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Information transfer and aggregation in an uninformed committee: A model for the selection and use of biased expert advice

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ABSTRACT

A committee of five uses majority rule for decisions on two public goods. Individual committee member preferences depend on a state of nature that is unknown to the committee members but the state of nature is known to two experts who have preferences about committee decisions. Experts have no vote on the committee but provide a recommendation to the committee at the opening of a meeting. Two experts who have known, opposing biases are selected – a dyadic mechanism. The results reveal that experts do not tell the truth but committee decisions are as if committee members know what the experts know. The information transfer occurs because committee members anticipate the biases and properly infer the information held by the experts.
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1. Introduction

The paper reports exploratory experiments focused on information aggregation within a committee organizational and experimental environment in which information aggregation is important and cheap talk is possible. The environment consists of conflicts that are prominent features of many models of political decisions. Committee organization and decision procedures are designed and tested as mechanisms to facilitate informed collective decisions. The experiments are exploratory in the sense of a merger of variables typically thought to be governed by two different sets of principles and the absence of an overriding theory to integrate the two. On the one hand, models of committee decisions typically rest on voting theory and cooperative game theory and do not extend themselves to cover strategic revelation of information. On the other hand, models of strategic revelation of information rest on non-cooperative game theory, which cannot explain the dynamic process of committee equilibration characteristic of majority rule voting groups. In the absence of an overriding model that integrates the two bodies of theory, the exploratory approach is attractive.

An organization is created in which a specific form of competition between experts with conflicting preferences is imposed for the purpose of information aggregation. The experiments ask if the organization successfully facilitates information transfer within a

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challenging environment. The environment is more complex than those where non-cooperative game theories of cheap talk can be successfully applied. Truth telling is not incentive compatible. The nature of the conflict is also more complex than typically studied in committee processes. The configuration of preferences is such that under full information majority rule equilibrium exists but committee members are not fully informed. Uncertainty about the consequences of options exists and the only sources of information are people with biases. Thus, there is no common source of information to guide a proposal and voting process. The questions posed by the experiments are the degree to which information transfer and aggregation might occur within the organization and if they are observed what might be the underlying principles at work that create them. The answers are: (i) the information transfer takes place with remarkable accuracy; and (ii) much of the behavior of experts and committee members is anticipated by the underlying models, but behavior suggests that a more complex equilibrium concept than simple Nash is required to capture the interaction between the experts and the committee.

The problem is centered on a committee or group that must make a collective decision in a classical Public Choice environment. The group must choose the levels of two public goods and the group is in conflict about the options. Individual preferences depend on a state of nature that if known, would influence the preferences of all participants but would not remove the conflict. The state of nature is known to a set of "experts" whose advice can be acquired by the committee.[1] Advice of experts is in the form of recommendations of actions to be taken by the committee as opposed to a report that identifies the state of nature or facts that can be verified. Thus, the environment is complicated by the fact that the description and identification of the state is not part of an expert assessment available to the committee, reflecting the possibility that the language to describe the state as viewed by experts need not be the same (described parametrically) as the language used by decision makers. Furthermore, the experts do not know the preferences of the decision makers except possibly as assessed thru repeated interactions, motions and votes. This fact is an important difference with models of information revelation where the expert strategically positions well-crafted messages concerning the state of nature in the light of known receiver preferences in order to induce the response preferred by the expert.

In summary, the recommendations are points in a two-dimensional space as opposed to sets of points or natural language. The purpose is to make sure that the content of recommendation messages is common knowledge even though the information carried by the recommendations differs from voter to voter. In more complex messages spaces such as ordinary language, the assumption of common knowledge about the message content cannot be maintained.

The experts have their own preferences over the alternatives and thus, have incentives to influence the group. The lack of private goods prevents payment of experts based on information that might become available after the decision is made, so there is no way of structuring the institutional incentives of the experts to provide unbiased advice. At base, it is a problem of moral hazard exacerbated by the lack of commitment typical of cheap talk.

The focus of this paper is on one specific type of mechanism as a step toward the challenge to design mechanisms that facilitate the successful transfer and aggregation of information held by experts to groups who must make a decision. In a world of specialized information relevant for decisions of public goods, the problem is a familiar one. Possible examples include policy determining committees that depend on expert testimony for information. In a sense, it is similar to the problem of designing legal processes that facilitate the accurate transfer and aggregation of information to a jury when the information is held and perhaps only partially exposed by those who have self-interest in influencing the decision. Furthermore, the "truth" may never be known.

The example mechanism studied here is "dyadic" in the sense that two experts are selected from those possible and will be called upon to offer proposed decisions and give advice to a committee. A group decision process for expert selection is not considered here, even though it is of considerable interest. Instead, the expert selection is imposed for testing purposes. The selection is guided by four conditions: (i) the experts know the state with certainty; (ii) the experts have known biases in the sense that for a given state the divergence of expert preferences from the preferences of the decision makers is transparent; (iii) with respect to their interest in committee decisions, the experts are in conflict – playing a game with its own properly configured Nash equilibrium; and (iv) the preferences of individual committee members are not known to the experts.

Thus, the dyadic mechanism depends on the selection of experts that have known biases relative to other preferences and have directly conflicting preferences. The competition between experts is designed to prevent them from colluding. The experimental issue is to determine if such a mechanism will facilitate a decision such that the uninformed voters choose as if they possessed the information about the state that is known only to the experts. The overall structure of the process has similarities with jury processes in which the experts with information about the state of nature, the defense and the prosecution, are involved in a zero sum game.

[1] Thus, the environment consists of multiple senders and multiple receivers whose vote determines the public good levels. Preliminary analysis of our setting can be found at Gilligan and Krehbiel 1989. The environment and challenges are different from those studied in a broad and important survey by Dewantripont and Tirole (1999) who study the search incentives of experts in the light of preferences of a single decision maker and the technologies available for verification of facts reported by experts. Some important differences and similarities with the literature on "cheap talk" are worth noting. Information transfer and the possibility of a fully revealing (Nash) equilibrium in the case of multiple senders of state information and a single receiver has been explored by Battaglini (2002) and the case of one sender and multiple receivers is studied by Battaglini and Makarov (forthcoming) and by Vespa and Wilson (2014). In such games, each agent has an independent influence on the outcome while in the majority rule environment studied here; a single vote has an influence only in the case of a majority of one. Other important structural differences exist between the experiment reported here and the previous works. The setting of Battaglini and Makarov (forthcoming) contains only two states of the world and two receivers each of whom takes a separate action. The message sent about the state could be public or private. By contrast, in the committee setting a large number of states exist, the receivers (the committee members) take only one action and all messages are public and are in the form of a recommended action as opposed to an identification of the state. Chakraborty and Harbaugh (2010) and Chung and Harbaugh (2014) explore the beliefs of a single decision maker as possibly influenced by a biased, multi-dimensional recommendation and in that context explore the role of transparency of biases following the questions posed by Dickhaut et al. (1995).

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