The Impact of Risk Sharing on Efficient Decision

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Abstract

A group of risk-averse members must choose among monetary risks and payoff-sharing rules. Departure from the status quo requires unanimous consent. Such groups drill for oil, bail out nations, and make hostile takeover bids. Assume agreement on probabilities. As is well known, if all members have identically shaped HARA utility functions, efficient group act-choices follow another such function independently of payoff sharing. We show that all other groups inevitably have complex efficient behavior, accepting gambles among individually unacceptable lotteries in almost every status quo position. We also develop proper risk aversion for groups, and treat disagreement on probabilities.

A consortium of three medium-sized oil companies has an opportunity to purchase a major lease. Need they agree on how to divide up drilling expenses and revenues before they determine whether to buy the lease? More generally, our central question is this: When will a group’s choice among lotteries not depend on the weightings applied to its members’ welfares? This article describes the answer in relation to the nature of syndicate members’ utility functions.

Because squabbling is virtually inevitable among members of an investment group—whether its purpose is to bail out debtor nations, operate a privately held firm, succeed in a hostile takeover, or build a nuclear plant—and because many financial opportunities have a short fuse, this question is of considerable practical importance. It is also important in the many areas of economic theory where risk sharing plays a role, especially since its answer shows how readily surprising behavior can have normative underpinnings even in the simplest of general decision and risk-sharing problems. This is the problem of a syndicate (Christenson,
Consider a group of \( n \) agents who must agree on a decision among monetary risks and on the division of the group payoff among members. To undertake action—that is, to depart from the status quo—requires unanimous consent. Suppose that each agent \( i \) has a strictly risk-averse utility function depending only on his total monetary position and, for the moment, that all agents agree about all relevant probabilities. Mutually advantageous bets are thus impossible, as is a strategy of making the group effectively risk-neutral by shifting all risk to risk-neutral members. Nonmonetary considerations play no role. Moreover, agents cannot influence the outcome by their own efforts. In this context, how does the nature of the agents' utility functions affect efficient group choice among risks? We make no assertions or assumptions beyond ex ante efficiency, as indicated by Pareto comparisons, about how groups do or should bargain internally or make external choices. Because of the indeterminacies and complexities of bargaining strength, fairness, and so on, group choices can be expected to display properties that would be unreasonable for individuals. Indeed, in many group decision problems, the need for unanimous consent by itself makes randomization desirable, violating the sure-thing principle or substitution axiom for the group, though the reason is more subtle in pure risk sharing than in a couple's choice of where to vacation (see note 3).

An important class of principal-agent relationships has the agent play a major role as decision maker. To establish such a relationship, say between the limited and general partners in a real estate investment venture, requires unanimous assent. Risk sharing is often a significant factor. Thus many principal-agent problems have the features of concern here. They usually have the additional complication of ensuring that the agent adheres to the contingent decisions he would promise on behalf of the principals, even though he has relevant private information. Often principals or agents have multiattribute utility functions. Though we do not deal with the incentive-compatibility or multiattribute aspects of principal-agent problems, our results are relevant to principal-agent and group decision problems broadly, not merely to tightly defined syndicates.

After laying out the group decision problem (section 1), we contrast the well-known, simple, and "reasonable" external behavior of HARA groups—groups whose members all have HARA utility functions of the same shape (section 2)—with the complex patterns of choices of all other groups (section 3). Our major theorem proves that every non-HARA group in essentially every possible status quo will inevitably be randomization-prefering in some choice problems, i.e., would accept gambles all of whose payoffs are unacceptable lotteries. Thus the only groups for which no two gambles' Pareto frontiers cross are HARA, and for all others, crossings are possible almost everywhere. We also explore the group analogue of the recently introduced concept of proper risk aversion, namely that an undesirable lottery will not be made attractive because another undesirable gamble is pressed upon the group (section 4). Our final analytic discussion addresses situations in which the group members disagree on probabilities (section