

Risk attitude : preference models and applications to bargaining

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Summary

This thesis is a collection of essays on decision making. The first of these essays (Chapter 2) deals with the traditional and controversial topic of ordinal versus cardinal utility. By providing simpler and more general preference foundations for difference representations, the chapter shows that cardinal utility is easier to obtain than traditionally thought. The chapter unifies all earlier derivations by showing that they can be obtained as direct corollaries.

Chapter 3 introduces a new preference condition that can be used to justify (or criticize) expected utility. The approach of the chapter is alternative to Savage's, and is accessible to readers without a mathematical background. It is based on a method for deriving "comparisons of tradeoffs" from ordinal preferences. The new condition simplifies previously-published tradeoff conditions, and at the same time provides more general and more powerful tools to specialists. The condition is more closely related to empirical methods for measuring utility than its predecessors. It provides a unifying tool for quantitatively measuring, qualitatively testing, and normatively justifying expected utility.

Chapter 4 extends the methods from Chapter 3 to rank-dependent utility and prospect theory, and thereby gives axiomatic foundations for those decision models. The resulting foundations are, at a time, more general and more accessible than earlier results. The conditions used are better suited for empirical measurements of utility than earlier conditions, and accordingly are easier to test. Whereas Chapter 3 is particularly addressed to readers without a strong mathematical background, Chapter 4 can be seen as the theoretical, more advanced, and more general counterpart.

Chapters 5 and 6 deal with loss aversion in prospect theory. To a considerable extent, risk aversion as it is commonly observed is caused by loss aversion. Chapter 5 proposes a quantitative index of loss aversion. Under prospect theory, the proposal leads to a decomposition of risk attitude into three distinct components: intrinsic utility, probability

weighting, and loss aversion. The main theorem shows how the index of loss aversion of different decision makers can be compared through observed choices. Chapter 6 points out the difficulties in quantifying loss aversion for general situations with nonmonetary outcomes. A theorem shows how, nevertheless, also for general outcomes it is possible to obtain relative comparisons of loss aversion.

Chapters 7 and 8 apply rank-dependent utility and prospect theory to bargaining game theory. Under rank-dependent utility two factors influence the risk attitude of a decision maker: the utility function and the probability weighting function. Arising from the same definition of risk aversion, two forms of risk aversion can be distinguished: utility risk aversion and probabilistic risk aversion. The main finding of Chapters 7 is that these two forms of risk aversion can have surprisingly opposite consequences for bargaining solutions that exhibit a weak monotonicity property. In particular, in a large class of bargaining problems both increased utility risk aversion and decreased probabilistic risk aversion of the opponent are advantageous for a player. Chapter 8 examines the influence of loss aversion in bargaining problems under prospect theory. It is shown that it is usually better for a player if the opponent is less loss averse. These results hold in particular for the Kalai-Smorodinsky and the Kalai-Rosenthal bargaining solutions. The Nash bargaining solution does not behave regularly in this respect.

Chapter 9 is about an empirical experiment. The change of currency in Europe gave a unique opportunity to test whether people, when evaluating money, think in terms of numbers instead of in terms of real values. It is hard to disentangle the influence of numbers and real values on risk attitude. The currency conversion gave the opportunity to keep one of the two aspects fixed while the other varies, and to observe changes in risk attitude caused by changing numbers separately from that caused by changing real values. In Belgium the scale changed by a, considerable, factor 40. Therefore, we chose Belgium to carry out an empirical study to test the effects of value versus numerical changes. We measured the risk attitudes of 87 subjects in December 2001, shortly before the introduction of the Euro, and did the same for 92 subjects in May 2002, when people started to get accustomed to the Euro. We find that changes in value while keeping numbers constant do affect risk attitude, but changes in numbers while keeping values constant do not, in agreement with postulates of rationality.

