Book Review

Quiggin's Rank Dependent Model

JOHN QUIGGIN. **Generalized Expected Utility Theory: The Rank-Dependent Model.**
Boston: Kluwer Academic, 1993. Pp. 208. $69.95.

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The idea of expressing risk attitudes not only through the transformation of
outcomes into utilities, but also through the transformation of probabilities into
decision weights, has been around since the early fifties. However, the "obvious"
formula,

$$\sum_{i=1}^{n} \varphi(p_i)\, U(x_i),$$

used to evaluate a lottery $(p_1, x_1; ...; p_n, x_n)$ yielding $\$x_i$ with probability p_i,
$i = 1, ..., n$, can be shown to violate stochastic dominance. This, and a general for-
mula from Allais, inspired Quiggin (1982) to invent *rank-dependent expected utility*
(*RDEU*) (I use Quiggin's term here). Assume henceforth that $x_1 \geqslant \cdots \geqslant x_n$. Then
the RDEU of the lottery is

$$\sum_{i=1}^{n} (\varphi(p_1 + \cdots + p_i) - \varphi(p_1 + \cdots + p_{i-1}))\, U(x_i).$$

This form does not violate stochastic dominance and has become the basis of the
most popular stream within nonexpected utility.

At first, Quiggin's idea did not receive attention. The same form was discovered
independently by Schmeidler and Yaari around 1983 (and later by Allais). Only
when one of the early contributors, Chew, discovered Quiggin's article did

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Quiggin's early work become well-known "in the West," and nowadays Quiggin is credited as the inventor of RDEU.

In the meantime, Quiggin not only continued his work in agricultural economics but also contributed several more ideas to RDEU. He has laid them down, 10 years after this 1982 discovery, in the book reviewed here. In addition to its historical interest, the book contains many challenging and thought-provoking ideas, several of them still new and not yet widely known, and gives an enthusiastic overview of the basic motivations of RDEU as well as of its possible future.

It should be kept in mind that the primary aim of the book is the optimal transfer of ideas, rather than 100% accuracy and precision (p. xii: "at the expense of rigor ... if necessary"). Thus notations and definitions are usually formulated as "in most of what follows," or "is normally assumed;" sometimes this makes it difficult for the reader to decide what the exact content of stated results is. The difficulty is enhanced by several misprints and small inaccuracies in formulation. For instance, Quiggin claims that states with the same probabilities need not be "interchangeable" in RDEU (p. 17, below (3.2); p. 132, 1.5/6). This will mislead many readers. What is meant here is that such states need not receive the same decision weights, an interpretation that may not be meaningful outside the realm of RDEU. In the analysis of mean-preserving monotone spread at p. 85 and onward, the equivalence with concave transformation (p. 85, fifth paragraph) need not hold true.

References are not always accurate. For instance, prospect theory does not consider lotteries with more than two nonzero outcomes, contrary to the suggestion in the first line of Section 4.9. The first two references below Formula (4.5) are not given in the reference list. It is historically important to note that Formula (5.8) was *not* proposed by Allais, because Allais did not rank-order outcomes and this is crucial.

The book gives ideas of many kinds. The first four chapters present a general expected-utility background and the next two chapters give risk aversion results for RDEU. Chapter 7 gives Quiggin's research ideas on "monotone spreads," Chapter 8 those on the design of lotteries, and Chapter 13 those on state permutation axioms. Works by other authors are sketched in the remaining chapters. The book is primarily intended for a theoretically oriented economic audience; psychologists will not find much empirical material of interest to them. All together, the book can serve as a rich source of ideas of many kinds.

REFERENCES

QUIGGIN, J. (1982). A theory of anticipated utility. *Journal of Economic Behaviour and Organization* 3, 323–343.