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Expert information and majority decisions ☆

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ABSTRACT

This paper shows experimentally that hearing expert opinions can be a double-edged sword for collective decision making. We present a majoritarian voting game of common interest where committee members receive not only private information, but also expert information that is more accurate than private information and observed by all members. In theory, there are Bayesian Nash equilibria where the committee members' voting strategy incorporates both types of information and access to expert information enhances the efficiency of the majority decision. However, in the laboratory, expert information had excessive influence on the voting behaviour and prevented efficient aggregation of individual information. We find a large efficiency loss due to the *presence* of expert information especially when the committee size is large. Using an incentivized questionnaire, we find that many subjects severely underestimate the efficiency gain from information aggregation and they follow expert information much more frequently than efficiency requires. This suggests that those who understand the efficiency gain from information aggregation and perceive the game correctly might nonetheless be "stuck" in an inefficient outcome.

1. Introduction

When collective decisions are made through voting, typically each voter has not only private information known solely to themselves but also public information observed by all voters. Examples of commonly held information in collective decision making include "expert" opinions solicited by a committee, shared knowledge in a board meeting that has emerged from pre-voting deliberation, and evidence presented to a jury. Such information may well be superior to the private information each individual voter has, and if so, it would be natural to expect that their votes should take the public information into account at least to some extent.

Meanwhile, such public information is rarely perfect, and in particular expert opinions are often alleged to have excessive influence on decision making. For example, in recent years the IMF's advice to the governments of some highly indebted countries have heavily influenced their parliamentary and cabinet decisions for austerity. However, the IMF's expertise has been questioned by specialists in monetary policy, and it has been reported that the IMF itself has admitted that they may have underestimated the impact of their austerity measure in Greece.[1] Financial deregulations in the 1990s seem to have been prompted by endorsements from financial experts at the time, but some politicians reflect that in retrospect they may have followed expert opinions too naively.[2] Indeed, the role of experts in political decisions was one of widely discussed topics in debates on the UK's withdrawal from the EU, where a vast majority

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[1] "IMF 'to admit mistakes' in handling Greek debt crisis and bailout", *Guardian*, 4 June 2013, http://www.guardian.co.uk/business/2013/jun/05/imf-admit-mistakes-greek-crisis-austerity.

[2] "Gordon Brown admits 'big mistake' over banking crisis", *BBC News*, 13 March 2013, http://www.bbc.co.uk/news/business-13032013.

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of "experts" on political, economic, and social issues warned against leaving the EU.[3] In the legal profession, how information from an "expert witness" should be presented in trials is an important topic, so that the judges and juries can process the information appropriately when making their decisions (Federal Judicial Center, 2011). The recognition that expert opinions can be overly influential in collective decision making is not a recent one. In the Athenian Democracy of Ancient Greece, any citizen could be expelled from the city state for ten years if he was considered to be excessively influential on democratic choice and thus posing a risk for a potential transition to tyranny.[4,5] How would collective decision making through voting be influenced by shared information? If commonly observed expert information is better than the information each voter has, would the presence of such expert information improve the quality of the collective decision? Can expert information have "too much" influence? If so, why?

This paper addresses these questions experimentally, by introducing a public signal into an otherwise classical Condorcet jury setup with majority rule. The public signal is observed by all voters, and when it has superior accuracy to each voter's private signal, we call it "expert" information. We find that expert information had excessive influence on voting behaviour, which may lead to inefficiency. Moreover, we argue that the excessive influence of expert information stemmed largely from failure to appreciate the efficiency gain from aggregation of private information, which was observed for a majority of the voters. Those who did understand the benefit of information aggregation were nonetheless "stuck" in the inefficient outcome, because as minority voters they had no or very little influence over the majority decisions.[6]

Before reporting on the experiment we first present a majoritarian voting game with expert information and identify two symmetric strategy equilibria of interest, namely i) the symmetric mixed strategy equilibrium where each member randomizes between following the private and expert signals should they disagree; and ii) the "obedient" equilibrium where all committee members and hence the committee decision always follow the expert signal.[7] We note that in the mixed strategy equilibrium, the expert signal is collectively taken into account in such a way that it maximizes the efficiency (accuracy) of the committee decision among all symmetric strategy profiles. The Condorcet jury theorem (CJT) holds a fortiori so that as the size of the committee becomes larger the probability that the decision is correct increases and converges to 1. However, in the obedient equilibrium, private information is not reflected in the committee decision and its efficiency is identical to that of expert information, which may well be lower than the efficiency the committee could achieve in the absence of expert information. In other words, the introduction of expert information might reduce efficiency, depending on which equilibrium is played.

Motivated by the possibility that expert information can enhance or diminish the efficiency of equilibrium committee decisions, we conducted a laboratory experiment to study the effect of expert information on voting behaviour and majority decisions. Of particular interest is whether the subjects can incorporate expert information into their voting behaviour efficiently not least because doing so requires complex statistical and strategic calculations as well as coordination across voters. Specifically, we set the accuracies of the signals in such a way that the expert signal is more accurate than each voter's private signal but less accurate than what the aggregation of the private signals can achieve by informative voting without the expert signal. Such parameter values seem plausible in that the expert opinion should be taken into account but should not be decisive on its own. We had seven-person committees and fifteen-person committees, the latter of which entail a larger potential efficiency loss from the obedient outcome because more private information can be wasted by obedient voting in a larger committee.

In the experiment we find that the voters follow the expert signal much more frequently than they should in the efficient mixed strategy equilibrium. Specifically, the majority decisions follow the expert signal most of the time, as is consistent with the obedient equilibrium.

Along with the treatments with both private and expert information, we ran treatments where each voter received a private signal only, in order to compare the observed efficiency of the committee decisions with and without expert information. For seven-person committees the difference in efficiency between the two treatments is insignificant, largely due to some non-equilibrium behaviour (i.e., voting against private information) in the control treatment with private signals only, which reduces the benchmark efficiency. However, despite some inefficient non-equilibrium voting, the fifteen-person committees without expert information perform much better than those with expert information and the difference in efficiency is significant. This suggests that expert information may indeed be harmful for a larger committee.

In order to further investigate the source(s) of over-reliance on public information, we also ran the treatments where i) public information is less accurate than private information; and where ii) public information is presented as a common biased prior rather than an additional piece of information on top of a uniform prior. When the public information is less accurate the subjects follow their private information most of the time, which indicates that the over-reliance on public information is due to its superior accuracy. We also find that when public information that has superior accuracy is presented as a common biased prior and therefore less salient on screen when the subjects make decisions, obedient voting is also less pronounced. However, voting according to the biased prior (against the private signal when they disagreed) is still frequent enough relative to the prediction from the efficient equilibrium that the majority decisions follow the biased prior very often.

Furthermore, using an incentivized questionnaire, we examine subjects' understanding of the power of information aggregation through majority rule in the absence of any strategic concerns.[8] The answers to the questionnaire reveal that more than a majority of the subjects severely underestimate the efficiency gain from information aggregation. Moreover, those who give correct answers vote according to public information more often when the public information and private information disagree. This suggests that, from the viewpoint of a social planner who decides whether to and how to provide a committee with expert information, creating an equilibrium with higher efficiency does not necessarily mean it is played.

[3] "Who are 'experts' anyway?", *Guardian*, 12 November 2016, http://www.theguardian.com/science/political-science/2016/nov/12/who-are-experts-anyway.

[4] Several citizens were banned from the Ancient Athenian Democracy for this reason, including Aristides the Just, one of the most well-known Athenian citizens for his intelligence and objectivity (hence the name Just, see "Aristeides" in *Plutarch's Lives*, http://oll.libertyfund.org/titles/plutarch-plutarchs-lives-dryden-trans-vol-2#lf1014-02_head_016).

[5] This procedure is called *ostracism*, since the names of the over-influencing experts was written by voters behind pottery shards (*ostraka*) for the ballot (see Kagan, 1961for a detailed description).

[6] As we will discuss later in Section 2, a public signal can also be thought of as shared information emerged through pre-voting deliberation.

[7] While the voters may ignore their private information completely, they cannot ignore the expert information completely in equilibrium. That is, voting according only to their private signal is never an equilibrium, since if a voter knows that all the others will follow their private signals, he deviates and follows the expert signal.

[8] Specifically each subject chose how "the computer will vote" on all voters' behalf, namely whether the computer will vote according to the private signals all voters will receive, (in which case the decision coincides with the majority of the private signals); or the public signal only, (in which case the decision coincides with the public signal).