

Why Managers and Companies Take Risks



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Les Coleman

Why Managers and Companies Take Risks

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and 46 Tables

Physica-Verlag

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Publication of this work was assisted by a publication grant from the University of Melbourne.

ISSN 1431-1941

ISBN-10 3-7980-1695-7 Physica-Verlag Heidelberg New York

ISBN-13 978-3-7908-1695-2 Physica-Verlag Heidelberg New York

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Printed in Germany

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Typesetting: Camera ready by author
Cover Design: Erich Kirchner, Heidelberg
Production: LE-TEX, Jelonek, Schmidt & Vöckler GbR, Leipzig

SPIN 11668084 Printed on acid-free paper – 88/3100 – 5 4 3 2 1 0

Preface

This book uses risk in its dictionary meaning as the probability of an undesirable outcome, and has two research questions: when managers make decisions, what leads them to choose a risky alternative? and: what determines whether the decision proves correct? Answers to these questions form a model of decision making that explains the process and results of managers' risk-taking in the real world.

There is an extensive literature on risk and decision making because the topic has been of interest in many disciplines since at least the 18th century. Thus insights on the research questions are available from studies of animals, humans and organisations; and have been drawn by scholars in biology, psychology, finance and management. Even so, there is a large gap as most studies are conducted away from corporate settings and use subjects with limited decision experience. The few studies set in real-world conditions tend to concentrate on just a single aspect of decision makers' attributes, setting and behaviour, and on either decision choices or outcomes. The empirical work in this book is designed to fill part of this gap.

My specific purpose is to integrate a wide spectrum of decision features and provide a seamless link between decision maker, environment and outcomes in relation to non-diversifiable risks associated with the decisions of individual managers. A model is developed from the literature which indicates that the main determinants of individuals' risk-taking are personality, decision making style and expectations in regard to the outcome. This theoretical model is then quantified using a hypothetical business decision which records decision maker attributes and examines why they take a risky alternative or not. A second survey records the attributes of executives and their organisations, and uses this material to explain financial results and crisis frequencies in terms of decision maker attributes, industry and organisation characteristics, and organisational environment and risk practices. Thus conclusions are drawn from representative real-world data through surveys of experienced managers.

The materials address the organisation-level topic of risk-taking by managers, and point to strategies for organisations to dial up the right level of risk. Conclusions from the research are presented as an extended explanation of the causes and consequences of risk-taking; a new model of deci-

sion making called Risk Budget Theory; and a manager oriented guide to developing risk-based strategy. This extends the scope of risk management which – in Australia, at least – has largely addressed workplace hazards or provided defences for Boards against potential litigation. Apart from the book's contribution to management theory, the holistic description of managers' real-world decision making has applicability to practising managers, and the explanation of corporate results will interest investors.

This book had its origins in a casual remark by a colleague who suggested that many people would be interested in whether risk was rising or falling. In my ignorance of risk, the answer seemed obvious. However, it proved anything but; and launched me into a decade of fascination with a topic that has engaged researchers for centuries.

Since Murray Cliffe's observation, many people have generously helped with insights, ideas, comments and feedback. Professor Danny Samson, who supervised my research for the PhD thesis which formed the basis of this book, has been generous with his time and expertise: this book has greatly benefited from his input. Professor Ira Horowitz also made valuable comments. Professor Rob Brown and other Finance faculty at the University of Melbourne have provided great assistance and encouragement. Other academic colleagues – particularly Mitch Casselman, Victor del Rio, and Dayna Simpson – provided rich support, as have friends at ExxonMobil and other organisations who kept my research relevant to management.

I appreciate the assistance of Springer in progressing this work, and acknowledge a grant from the University of Melbourne that facilitated its publication.

I am particularly grateful to Sue, Lou, Georgie and Robbie who were interested and supportive of this research, as were a wide circle of family and friends who provided continuous help and encouragement. Naturally all errors and omissions are mine.

January 2006

Les Coleman

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CHAPTER 1 Introduction

“To avoid all mistakes in the conduct of great enterprises is beyond man’s powers”

Plutarch, *Lives: Fabius*

Management can be reduced to the task of serial decision making, frequently in unfamiliar areas. When risk is defined as the possibility of a significant, adverse outcome, successful management requires correct choices in the face of uncertainty. Thus management skill is a function of analysis, foresight and risk evaluation.

This book focuses on the last competency and seeks to answer two simple questions: when individual decision makers – particularly managers – face choices, what makes them prefer a risky alternative? And: what determines whether the decision proves correct? To take concrete examples: why do some managers conduct in-house research and development, whilst others purchase developed technologies? when decisions are post-audited, what leads a few mergers and acquisitions to succeed, whilst most fail? why are some firms crisis-prone, whilst others prove trouble-free?

This book’s focus is on the top level of organisations, particularly on the causes and consequences of risk-taking by managers, and on the strategies that organisations can employ to dial up the right level of risk.

This chapter sets the scene for the book as a whole and proceeds in four parts. The first amplifies the questions above to describe the ‘research problems’ which are tackled, and the next section outlines the strategy followed. The third section describes the contribution of the book; whilst the chapter closes with an outline of general strands in the literature to put the book in the context of existing thought.

Research Problems Tackled by this Book

Bewley (2002: 343) wrote that “the most fundamental elements of economic life are the decisions made by its participants” and then observed that explanatory models are “inappropriate”. According to Huber and

Kühberger (1996: 329): “most of the experimental results on the risky behavior of individuals have been in reference to simple gambles... [But] behavior in the gambling tasks differed systematically from that in the natural-decision tasks.”

It is hard to envisage a larger research target than an important discipline whose fundamental elements lack an appropriate explanatory model. And it is hard to envisage a larger research void than an important behaviour that is being incorrectly investigated. This book uses real-world data to tackle part of the research target, specifically the mechanisms which lead managers to select risky alternatives and the financial and risk implications of these decisions.

Two common threads link materials in this book: consideration of risk in its dictionary meaning as the probability of an undesirable outcome; and behavioural economics (especially natural decision making)¹.

Behavioural economics (BE), which incorporated psychology into economics, emerged in the 1950s through the efforts of scholars including Richard Cyert, Herbert Simon and James March [Augier and March (2002)]. They encouraged wholesale rejection of the normative economic assumption that individuals operate rationally to ensure their behaviour is optimised. The eclectic discipline sought to explain real-world economic behaviour, rather than advancing proscriptive solutions, and the term behavioural economics came into common use after 1980 [Gilad et al. (1984)]. The state of thinking of this fascinating discipline is well described by Kahneman (2003) and Camerer and Loewenstein (2004).

A study of individuals' risk-taking behaviour (such as set out here) would not be important so long as the dominant normative assumption of expected utility (EU) held true. Under expected utility, decision makers choose the best probability-weighted outcome from all available choices. Markets ensure that equilibrium prices are derived for the present value of the expected outcomes. To the extent that decisions (including market prices) do not maximise expected utility, there is an opportunity for a utility-optimiser to generate profit.

¹ *Behavioural Economics* lacks an agreed definition, but a good example is provided by Mullainathan and Thaler (2000: 1): “the combination of psychology and economics that investigates what happens in markets in which some of the agents display human limitations and complications.” *Natural Decision Making* involves experienced decision makers in field settings where decisions are not routine. These are investors and managers, airline pilots and fire chiefs whose decisions involve a struggle with complexity, lack of data and poorly known risks. Their decisions have urgency, immediacy and serious consequences. According to Meso et al. (2002: 64) natural decision making is “how people use their experience to make decisions in complex, dynamic real-time environments.”

The self-correcting features of this process were clear to Evans (1997) who found that individuals' anomalous behaviour was reduced when they are placed in a market setting, presumably because markets are sufficiently large to eliminate any irrational biases, either by smoothing them or applying the error-correcting power of rational participants.

Under assumptions of EU, no matter how interesting it might be to understand individual decision making, the knowledge is of little economic relevance. This view dates to at least the 1980 opinion of Schumpeter [Machlup (1978: 465)]:

"It is methodologically mistaken for economics to deal with ... the motives of human conduct ... A relationship between the value functions which the economist must assume and certain psychological or physiological facts may well exist, but this relationship is only of philosophical interest. For the economic results it is irrelevant and can never be the task of the economist to go into these matters."

This explains how the results of behavioural studies can be dismissed by macro-economists as merely pointing up the mechanics of individual decisions, rather than displaying revealed preferences which are critical, especially to market valuations. It also explains why behavioural economics is outside the mainstream of the discipline², and has not yet been widely taken up in the management literature.

Despite patchy coverage elsewhere, behavioural economics has found considerable application in finance. This is because of its measurable impact on markets, the availability of good data to conduct tests, and strong incentives to find explanations. For instance, De Bondt and Thaler (1990: 57) point to extremes in market swings and analysts' forecasts and conclude there is no alternative but "to take seriously the behavioural explanations of anomalous financial market outcomes." Another motivation is the growth in retirement savings and savers' preference for mutual funds which is increasing the dominance of markets by professional investors: in theory, this should make individual biases less important. However, the evidence shows that investment professionals are subject to behavioural biases [Shapira and Venezia (2001)], and so their garnering of market power may exacerbate anomalies. The evidence is clear that decisions of individuals contribute to biases which are able to distort markets (even quite significantly, for instance through formation of bubbles). And, of course, biases are important in corporate finance when individuals make major decisions such as in takeovers. Thus it has become impossible to

² A still tentative alternative view comes from Berg (2003: 412) who argues that "major themes in behavioural economics ... now fit comfortably into most major journals in economics...[although] it has not been accompanied by a new normative framework for analysing policy."

sustain the comfortable assumption that individuals' behavioural biases are irrelevant to finance and management.

A second justification for dismissing individuals' behavioural biases is that they only affect the demand side of markets. Supply side impacts, however, are increasingly evident. For instance, investors are more willing to sell assets (such as stocks and houses) which have been profitable than they are to sell equivalent assets which have returned a loss [Odean (1998)]; evidence also shows that transactions depend on their assets' price path [Heath et al. (1999)].

Decision making is clearly far more than a clinical calculation using rational methodology. Thus an important question raised by this book is the extent to which risk and systematic deviations from profit maximisation should be incorporated into formal decision making models. Some authors believe it is necessary to correct irrational decision making, and they advocate more intensive teaching of normative decision models such as expected utility.

The opposite view is advanced by Raiffa (1961: 692) who pointed to the "need to teach people how to cope with uncertainty in a purposive and reflective manner." In addition there are valid reasons why stakeholders would prefer managers to actively control operational risk. And – as discussed by Berg (2003) – there are situations in markets where non-optimising decisions ('anomalies') can have positive consequences. Moreover context can be critical to risk: what is an appropriate decision for a hedge fund may not be appropriate for a charity.

This book assumes that decision makers act rationally when facing risks; that their approach has behavioural, economic and social elements; and that the results of their decisions are economically important at the level of individuals, firms and markets. The book also finds significant shortcomings in the considerable body of work published on risk and decision making. In particular there is not a satisfactory model of how people make decisions which is both predictive and consistent with evolutionary pressures to accumulate knowledge and optimise outcomes³.

The significance and breadth of the influences of risk on decision making offer major challenges in the recognition, analysis and consummation

³ There is a longstanding association between finance and biology. Malthus (1798, reprinted 1973) linked the biology of population growth to the economics of natural resource supply; Schumpeter (1939) adopted a Darwinian view of business cycles with his description of capitalist development as an evolutionary process incorporating natural selection and punctuated equilibria. Nelson and Winter (1982) arguably popularised the modern association between evolution and economics, and encouraged Hodgson (1995) to collect 30 key papers charting the post-1950 emergence of biological analogies in economics.

of a decision. So for this book to have a manageable topic, the focus has been reduced to two simple research questions.

The first research question is: when individual decision makers – particularly managers – face multiple choices, what makes them adopt a risky alternative? In specific terms:

- what elements of behavioural economics help to explain decision making by individuals in real-world settings?
- how applicable are published theories to managers' decision making, especially Prospect Theory?
- what are the relative influences of the decision facts, the personality and other attributes of managers, institutional setting and culture, and risk environment?
- which models are best able to explain managers' decisions?
- what is the role of experts in decision making under risk?

The second research question is: what determines whether managers' choice of a risky alternative proves successful? Again this can be broken into specifics:

- what features of decision makers and organisations explain the occurrence of crises and serious incidents?
- is there a linear relationship between firm risk and return?
- which of published models explain the relationship between risk and financial performance of companies?
- what are the relative influences on firm returns of managers' characteristics, corporate structure, industry parameters, and risk environment?

This book seeks a solution to these research questions by developing a decision making model to explain the behaviour of individuals under risk; and then examining its implications. The strategic objectives of the approach are to:

- Take a real-world view of risk by using its common, dictionary meaning as the chance of bad consequences or loss (*Oxford Dictionary* defines risk as “hazard, chance of or of bad consequences, loss, etc, exposure to mischance”).
- Focus on risky decisions without assuming that decision makers treat gains and losses symmetrically, nor that they place them on a continuum
- Separate the process of decision making followed by individuals (especially managers) from that used by organisations. Previous work commingled the two, and ran into difficulties over risk preferences which can be determined *ex ante* for individuals (by interviews and questionnaires at the time of decision), but not for organisations

(where risk attitude is usually measured *ex post* by a proxy related to variation in accounting or market measures)

- Replicate real-world decision making by heterogeneous individuals rather than measuring less representative responses of homogenous, naive subjects.
- Include a large number of independent variables in an initial screen of the drivers of decision making under risk, and so guard against the hypothesis myopia that has plagued a number of models
- Be multidisciplinary and draw the best contributions from a variety of studies by researchers in the natural and social sciences. Lopes (1994: 198) warned against a uni-disciplinary approach: “just as psychologists construe the world in ways to fit it to the lab, economists construe the world in ways to make it mathematically tractable.” Although risky decision making by investors and managers should notionally be the preserve of economic theory, the issue and its consequences are “much too serious to be left to economists” [McClelland (1961: 12)].

The analysis owes a large intellectual debt to six pioneering works⁴:

1. ‘Timid Choices and Bold Forecasts: A cognitive perspective on risk taking’ by Kahneman and Lovallo (1993) which explains how managers can misjudge decision outcomes
2. ‘Characteristics of Risk Taking Executives’ by MacCrimmon and Wehrung (1990) which used a survey of 509 senior business executives to examine differences in the socio-economic characteristics of those who take risks and those who avoid them.
3. ‘Managerial Perspectives on Risk and Risk Taking’ by March and Shapira (1987) which was published in *Management Science*
4. ‘The Expected Utility Model: Its variants, purposes, evidence and limitations’ by Schoemaker (1982) which provides an illuminating evaluation of one of decision making’s most important tools
5. ‘Performance, Slack and Risk Taking in Organisational Decision Making’ by Singh (1986) which was published in the *Academy of Management Journal*.
6. ‘Determinants of Risky Decision-making Behaviour: A test of the mediating role of risk perceptions and propensity’ by Sitkin and Weingart (1995) which was published in the *Academy of Management Journal*.

⁴ In mid 2003, the ICI Web of Science citation database listed 132, 43, 210, 349, 148 and 44 citations, respectively, for these papers.

The Analytical Strategy of this Book

Economics has four principal techniques to describe the way people reach decisions when facing risk or uncertainty. The first is a normative depiction of what should happen, and is typified by the subject-free thought experiments of Bernoulli (1738, translated 1954) and Ellsberg (1961). The second technique uses mathematics to codify the outcome. Good examples are provided in finance by the Capital Asset Pricing Model (CAPM) and Black-Scholes option pricing model. The third – and arguably most topical – approach uses laboratory experiments to develop descriptive models such as those of Kahneman and Tversky (1979). The fourth technique studies the act of natural decision making and builds models that describe real-world behaviours and outcomes.

This book follows the last technique and proceeds through two broad stages. The first is to describe what is known about how individuals make decisions when facing risk. Given my intent to develop a unified model of the influence of risk on decision making, the literature search covered numerous disciplines: human and animal behaviour, financial markets data, and management and social sciences. The resulting 'material' includes experimental studies and field evaluations; old theories, and new concepts such as enterprise risk management; and studies from psychology, engineering and mathematics as well as economics and management.

The first figure summarises my approach.

The literature survey provides lessons from: studies of human behaviour and its interpretation by biologists and psychologists; animal behavioural studies; and analyses of human decisions at the individual level (e.g. merger transactions) and aggregated in equity and other financial markets. Decision models are drawn from traditional disciplines of economics and psychology, and use is made of advances in other disciplines such as engineering, mathematics and law. The disparate literature and existing models are combined to develop a revised model of risk and decision making which is then validated using tailored surveys of executives. The result gives the ability to project the outcome of risk-sensitive decisions and so form expectations of future risk.

The first part of the literature survey identified the process by which a decision is reached. As noted by Schoemaker (1982), this includes how the facts of a decision are understood and processed; what information is incorporated in the decision process, and the way it is sought and analysed; and how conflicts are resolved. This goes beyond a description of the ideal process where decision makers are well informed, understand their situation and alternatives, target economic optimisation and are purposively ra-

tional. Alchian (1950: 211) pointed out that even though such “unrealistic postulates” typify post-War economic methodology, they cannot be assumed for real-world decisions which are characterised by incomplete information and less than robust analysis.

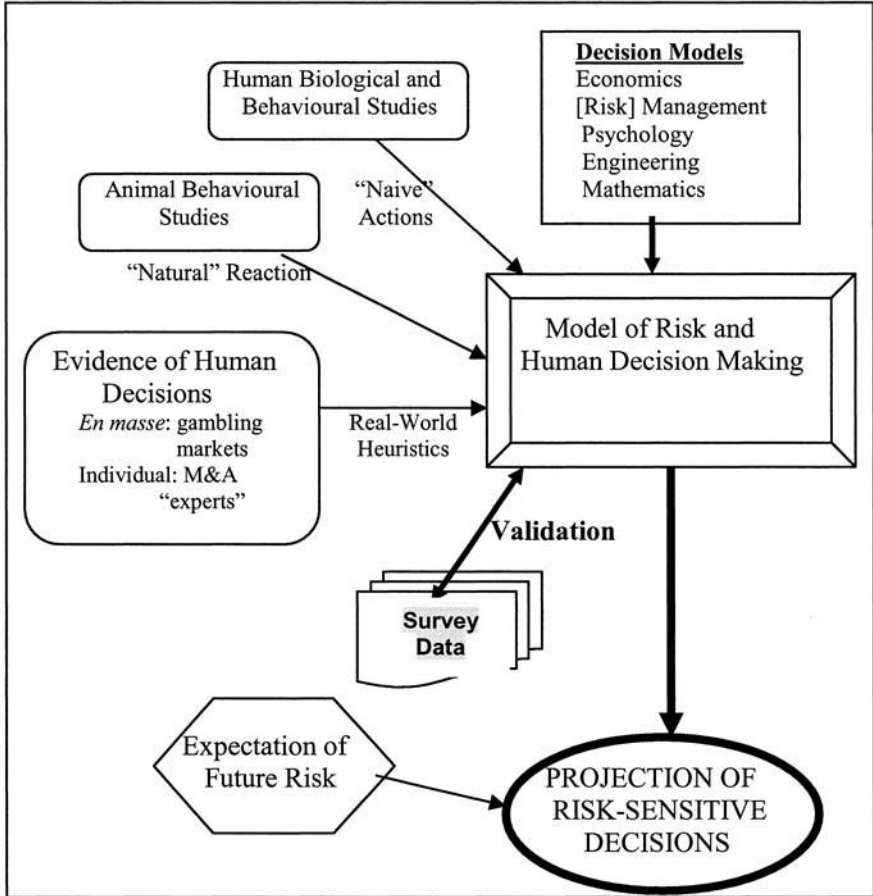


Fig. 1.1. Constructing a Risk and Decision Making Model

The second element of the literature search is to actively seek out evidence to support the mechanisms identified. My aim is to collect a representative sample of materials which describe the process surrounding decision making by individuals when facing decisions with risky alternatives in the real world.

Unfortunately most empirical studies examining decision making deal with known probabilities, or what Knight (1921) called probabilistic risk.

Data are derived from experiments in unreal settings such as laboratories using unrepresentative decisions such as fair gambles with dice and the like. Experiments are qualitatively different to all real-world decisions (bar those in games of pure chance) which involve uncertain outcomes whose statistical distribution is not known. According to Fox and Tversky (1998: 881), “there is ample evidence that people’s intuitive probability judgments are often inconsistent with the laws of chance.” Allais (1988: 274) was similarly critical of what he termed a ‘fundamental gap’ in research and asked rhetorically: “how can the validity of axioms and their implications be tested without referring to observed facts?” Without belabouring the point, there is room to doubt the extent to which traditional risk-based experimental studies can be generalised to real-world behaviours.

A further concern about many research materials is the homogeneity of their subjects: a surprisingly high proportion of studies rely upon responses solely from undergraduate students. Perhaps because the use of these homogenous, naïf subjects is so experimentally convenient, researchers rarely discuss the inevitable bias to results. Only a handful of studies have compared large enough samples of students and more representative subjects to give a statistically meaningful comparison. A good example is provided by Frederick (2003) who tested intergenerational time preferences using 158 Pittsburgh jurors and 243 undergraduates at the University of Arizona and Carnegie Mellon University. He found consistent differences between the two groups in all measures, and one third were statistically significant ($p < 0.05$). A similar conclusion was reached by Potters and van Winden (2000) who compared the responses of 142 students and 30 public affairs professionals. They concluded that there were significant differences ($p < 0.1$) in the decisions of the two groups. Schoemaker and Kunreuther (1979) studied the insurance decisions of 201 undergraduates and 101 insurance buyers and found significant differences in risk attitudes (students were more risk prone), and in decision making style.

The need to obtain representative, preferably real-world, evidence also recognises the arguments of Friedman (1953) and Machlup (1978) that economic theories are only valid if they are able to accurately predict (or at least explain) behaviour which has not been used in constructing the model. This avoids data-mining of the type which *ex post* rationalises observed experimental behaviour; and it eschews normative descriptions which explain away any inconsistencies or violations as anomalies, or due to confounding data. The latter approaches mean that no ‘law’ can ever be disproven: each is merely tautological; and prediction is impossible.

A good example of the way that anomalies are rationalised away is the concept of satisficing which Simon (1955) advanced to explain how humans are prevented from optimising their decisions because of a shortage

of time, data, computational capacity and so on. Decision makers are boundedly rational and abandon further effort when the cost of obtaining information exceeds a threshold. Another example is the extensive catalogue of evidence that decision makers do not make sensible decisions [e.g. Rabin (1998)]: most are dismissed as decision shortcuts that induce cognitive illusions in people (and animals), rather than analysed for evidence of purposeful decision intent.

The approach here assumes that real-world decisions have a logical basis, and collects empirical data to develop a comprehensive decision making model. Two types of dataset are available. The first is obtained by examining individuals' hypothetical or actual decisions, and collects data by intensive study such as surveys of subjects' *ex ante* characteristics and expectations. The second method considers the aggregated outcomes of many similar decisions which have been made at the enterprise or market level such as in market trading⁵.

Despite the superficial attractiveness of real-world settings, these approaches still suffer from several deficiencies. First they address only a single decision in isolation: what should I do in this particular case? This ignores the editing process which preceded or even triggered the decision (that is, not everyone gambles, invests, or holidays overseas). In addition, analyses can be only ever be partially alert to all situational parameters, which means the impact of some salient forces may not be recognised. A third deficiency is that the approaches cannot control the decision context and stimuli: thus they have difficulty in precisely calibrating risks, probabilities and outcomes.

Perhaps most importantly, it is not always easy to precisely titrate what is the 'real world' and what is not. A laboratory experiment involving students in a hypothetical gamble is not; and examining the actual performance of companies in light of their characteristics is. However, this does not imply that all laboratory experiments should be dismissed as artificial; nor that the results of all field experiments be accepted uncritically. As Schoemaker (1982) points out, a valid decision making model will be used successfully in experimental settings. Distinctions are even more complicated in the grey area of hypothetical decisions. Tsevat et al. (1995), for instance, evaluated the health values of seriously ill, hospitalised patients using the following question: 'would you prefer living one year in your

⁵ A further extension is possible where firms are driven in accordance with the assumptions of rational principal-actor models. This compiles *ex post* outcomes, typically financial results, and analyses them in the light of managers' attributes and firm characteristics (e.g. size, market, governance).

current state of health or 11 months in excellent health?’ Is this realistic? What if the patient’s physician or family are asked about their preference?

For simplicity, my view is that real-world studies must involve subjects who are experienced decision makers and present decisions in a natural manner using material that is relevant to subjects’ experience. Moreover, evidence which is most valued will come from settings which approximate real-world circumstances. Because it can be challenging to lay down hard guidelines on what is ‘real-world’ and what is ‘artificial’, the merit of evidence is determined by its representativeness, rather than its context.

The complex issues surrounding risk and decision making make it tempting to concentrate the literature survey around a single discipline. But cursory reading shows that a fragmented approach will not adequately address such a complex topic where the individual and market, process and mathematical model, risk and reward circle each other like sets of twin suns. It is not possible to understand decision making without using multiple disciplines to examine both the decision stimuli and the decision makers’ personal attributes.

It proved a significant challenge to synthesise knowledge from a variety of disparate paradigms and intellectual traditions. The result incorporates assumptions, conclusions and methodologies which often conflict, and have rarely been integrated. As a stark example, psychologists studying decision making focus on the person and process; whereas economists focus on the aggregate outcomes; and engineers and lawyers look at specific outcomes, particularly failures. Thus psychologists’ models of decision making look like road maps or how-to guides, whilst economists compile pages of complex formulae. In epistemological terms, this is the conflict between anti-positivists and positivists who, respectively, see the world as comprehensible only from an individual’s unique position, or as subject to depiction by causal relationships [Burrell and Morgan (1985)].

The goal of the literature search is to develop a model of decision making which can be empirically validated, and used to make at least qualitative predictions. The model is required to be testable, and provide guidance on how behaviours – particularly in management – change under shifting risks.

The second stage of the book’s analysis is to validate the model and use real-world data to examine the implications of risk-taking behaviour by managers. The empirical analysis is largely intensive in the form of surveys as this gives sufficient granularity in responses to examine the influence on decision making of individual differences.

Such intensive methods suffer from a number of deficiencies. One is the *Hawthorne Effect* where simply observing behaviour can possibly change it [Mayo (1933)]. Intensive studies must also recognise the Soros (1994)

Theory of Reflexivity in which systems with thinking participants are shaped by decision makers' actions. These concerns are exacerbated by the ethical research requirement for informed consent: describing the research proposal effectively frames the subjects' responses. Moreover surveys merely recognise patterns in subjects' reports and their validity relies upon the goodwill of participants. In a socially sensitive area such as risk and decisions, there is no guarantee that subjects' responses will reflect their true preferences.

Another deficiency is that – although the surveys are wide-ranging – they are not designed to evaluate the processes of making a decision, and hence are blind to the quality of risk-taking. In addition, the surveys do not consider operational risks such as workplace hazards and similar safety issues which are clearly important given the report by Studdert (2004) that a quarter of workplace accidents are associated with drugs or alcohol.

To counter possible biases in the preferred data collection strategy, two surveys are used so that hypotheses can be confirmed by independent datasets. This protects against the concern discussed above that some economic theories merely explain the data which have been used in constructing the model: the conclusions are tautological in developing *ex post* rationalisations of observed experimental behaviour.

Despite some limitations, the strategy followed by this book ensures that its findings have important strengths, especially: strong grounding in the literature, including results of empirical studies; linkage between the various research tools to ensure internal consistency of findings; explicit ties to independent, published statistics; strong emphasis on real-world decisions so that decision makers are operating in a familiar environment without artificial distortions; and use of heterogeneous samples of experienced decision makers. This should develop and test hypotheses in a realistic environment.

Whilst this approach appears logical, developing the model involved a fragmented approach of gathering data from numerous sources. To facilitate the reader's monitoring of the research process, figure 1.2 uses an approach suggested by Holloway (1979) to show the overall framework of the book.

Essentially risk and decision making are each analysed in parallel by means of a literature survey and empirical research. The results lead to the three contributions shown in heavy boxes – an update of Applied Behavioural Economics, Risk Budget Theory, and Enterprise Level Risk Strategy – which are discussed in the following section.

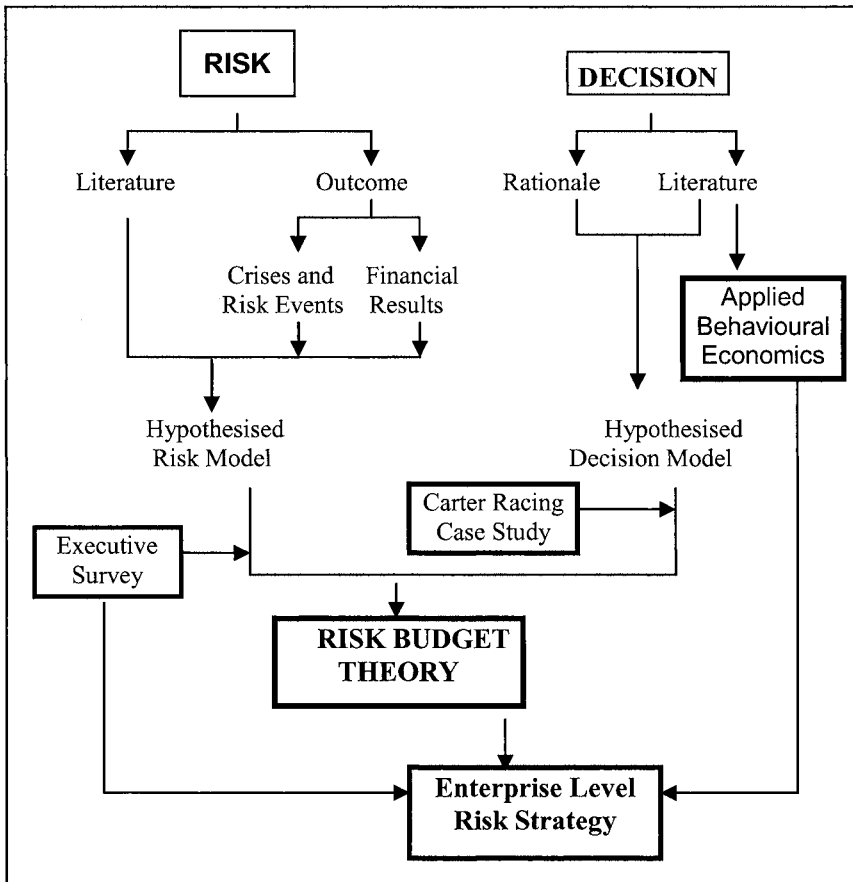


Fig. 1.2. Overall Framework of the Book

Chapters three and four cover the literature on risk and decision making by individuals, while chapter five covers the influence of risk taking by organisations on their performance. Chapter six reviews published models on risk and decision making to develop the hypothesised model discussed in chapter seven. The basis of the two surveys is discussed in chapter seven and results are provided in chapter eight. Chapter nine synthesises material from the literature survey and empirical analyses. Chapter ten reviews Risk Budget Theory whilst chapter eleven covers applied behavioural economics and enterprise level risk strategy.

The Contribution of this Book

The contribution of this book is to improve our understanding of the mechanisms and consequences of risky decision making by individuals, especially managers. This is relevant for two reasons. First risk is topical. A recent cover story in the magazine *Business Review Weekly* [17 April 2003] was subtitled: “Obsessed with corporate governance, company boards are afraid to take risks.” And Chair of CSIRO, the Australian government funded research body, Catherine Livingstone has pointed to the ‘risk paradox’ where voters are becoming more risk averse just when greater risk is required to tap increasingly beneficial new technologies [Livingstone (2002)].

The second reason to address risk is its centrality to microeconomics and its importance in management theory. Risk-taking by individuals (and by all but the largest organisations) is not diversifiable in the manner assumed in modern capital markets theory: decisions frequently result in a single risk:reward trade-off and lack a clear probability distribution. As a result, risky decisions hold the potential for financial catastrophe. Given that most of the individuals examined in the research here are managers, the principal-agent interaction means their decisions impact on the risk:reward trade-offs of their employer. The research strategy specifically addresses this topic, and determines the importance to firm success of good risk-taking (as opposed to the importance of strategy and structure as depicted in, for instance, the Porter (1980) competitive model).

A further contribution of the book is to unify knowledge from a variety of disciplines which – because it has been developed virtually independently – remains fragmented. Relevant literature is spread across animal behaviour, economics (accounting, finance and management), engineering, and psychology. There are also useful concepts and applications in fields as far apart as anthropology, politics, law and sociology. Although there have been some sporadic attempts to unify parts of this knowledge (e.g. economics and psychology by economists Simon (1955) and Rabin (1998), and by psychologists Edwards (1954) and Lopes (1994)), the disciplines have generally not communicated their understanding and unique insights.

This book has the generic goals of linking disparate literatures on risk and decision making, and providing useful guidance on the topic for managers who might wish to strategically influence their level of risk. Its specific goal is to contribute to improved knowledge through: summarising and extending empirical data, particularly on the population of risky decisions, the outcomes of risky decisions, and risk management practices; evaluating the influence of demographic and personality measures on risk

propensity, and explaining their action; using heterogeneous subjects in representative settings to examine the motivations, goals and results of risky decision making by individuals and organisations; and developing an improved model of decision making that is able to accommodate influences on individuals such as differences in personality, assets, and overall portfolio of risks.

These contributions are drawn together in the final chapters under three themes: Risk Budget Theory of Decision Making; Applied Behavioural Economics; and Enterprise-Level Risk Strategy. A brief summary follows of each so that their development can be traced through the literature review and empirical studies.

Key to the Risk Budget Theory of Decision Making (RBT) are conclusions that decision makers: are subject to bounded rationality; make decisions in stages; use reference levels to divide outcomes into losses and gains; feel a loss more than the equivalent gain; treat separate decisions as a sequence and mentally account for net moves above and below the reference level; and are loss-averse in that they avoid a net losing outcome. In addition, they pay minimal attention to outcome probabilities and do not follow a logical process of comparing alternatives; nor do they have stable risk attitudes, but rank alternatives by their utility (which is efficiently described by an exponential function).

RBT proposes that decision makers simplify their task by using a risk budget, ρ , which is a function of the sum they are prepared to lose at any point in time. The budget is a unique function of the decision maker's personality, endowment and context. As decisions proceed through a sequence, decision makers accumulate their net change in endowment, and – when further decisions are offered – deduct potential losses from the accumulated position: if this revised outcome produces a loss greater than the risk budget, it is rejected; if the worst outcome does not blow the risk budget, then the decision is assessed on its merits. Decision makers whose net loss position exceeds the risk budget will either take no action, or – if strongly loss averse – will select an alternative whose outcome will wipe out accumulated losses, irrespective of the risks involved. The theory is applicable to all forms of endowment ranging from wealth to health and prestige.

The book also provides a partial update of *Applied Behavioural Economics* (ABE), which is a term coined by Maital (1988) in his introduction to a volume of conference proceedings that provided empirical results of relevance to managers and policy makers, and addressed issues as diverse as productivity, labour relations, and tax evasion. Although not widely studied as a formal discipline, ABE sits astride the real-world interface between psychology and markets where minds meet dollars, and its knowl-

edge base has expanded rapidly following developments in animal behaviour, psychology and economics; and through derivative models from fields including law, medicine, and politics. This book seeks to draw together many relevant studies of ABE to provide representative evidence to support decision theories.

Enterprise-Level Risk Strategy uses recent findings from behavioural research to update previous concepts of corporate risk strategy, and provides empirical support through field research into executives' attitudes towards risk. The result is a comprehensive approach to corporate risk strategy which covers manager selection, risk philosophy, measures of organisation risk, and financial consequences. The Strategy should allow organisations to better educate their managers about influences on risk-taking, involve appropriate staff in risky decision making, and evaluate exposures to potential crises.

This Book in Context of the Literature

Because decision making underpins our whole commercial structure and is driven in large measure by perceptions, risky decision making is an important behaviour which has long attracted interest from many research fields. Milestones in building its truly vast scope are well reviewed by Simon (1959), Yates (1990) and Svenson (1996).

Today it is possible to discern eight important themes in the literature related to managerial risk and decision making:

1. Decision theory is made most relevant by drawing on a variety of disciplines and by learning from observations in natural settings. Those relevant to risk are typified in the paper 'Prospect Theory in the Wild: Evidence from the field' by Camerer (1998). Other learnings from a useful natural risk laboratory – racetrack betting markets – have been captured by Schnytzer et al. (2002) and Vaughan Williams (1999).
2. Psychologists have developed an extensive literature on risk. Kogan and Wallach (1964) established the yardstick with their book *Risk Taking – A study in cognition and personality*, whilst modern treatments include Timpop (1994) *The Psychology of Risk Taking Behavior* and Lopes (1994) 'Psychology and Economics – Perspectives on risk, cooperation and the marketplace'.
3. The last few decades have seen emergence of a catalogue of examples which show that people do not follow normative economic assumptions, particularly maximisation of their utility. The key issues are brought out by Barberis and Thaler (2002) in 'A Survey of Behavio-

ral Finance'. These ideas have begun to cross into the management literature with a good example provided by Lovallo and Kahneman (2003).

4. Because risk and decision making defies 'rational logic', its long history has attracted innovative and free-thinking contributions. Contemporary examples include 'Psychology and Economics' by Rabin (1998) and 'The three Ps of total risk management' by Lo (1999).
5. Decision makers handle risk in a complex fashion which is related to their history, interpretation of the problem, personal attributes and judgements. Guidance on untangling these processes can be found in the paper 'Reconceptualising the determinants of risk behaviour' by Sitkin and Pablo (1992) which won the Academy of Management's Best Paper of the year in 1992.
6. Risk has exploded as a topic of public interest after gaining a compelling immediacy for its impacts on boards, social policy and technology. Work first merely identified sources of risk, but is now beginning to struggle with what risks might look like in the future. An insightful example is *Reckoning with Risk* by Gigerenzer (2002).
7. Deployment of new technologies and synergistic breakthroughs from their integration have brought what Beck (1992: 12-13) called the *Risk Society*. He believes that today's global society and technologies have made risk a key trait of modern life:

"The productive forces [of modern industrial society] have lost their innocence in the reflexivity of modernisation processes. The gain in power from techno-economic 'progress' is being increasingly overshadowed by the production of risks."
8. Interest in enterprise level risk management has been revived by a number of high profile crises and governance failures in Australia, Europe and the United States. Consulting firms have quickly responded with a number of recent books including Deloach (2000) and McCarthy and Flynn (2004).

Finally, the topic is so broad and so important to survival, or at least success, that it constantly encourages evolutionary thinking. Lo (1999: 20), for instance, proposed decision making as risk management in:

"a broadened view of economic science, one based on the principles of ecology and evolutionary biology [as] ... the messy empirical history of markets and economic interactions suggests a more organic interpretation... If we are to understand the roots of risk preferences, it must be in the context of the survival instinct and how that has shaped economic institutions."

This owes much to the thinking of polymath biologist Wilson (1975: 4) who neatly codified his thoughts as *sociobiology* which he defined as "the systematic study of the biological basis of all social behaviour." He sees decisions as driven by a sort of behavioural software, with built-in contin-

gencies and risk as one of the key inputs. Winterhalder and Smith (2000) suggested that human decisions are driven by 'specialised cognitive modules' which have evolved over aeons.

Despite considerable progression on a number of fronts, gaps remain in our knowledge of risk and decision making. Those of particular importance to management research comprise the following:

1. There is no agreement on the definition of risk, nor is there a good understanding of the empirical relationship between various definitions and the latent risk variables that they measure. The literature similarly lacks consensus on what empirical measures are appropriate to describe levels of risk and the risk propensity of individuals and organisations; and it is imprecise in the meaning attached to many terms used to describe decision making anomalies.
2. There is little information on changes in different measures of risk over time; nor on changes in risk propensity for both individuals and populations.
3. The frequency of risky decisions is unknown, although Howard (1988) suggests that it might impact less than ten percent of business decisions. Similarly there is a dearth of empirical data describing other populations such as corporate crises (i.e. realisation of a risk), and the proportion of successful outcomes of risky decisions.
4. Although a number of personality measures have been proposed as indicators of attitudes towards risk, it is not clear how much confidence can be attached to their reliability. In addition, consensus is lacking on the effects of key demographic variables including age, gender and nationality. Without precision in how demographic and personality measures drive risk propensity, models of decision making have difficulty in accommodating basic differences between individuals and decisions.
5. Most studies of risky decision making have used small, homogeneous samples in artificial settings, and assumed that decision makers' aim is to maximise value. There have been few studies which encompass individuals' circumstances, real-world behaviours and decision outcomes. Thus the motivations, goals and results of risky decision making are not linked; and the normative assumptions of decision models are not verified.
6. Few experimental studies have examined the hypothesis that human decision making is risk sensitive, nor examined the transition between risk aversion and risk embrace.
7. Few studies have examined natural, or real-world, decision making across animals, humans and organisations using comparable metho-

dologies. There would be intriguing conceptual implications from qualitatively similar behaviours by qualitatively dissimilar organisms.

8. Analysis of risk-taking by organisations has not fully detailed the influence of organisation parameters and structures, and the impact of risk on organisation performance.
9. There is no template or guidance available to organisations which might wish to strategically influence their level of risk and propensity for new risk.

This book concentrates on items 3 to 5, 7 and 9, and seeks to make its contribution by compiling real-world evidence, linking circumstances to risk outcomes, and developing an holistic model of decision making. Generic goals are to link disparate literatures and provide useful guidance for managers on the organisation-level topics of the causes and consequences of risk-taking by managers, and strategies for organisations to dial up the right level of risk.

With this background, let us turn to the evidence on risk and decision making, particularly as it relates to managers.

CHAPTER 2 Theory of Risk and Decision Making in Management

Decision making and risk are important topics for managers. For instance, Peter Drucker (1992: 374), often proposed as the 'father of modern management', wrote: "Executives do many things in addition to making decisions. But only executives make decisions. The first managerial skill is, therefore, the making of effective decisions." According to Hammond et al. (1998: 47): "making decisions is the most important job of any executive. It's also the toughest and the riskiest." Emphasising the risk inherent in decision making, US heart surgeon Robert Jarvik (2003: 1) said: "Leaders are visionaries with a poorly developed sense of fear and no concept of the odds against them. They make the impossible happen." Nutt (1999) highlighted the fate of most decisions with his observation that half are wrong.

This chapter discusses the role of risk in decision making, principally from the perspective of management science. That is not to ignore other rich literatures on risk, especially in finance. However, most of these look at risk from a market perspective, assuming it is diversifiable, whereas real-world decisions by managers are not usually diversifiable.

The balance of this chapter starts with a discussion of the various meanings of risk, and is followed by an analysis of its role in decision making. The third section examines techniques developed in economics and operations research to quantify managers' risk preferences, and the final section foreshadows the risk-related contributions of this book.

Definitions of Risk

Any discussion of risk quickly reveals it is not a shared concept. A good example came in questions posed by Professor Bernd Rohrmann [personal communication, 7 March 2003]: "what risk? who's risk? [is it] risk perception, risk attitudes, risk behavior?" As my scope is all this and more, it is appropriate to clarify the meaning of significant words in this analysis, particularly 'risk', 'uncertainty', and 'risk aversion'.