyle involve?	-.109 71	-.176 72	-.071 72	.010 71	-.188 72	-.010 72	-.176 72
8. Do you prefer to take risks or avoid risks when making decisions about your health?	-.233 * 72	-.211 † 72	-.165 72	-.219 72	-.328 ** 72	.036 72	-.353 ** 72

† p < .1, * p < .05, ** p < .01, *** p < .001

Table A5.25: Correlations between finance cross-domain variables and reported risk taking

	Recreation risk	Health risk	Career risk	Financial risk	Safety risk	Social risk	Overall risk
1. Have the risks mentioned above changed the way you manage personal finances?	.445 14	.107 14	-.171 14	-.319 14	-.300 14	-.057 14	-.059 14
2. Have these events made you more or less cautious about your financial management?	-.390 † 20	-.246 20	.303 20	.274 20	-.116 20	.145 20	.146 20
3. How do you feel about your current financial situation?	-.257 * 72	-.151 72	.055 72	-.073 72	-.213 † 72	.083 72	-.203 † 72
4. Compared with the last few months, is your current general financial situation better or worse?	-.144 72	.052 72	-.027 72	.023 72	.043 72	.177 72	.026 72
5. When making important decisions about personal finance risks, how frequently do you think through all the pros and cons of each alternative?	-.099 72	-.310 ** 72	.001 72	-.074 72	-.008 72	.142 72	-.123 72
6. When making important decisions about risks to your personal finances, how frequently are you influenced by your feelings, or emotions?	-.077 72	.088 72	-.043 72	.112 72	.081 72	-.209 † 72	-.004 72
7. How much risk is involved in your personal finances?	-.004 72	-.069 72	-.022 72	-.534 *** 72	-.186 72	-.136 72	-.278 * 72
8. Do you prefer to take risks or avoid risks when making decisions about your personal finances?	.071 72	-.108 72	-.050 72	-.534 *** 72	-.179 72	-.054 72	-.245 * 72

† $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

Appendix 6

Descriptive statistics for the newly created variables used in the analysis discussed in Chapter 7

Table A6: Descriptive statistics for the variables used in the analysis described in Chapter 7

	N	Mean	SD	Skew	Skew	Kurtosis	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Std. deviation	Statistic	Std. deviation
SD feeling variables	358	.869	.510	.410	.129	.353	.257
SD better or worse variables	358	.710	.483	.500	.129	.979	.257
SD payoffs and costs variables	358	.861	.620	.431	.129	-.415	.257
SD emotion variables	358	.798	.547	.234	.129	-.430	.257
SD perceived risk variables	358	1.037	.596	.225	.129	-.553	.257
SD risk preference variables	358	.858	.531	.202	.129	-.352	.257
Work goals scale	358	3.054	.794	-.069	.129	-.105	.257
Life balance scale	358	2.740	.913	.232	.129	-.298	.257
Health protection scale	358	2.994	.910	.005	.129	-.622	.257
Use of money scale	358	2.994	.888	-.067	.129	-.367	.257
Gambling scale	220	2.983	1.063	.382	.164	-.611	.257

Appendix 7

The development of the domain-specific risk preference scales discussed in Chapter 7

Principal components analysis was used to examine each set of ten domain-specific items. The tables below show the Varimax rotated component matrix for each set of items.

Table A7.1: Varimax rotated component matrix for work domain-specific items

	Component		
	1	2	3
1. I meet almost all my goals at work without significant risk to me or the organisation.	.759	.005	-.183
2. When making an important decision, I would rather wait and see than risk making a mistake.	.631	-.003	.198
3. Risk is part of the excitement and interest of my work.	-.593	.240	-.005
4. I prefer not to reach targets than to take risks.	.534	-.321	.141
5. I avoid the risk of making a mistake as often as possible.	.446	-.242	.217
6. To get on with my work, I am happy to put up with things that can go wrong.	.005	.812	-.003
7. I do whatever it takes, including taking risks, to achieve targets.	-.302	.581	-.008
8. To achieve at work, I have to risk making mistakes.	-.437	.517	.367
9. I feel apprehensive that I might make a mistake at work.	-.003	-.141	.853
10. I feel apprehensive when I take risks to achieve work-related goals.	.457	.145	.672

Factor 1 comprised items 1, 2, 3 (recoded), 4 and 5.

Cronbach's alpha for Factor 1 = .633

Factor 1 formed the work goals scale.

Factor 2 comprised items 6, 7 and 8.

Cronbach's alpha for Factor 2 = .483

Factor 2 was not used in subsequent analysis.

Factor 3 comprised items 9 and 10.

Cronbach's alpha for Factor 3 = .544

Factor 3 was not used in subsequent analysis.

Table A7.2: Varimax rotated component matrix for health domain-specific items

	Component			
	1	2	3	4
1. I feel spending a lot of time at work is losing out on a full life.	-.720	.117	-.005	.411
2. I get satisfaction from working long hours.	.706	.175	.221	.003
3. I rarely take work home in the evenings or at weekends.	-.701	.003	.180	-.146
4. The best way to get my work done is for work to have top priority in my life.	.681	-.004	.007	.315
5. To do what I want to in life, I have to expose myself to things which can be health hazards.	-.003	.847	.102	.101
6. My health is too important to me to put it at risk voluntarily.	-.009	-.756	.277	.008
7. I'd rather enjoy life than spend time trying to avoid health hazards.	-.005	.486	-.452	-.009
8. I try to prevent health problems before I feel any symptoms.	-.001	.007	.837	-.006
9. I am apprehensive about health hazards and take action to prevent them.	.009	-.284	.705	-.003
10. I am apprehensive if I know I need to spend a lot of time doing things unrelated to work in the evenings or at weekends.	.161	-.002	-.005	.895

Factor 1 comprised items 1 (recoded), 2, 3 (recoded) and 4.

Cronbach's alpha for Factor 1 = .658

Factor 1 formed the life balance scale.

Factor 2 comprised items 5, 6 (recoded) and 7.

Cronbach's alpha for Factor 2 = .603

Factor 2 formed the health protection scale.

Factor 3 comprised items 8 and 9.

Cronbach's alpha for Factor 3 = .210

Factor 3 was not used in subsequent analysis.

Factor 4 comprised item 10.

Factor 4 was not used in subsequent analysis.

Table A7.3: Varimax rotated component matrix for finance domain-specific items

	Component		
	1	2	3
1. I enjoy the excitement of gambling.	-.843	.125	-.003
2. Gambling is an opportunity for me to have fun.	-.824	.007	-.005
3. Whenever possible, I avoid gambling with my money.	.732	-.137	.330
4. Gambling is just a waste of money.	.656	-.006	.009
5. I enjoy spending most of my disposable income.	-.001	.836	.007
6. I prefer to always leave a good proportion of my money in my account, or save it, than risk or spend much of my money.	.002	-.792	.205
7. I take opportunities to enjoy my money now, rather than in the future.	-.129	.747	.008
8. I systematically divide my income into spending and saving money.	.104	-.509	.107
9. I feel apprehensive when I gamble.	.263	.146	.830
10. I feel apprehensive if I know I'm likely to overspend.	.005	-.469	.684

Factor 1 comprised items 1 (recoded), 2 (recoded), 3 and 4.

Cronbach's alpha for Factor 1 = .791

Factor 1 formed the gambling scale.

Factor 2 comprised items 5 (recoded), 6, 7 (recoded) and 8.

Cronbach's alpha for Factor 2 = .721

Factor 2 formed the use of money scale.

Factor 3 comprised items 9 and 10.

Cronbach's alpha for Factor 3 = .477

Factor 3 was not used in subsequent analysis.

Appendix 8

Correlations between domain-specific risk preference scales discussed in Chapter 7

Table A8.1: Correlations between domain-specific risk preference scales

	Work goals scale	Life balance scale	Health protection scale	Gambling scale
Life balance scale	.001 358			
Health protection scale	-.136 ** 358	-.031 358		
Gambling scale	.305 *** 220	.130 † 220	-.186 ** 220	
Use of money	.130 * 358	.099 † 358	-.278 *** 358	.199 ** 220

† p < .1, * p < .05, ** p < .01, *** p < .001