Risk taking and information aggregation in groups

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ABSTRACT

We report a controlled laboratory experiment examining risk-taking and information aggregation in groups facing a common risk. The experiment allows us to examine how subjects respond to new information, in the form of both privately observed signals and signals reported from others. We find that a considerable number of subjects exhibit 'reverse confirmation bias': they place less weight on information from others that agrees with their private signal and more weight on conflicting information. We also find a striking degree of consensus when subjects make decisions on behalf of the group under a random dictatorship procedure. Reverse confirmation bias and the incidence of consensus are considerably reduced when group members can share signals but not communicate.

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1. Introduction

One of the key functions of deliberating groups is the bringing together of people who have independently obtained information on a common risk. When such groups effectively aggregate information from different members, this allows the members to respond better to the risk. But is this a faithful representation of how people share and process information in groups? How do people actually use information received from others? We present a controlled laboratory experiment that investigates this question with respect to decisions under risk over monetary earnings.

Previous economic experiments on group decision-making under risk show that when all members of a group have the same probabilistic information, group decisions often differ from what group members would have decided individually. We extend this literature by focusing on an experimental setting where each group member has private prior information about a common risk. In such a setting individual group members can benefit from updating these priors using information conveyed through group interaction. Previous research has shown that individuals often update priors in a way that is

incompatible with Bayesian updating (see Camerer, 1995 for a review). Moreover, an extensive literature in social psychology documents important group effects in the way individuals process information obtained from group deliberation (e.g. Moscovici & Zavalloni, 1969; Stoner, 1961). An important distinction between our design and this literature is that we introduce heterogeneous information in a controlled fashion. In a controlled laboratory environment, we investigate (i) how private information is aggregated to influence individual decisions and (ii) how an individual decides on behalf of a group.

The experiment is divided into four stages. In each stage, subjects make an investment decision whose outcome depends on a binary state of the world variable. In stage I subjects make individual decisions knowing that both states are equally likely ex ante. At the beginning of stage II subjects receive a private signal about the state of the world, and then make another individual decision. At the beginning of stage III we randomly form groups in which subjects can share their private information with two others, and then a single decision is made for the group by a randomly selected group-member. How the group interaction in stage III proceeds depends on the treatment. In our COMM treatment, subjects communicate with fellow group members through unrestricted free-form electronic chat; in our NO-COMM treatment, subjects interact only by reporting their private signals to fellow group members. Finally, in stage IV subjects make decisions based on the same information they had in stage III, but this time a subject's decision is a purely individual decision, i.e. it is not observed by other subjects and it cannot affect their payoffs.

Controlling for the probabilistic information that subjects receive in various stages allows us to measure how strongly subjects' preferred choice under risk responds to this information. We are particularly interested in whether subjects' response depends on the source of information: a privately observed signal or information provided by a fellow group member. Comparing decisions in stages I and II allows us to observe how subjects react to privately observed signals, while comparing individual choices from stages II and IV allow us to examine how subjects respond to information received from others.

Finally, choices from stages III and IV allow us to compare choices on behalf of the group with choices on behalf of oneself. In stage III, when subjects decide on behalf of their group, we do not force them to reach a consensus with others. Instead, we use a random dictatorship procedure, which incentivizes subjects to reveal their own preferred level of risk-taking for the group. This procedure delivers easily interpretable "group choices" made by individual subjects and has the advantage of eliminating strategic considerations associated with other group decision-making processes.[1]

We find that subjects generally respond intuitively to information they receive privately. Subjects also readily share their signals with their group – there is no systematic evidence of strategic reporting. We cannot reject the hypothesis that many of our subjects act in line with rational Bayesian updating. Note that with Bayesian updating we refer here to the joint hypothesis of fully trusting signals reported by other players and using this information to update one's priors. For subjects who receive two conflicting signals from fellow group members, we find that about half of subjects leaves their decision under risk unchanged. This is in line with taking the reports at face value and updating subjective beliefs using Bayes' rule. However, the other half of the subjects who receive two conflicting signals change their decision. This may reflect a violation of rational Bayesian updating or it may reflect a mistrust in the signal reports of others. Interestingly, when subjects can freely communicate (treatment COMM), we see a systematic bias towards changing one's decision *away from the direction predicted by their private signal*. We refer to this behavior as 'reverse confirmation bias'. Without free-form communication (treatment NO-COMM), changes are equally likely to occur in either direction.

We also find treatment differences in the group decision-making stage. In the COMM treatment, the majority of the subjects make the same decision as fellow group members. This degree of consensus is remarkable given the absence of any monetary or reputational incentives for reaching consensus. In the final stage, approximately half of the subjects make the same choice that they made in the group-decision making stage. This pattern of decisions is consistent with the explanation of consensus at the group stage as driven by persuasive arguments by peer subjects. However, given that half of the subjects make different choices in these stages we cannot exclude that social preferences over risk play a role.

The remainder of the paper is organized as follows. In the following section we review related studies in psychology and economics. In Section 3 we describe our experiment and in Section 4 we present our results. We conclude in Section 5.

2. Related literature

2.1. Information aggregation

Both economists and psychologists have investigated the question of how groups aggregate information. Theories of information aggregation go back at least as far as the famous jury theorem of Condorcet (1785). Recent theoretical contributions to the literature on committee voting by Austen-Smith and Banks (1996) and Feddersen and Pesendorfer (1998) show that incentives to vote strategically can lead to group members voting against their private information, thus

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[1] Our random dictatorship procedure may also reduce the disproportionate influence of group members with particular risk preferences or personalities that is found in other studies. Ertac and Gurdal (2012) find that men who express a preference to be a group leader (decide on behalf of a group) are more risk seeking than men who do not. Nieboer (2015) reports that all-female groups do not take more risk than female individuals whereas all-male groups take significantly more risk than male individuals when groups decide by consensus.