Risky Business

DECISION MAKING UNDER RISK AND UNCERTAINTY: NEW MODELS AND EMPIRICAL FINDINGS, John Geweke (ed.), Dordrecht, Netherlands: Kluwer Academic Publishers, 1992, ISBN 0-7923-1904-4, 260 pp.

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This book contains 28 articles selected from presentations at the Fifth International Conference on the Foundation and Applications of Utility, Risk and Decision Theories (FUR V), held in 1990 at Duke University in the USA. Most of the papers provide theoretical analysis with the exception of several papers assigned to an empirical section. Unlike the edited book for the subsequent sixth international conference (also reviewed in this issue), this book does not contain editorial comments on the research in each paper. Further, since models which extend or replace expected utility are changing rapidly, the reader should realize that some of theories in this book have been developed further.

The first section titled 'Expected Utility Theory: Extensions' consists of seven articles. Their main theme is to preserve expected utility by either relaxing or extending the underlying assumptions of expected utility (EU). Fishburn provides an alternative axiomatic model to incorporate nontransitive preferences. Three papers in this section provide different views for the famous Allais and Ellsberg Paradoxes. Kadane proposes a two-stage hierarchical model to explain the

paradoxes in the frame of EU. Bordley and Hazen propose a negative complementarity over time and a positive correlation between present and future lotteries to explain the well-known violation of independence. In the next paper, Hazen claims that ambiguity aversion is 'rational', in possibly repeated decisions involved in policy making, and illustrates his point using a plant licensing example.

The next two papers apply the economic research approach of comparative statics to risk-taking behavior. Shogren shows that a person's actions, given increased risk, depend on both attitude toward risk and aversion to uncertainty about how well protective actions will protect against risks. Ormiston examines how choice is affected by changes in random variables characterizing possible choice alternatives. Finally, Rasmussen and Petrakis generalize the classic Rothschild–Stiglitz work which transforms a random variable with a mean-preserving spread, thus increasing its riskiness.

The second section titled 'Expected Utility Theory: Alternatives' covers several alternative theories which overcome the lack of descriptive validity of EU. Hagen discusses an extension of his earlier preference model which was a function of the mean, variance, and skewness of the distribution. Montesano proposes a two-fold formula for risk-aversion. LaValle and Fishburn propose a linear lexicographic state-dependent utility model for the case where preference is linear, but is not a continuous weak order. The two papers by Insua and Philipson question the traditional Bayesian approach to decision making. Insua proposes a model to incorporate imprecise judgment under only partial information. Philipson proposes an alternative model which does not require the non-descriptive assumption of experience stability. Finally, Rothenberg introduces a new concept of 'embodied risk' to explain anomalous behavior.

The third section will likely to be most familiar to behavioral decision theorists, since it reports empirical tests of several phenomena in decision making. Using a version of the Allais paradox, Erev shows that explicitly specifying probabilities increased the violation of subjective expected utility theory. He interprets the results to be caused by the lack of understanding of the concepts of probability by decision makers. Gigliotti and Sopher test Machina's Hypothesis II (fanning-out) and obtain supporting evidence on the border of the probability triangle for three outcome lotteries. In the off-border case, most studies support subjective EU and only a few studies support fanning-out. Krzysztofowicz shows the robustness of the multiplicative decomposition $u(x, p) = v(x)r(p)$ as an approximation to his generic utility model and demonstrates that an individual's preference is best described by a risk function over probability p, not by a value function over the outcome x. Rowe, Wright and Bolger find that in forecasting, probability judgements are biased but consistent; the results have practical value in selecting and aiding people making probability judgments. Smidts presents a brief description of his study (a complete paper is forthcoming in *Management Science*) of the relationship between risk attitude $u(x)$ in a field experiment with potato farmers and strength of preference $v(x)$ and shows that their relation is best described by a negative exponential function.

The fourth section contains 10 papers from an economic or risk analysis perspective on 'Information, Learning and Equilibrium', which incorporate decision theory generalizations and research paradigms. For example, Cox and Oaxaca point out limitations in traditional studies involving the Reservation Wage and provide a direct experimental approach. Instead of using a derived reservation wage, they ask subjects to precommit by stating directly their minimum acceptance offer and they find a significant precommitment effect. Munier proposes an axiomatic model to explain the violation of the independence axiom using both the formation of our beliefs and processing of the probabilistic information. Nau and McCardle abridge their 1991 'Theory and Decision' paper relating the principle of no arbitrage as a rationality principle to link market theory, game theory and decision theory.

Bostrom, Atman, Fischhoff and Morgan study the importance of correct communication in people's assessment of risk regarding the dangers of indoor radon. They discover that, beyond basic conceptions regarding indoor radon, most knowledge is imprecise and unstable. They also demonstrate the practical value of the research by designing new informational brochures on indoor radon and proving that the new brochure is superior to a brochure currently in wide use by the US Environmental Protection Agency. Elliott and McKee study risk reduction for familiar and new risks. They find that, in the laboratory, individuals prefer to reduce the familiar risk even though the new risk is more dangerous, providing evidence against classical economic theory which predicts that an individual's risk taking is independent of the presence of unfamiliar risks. The research shows that individuals use learned heuristics which may result in nonoptimal decision-making strategies.

Overall, the book contains a wide spectrum of approaches for examining decision making risk. This breadth ensures that all behavioral decision theory readers should find some familiar and some new approaches.