

Collective Preference for Ignorance*

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Very preliminary

Abstract

A committee needs to decide whether to approve a proposal. If approved, the proposal will give every member of the committee a private payoff, which can take different values depending on the state of the world. Before deciding on the proposal, the committee chooses whether to acquire a signal about the state. Even though information is costless, the choice is not always positive. I show that the committee will decide to remain uninformed if and only if different realisations of the signal lead to the same collective decision; I also formulate a corresponding condition on the distribution of individual payoffs. The paper also shows that a rule requiring a larger plurality of voters to adopt a proposal becomes optimal as the ratio of potential individual gains to losses moves away from one in either direction.

Keywords: collective decision-making, information acquisition

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1 Introduction

In many situations, groups of people make decisions that affect the welfare of each group member. Often, the effect of the decision on each individual payoff depends not only on that individual's preferences, but also on some state of the world. Although the state can be unknown, in a number of cases the group can make a collective decision to learn it. For example, the group can vote to seek advice from an outside expert, to commission a study, or simply to delay the decision until more information arrives. When will the group choose to make a more informed decision, and when will it prefer not to learn the information?

As a concrete example, consider a town assembly that needs to decide whether to approve a proposal of the national government to build an airport near the town. The airport can be built in the east side of the town or in the west side; the government has not yet disclosed the exact location, and both possibilities are considered equally likely. If the majority of members vote in

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favour of the proposal, the airport will be built, and each member of the assembly will receive a payoff (positive or negative). This payoff depends on the member's preferences (e.g. how often she travels), but also on the location, as nobody wants an airport to be built near their house. If the majority rejects the proposal, the airport will not be built, and everyone will receive a zero payoff.

The assembly can decide to learn the future location of the proposed airport, at no cost. Members thus vote on whether to acquire this information before voting on the proposal itself. Can it ever happen that the majority of them is in favour of voting on the plan without learning the location?

Clearly, if the assembly members have identical preferences, they will all be weakly better off when they know the proposed location. Similarly, if there is a majority of members who want the airport to be built in one location but not in the other, this majority will also vote to acquire information. Consider, however, the following situation. Suppose the assembly consists of three members, whose payoffs from having the airport in each of the locations are as follows:

Voter	Payoff if built in the west	Payoff if built in the east
Anna	3	-1
Bob	-1	3
Claire	-1	-1

If the assembly chooses to acquire information, then for each location, the majority of voters are against the project - thus, a choice to acquire information gives each agent a zero payoff. If they vote without having learned the location, then Anna and Bob get an expected payoff of 2 if the airport is built - thus, when the assembly votes in ignorance, the proposal is approved. Hence, Anna and Bob will get a higher expected payoff when the information is not acquired. So the majority of voters will oppose learning the location, and the group will choose to vote in ignorance.

The somewhat paradoxical result that the majority of agents is against acquiring information about the effect of their collective decision is driven by two factors. First, in each state of the world, there is a majority of agents who prefer one alternative (in this case, to reject the airport). Second, ex ante, the majority of agents prefer another alternative (to build the airport). As will be shown later, these factors are the key to understanding when the group will seek information.

In this paper, I analyse the collective decision of a committee to acquire a noisy signal about a binary state of the world, prior to voting on a proposal that gives each of them a private state-dependent payoff. As in the above example, it turns out that the committee will collectively choose not to acquire the signal if and only if the decision under both realisations of the signal are the same. This preference becomes strict if, in addition, the decision under both realisations of the signal is different from a decision made in ignorance. In terms of individual payoffs, it will be shown that the group will choose to seek information if and only if, (i) the numbers of voters who support and who oppose the proposal regardless of information are similar, and (ii), the number of voters who are in favour of the proposal under one signal but oppose under another signal is

sufficiently different from the number of voters with opposite preferences.

I also extend this setup to consider a general case in which the state space is arbitrary and the information that the committee acquires is a partition of that state space. I show that information will be acquired whenever messages that induce the decision which is different from the decision made in ignorance can be pooled into one message without changing the outcome.

I also look at several normative questions emerging in this setup. One is the effect of an outside agent releasing the information without asking the committee's opinion - the paper shows when such a release is optimal. A more interesting question is the choice of an optimal constitutional rule - a voting procedure that maximises the expected welfare of a group that will have to make a decision, having also an option to acquire information. I look at the committee that is considering a proposal that produces winners and losers in (potentially) unknown proportions, and analyse the optimal voting threshold - the minimum number of votes in favour needed for an alternative to be accepted. It turns out that the optimal threshold depends on the magnitude of the winners' gains and the losers' losses, and that this dependence is non-monotone. Specifically, simple majority rule is optimal when each winner gains the same amount that each loser loses. When the ratio of gains to losses moves away from one in either direction, the optimal threshold becomes larger.

Several strands of literature are related to this study. First, much attention has been devoted to the issue of committee decision-making under imperfect information (see a survey in Gerling et al., 2005). Researchers have looked at acquisition of private information by individual members of a committee (Persico, 2004; Gerardi and Yariv, 2008; Gershkov and Szentes, 2009; Gersbach and Hahn, 2012), as well as at situations in which committee members hold private information which they can choose to exchange (Visser and Swank, 2007; Gerardi and Yariv, 2007). Unlike these studies, I consider a situation in which the information acquisition decision is made collectively, and the resulting information likewise becomes public.

Additionally, a number of studies have focused on collective search or experimentation (Albrecht et al., 2010; Compte and Jehiel, 2010; Strulovici, 2010; Messner and Polborn, 2012; Moldovanu and Shi, forthcoming). In these papers, a committee can choose to acquire further information by continuing the search for another period, or by delaying a decision until the next period. The benefit of having more information can, however, be outweighed by the cost of foregoing the payoff in the current period. In contrast to this approach, in the current paper, deciding to gather information before choosing between alternatives does not entail any change in payoffs from either alternative. The decision to stay uninformed is driven not by payoffs that are lost when information is acquired, but purely by the effect of that information on the collective decision.

In more applied settings, this paper is related to the issue of adopting policy reforms, at which Fernandez and Rodrik [1991] look. In that work, welfare-maximising reforms that benefit some while hurting others can be rejected because of uncertainty over who will win and who will lose. In this paper too, the distribution of individual gains and losses in various states is the key to under-

standing the committee’s decision, although the focus here is on the choice of acquiring information.

A line of reasoning whose logic most closely resembles the analysis in this article comes from the research in sociology. This theory, first formulated by Davison [1983], proposes the existence of *third-person effect*, in which individuals tend to believe that others will be influenced by public communication to a greater degree than themselves. Hence, they might support actions to restrict this communication, not because it might have an effect on themselves, but because they think it will influence others in an adverse way¹. Although in this paper I do not make an assumption that people expect others to perceive public information differently from themselves, the essential logic is similar - opposition to acquiring information exists because individuals are afraid that this information will cause others to support a different decision.

The rest of the paper is structured as follows. I start by analysing the problem from a positive point of view. Section 2 outlines the baseline model, in which a group of agents decides on a proposal that brings each of them a specific private payoff in each of the two states of the world. I describe the distributions of payoffs under which the committee will or will not choose to acquire a binary signal about the state. Section 3 extends the setup to a case in which there is an arbitrary finite set of states, and the group is deciding whether to acquire an information partition on that set.

Then next sections switch to a normative focus. Section 4 considers the effect of an intervention by an outside party that can choose to reveal information regardless of the collective decision. Section 5 analyses the welfare-maximising voting procedure. Finally, Section 6 concludes.

2 Model with Two States

Consider a set I of individuals which constitute a committee that needs to choose whether to approve a project. There are two states of the world, called X and Y , which are initially considered to be equally likely. In each state, each option (accepting the project or rejecting it) gives a private payoff (positive or negative) to every individual; the distribution of these payoffs is common knowledge. The committee can choose to acquire a noisy public signal $\tau \in \{X, Y\}$; the value of the signal corresponds to the true state with probability $p \in (\frac{1}{2}, 1]$. The committee thus faces two choices: first, they decide whether to acquire the signal, and then, given the available information, they choose whether to go ahead with the project.

The committee decides between any two alternatives in the following way. Let the alternatives be called 0 and 1; I will subsequently use 1 to denote a “positive” decision - i.e. to accept the project, or to acquire information. For every individual $i \in I$, denote by u_i^0 and u_i^1 the expected utilities from choosing the respective alternative, conditional on the information available at the time

¹The third-person effect hypothesis has been confirmed by numerous studies, as Perloff [1999] describes.

the decision is made. Let u^0 and u^1 be the $|I|$ -dimensional vectors consisting of expected payoffs to all individuals. The committee's decision-making procedure is then described by a social choice function $h : \mathbb{R}^I \times \mathbb{R}^I \rightarrow \{0, 1\}$, which produces a decision given the vectors u^0 and u^1 . I will make the following assumptions about h :

A1. *Invariance under a linear transformation.* For any u^0 and u^1 , and for any positive scalar a and any $|I|$ -dimensional vector b , $h(u^0, u^1) = h(au^0 + b, au^1 + b)$.

A2. *Invariance under relabeling of alternatives.* For any u^0 and u^1 such that $u^0 \neq u^1$, $h(u^1, u^0) = 1 - h(u^0, u^1)$.

Assumption A1 means that applying an identical linear transformation to the payoffs of all agents does not change the decision. This holds if, for example, the social choice function depends on the ordinal ranking of alternatives for each agent, but not on the differences in utility from these two alternatives - e.g. when the committee's choice is decided through voting. Alternatively, this assumption holds when utility differences do matter, but multiplying these differences by the same positive number for all agents does not change the outcome.

Assumption A2 suggests that, as long as at least one individual is not indifferent between the alternatives, there is no "default" option - only payoffs from each alternative matter, not their names.

The simple majority vote meets these assumptions, as do various majority schemes in which the votes of different agents have different weights.

Assumption A1 implies that there exists a function $g : \mathbb{R}^I \rightarrow \{0, 1\}$ such that $h(u^0, u^1) = h(0, u^1 - u^0) \equiv g(u^1 - u^0)$. In words, g defines the committee's decision given the difference in expected payoffs to individuals from alternatives 1 and 0. To simplify notation, I will subsequently use g to describe the social choice function; and when discussing the decision on whether to accept the project I will normalize to zero the payoff to every individual when the project is not accepted.

If the committee chooses to acquire information, then, upon receiving signal X , they will believe that the state is X with probability p ; while if they receive signal Y , they will believe that the state is X with probability $1 - p$. Now denote by x_i and y_i the utility of individual i when the project is accepted and the state is X and Y , respectively. Let $x \equiv (x_1, x_2, \dots)$ and $y \equiv (y_1, y_2, \dots)$ denote vectors of payoffs. Then, if the information is acquired and the signal is X , the project will be approved when $g[p x + (1 - p) y] = 1$. Similarly, if the information is acquired and the signal is Y , the project will go ahead if $g[(1 - p) x + p y] = 1$.

Ex ante, each agent knows that the state is X with probability $\frac{1}{2}$. Now suppose the committee chooses to acquire information and the state of the world happens to be X . In this case, with probability p , the committee will receive signal X , and the individual i will get payoff x_i if $g[p x + (1 - p) y] = 1$; while with probability $1 - p$, they will receive signal Y , and the agent i will get x_i if $g[p x + (1 - p) y] = 1$. Similarly, if the committee chooses to acquire the signal and the state is Y , then agent i will receive payoff y_i if the signal is Y

(which happens with probability p) and $g[(1-p)x + py] = 1$, or if the signal is X (the probability of which is $1-p$) and $g[px + (1-p)y] = 1$.

Thus, if the committee chooses to acquire information, the ex ante expected payoff of individual i will be:

$$\begin{aligned} & \frac{1}{2}x_i (pg[px + (1-p)y] + (1-p)g[(1-p)x + py]) + \\ & + \frac{1}{2}y_i ((1-p)g[px + (1-p)y] + pg[(1-p)x + py]) - \end{aligned}$$

On the other hand, if the committee chooses not to learn the signal, her expected utility will equal $\frac{x_i+y_i}{2}$ whenever $g\left(\frac{x+y}{2}\right) = 1$.

Denote by v_i the value of information for agent i - in other words, the difference in agent i 's ex ante expected payoffs with and without the information. Subtracting the two expected payoffs and simplifying the result yields:

$$v_i = \frac{1}{2}[px_i + (1-p)y_i]g[px + (1-p)y] + \frac{1}{2}[(1-p)x_i + py_i]g[(1-p)x + py] - \frac{x_i + y_i}{2}g\left(\frac{x+y}{2}\right)$$

The committee will decide to learn the state of the world iff $g(v) = 1$, where $v \equiv (v_1, v_2, \dots)$.

Before proceeding with the analysis, observe that it follows from A1 that $g(\lambda z) = g(z)$ for any $\lambda > 0$ and any $z \in \mathbb{R}^I$. Also, from A1 and A2 it follows that $g(-z) = 1 - g(z)$ for any $z \in \mathbb{R}^I$ such that $z \neq (0, 0, \dots)$.

From the way v_i looks, it can be seen that in many cases, all agents will be indifferent between learning and not learning information. For example, when $g[px + (1-p)y] = g[(1-p)x + py] = g\left(\frac{x+y}{2}\right)$, the decision is the same regardless of the signal, and $v_i = 0$ for all i . To proceed with the analysis, it is necessary to impose some kind of a tie-breaking rule to decide what happens when all agents are indifferent. For most of the paper, I will use the following assumption:

A3a. *Lexicographic preference for zero. If $u^0 = u^1$, then $h(u^0, u^1) = 0$.*

Note that, when A1 and A2 hold, this is equivalent to saying that $g[(0, 0, \dots)] = 0$. A3a suggests that when acquiring or not acquiring information produces the same outcome, the committee decides not to learn the state of the world - perhaps because there is some small cost of obtaining information.

Using these assumptions, we can derive the following result:

Proposition 1a. *Assume that A1, A2, and A3a hold. Then the information will not be acquired iff $g[px + (1-p)y] = g[(1-p)x + py]$.*

Proof. See Appendix.

The proof of this result relies on the fact that in a number of cases, acquiring information has no effect on the decision in either state of the world, and thus

the committee chooses not to acquire it. This requires the use of Assumption 3a, which is to some extent arbitrary. It is also possible for the committee to make an alternative decision when all members are indifferent. This is captured in Assumption 3b:

A3b. *Lexicographic preference for one.* If $u^0 = u^1$, then $h(u^0, u^1) = 1$.

Using this assumption, we can check when the committee will strictly prefer not to acquire information.

Proposition 1b. *Assume that A1, A2, and A3b hold. Then the information will not be acquired iff $g[px + (1 - p)y] = g[(1 - p)x + py] \neq g\left(\frac{x+y}{2}\right)$.*

Proof. See Appendix.

These two results indicate that the committee will choose to remain ignorant when the decision is the same under any signal. When this decision is also different from the decision that is made in ignorance, the committee will strictly prefer to stay ignorant.

Now we can look at one particular social choice function that is frequently used. Specifically, let us make the following assumption:

A4. *Majority rule.* $h(u^0, u^1) = 1$ iff $|i \in I : u_i^1 > u_i^0| > \frac{|I|}{2}$.

Note that A4 implies that A1 and A2 hold.

Suppose the total mass of I is normalized to 1. Figure 1 then shows the (x, y) space of state-dependent payoffs. The letters $A - D$ here indicate mass of the population in the areas bounded by the thick lines. Thus, A represents the mass of agents who want the proposal to be adopted under any signal; B is the mass of those who prefer the proposal to go ahead when they receive signal Y but not when they receive signal X , and so on. When $p = 1$ (which means that the signal reveals the true state with certainty), then A , for example, represents the mass of individuals who prefer the alternative to be adopted in either state. Note that $A + B + C + D = 1$.

Suppose for simplicity that the mass of those for whom $px + (1 - p)y = 0$ or $(1 - p)x + py = 0$ is zero, i.e. (almost) nobody is indifferent when either of the signals is received. We can get the following result:

Proposition 2. *Under A4 and A3a, the information will be acquired iff $\max(B, D) + \min(A, C) > 1/2$.*

Proof. See Appendix

How can we interpret this result? Note that, since the sum of areas A through D equals one, the condition above is equivalent to the statement $\min(B, D) + \max(A, C) < 1/2$. If we rearrange these two equations, we can see that the information will be acquired iff

$$\max(B, D) - \min(B, D) > \max(A, C) - \min(A, C)$$

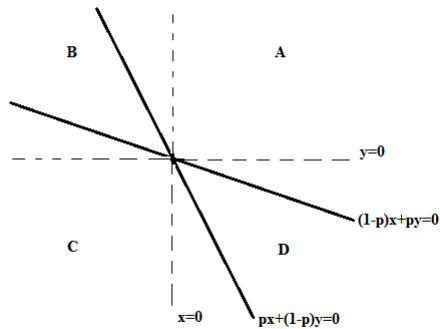


Figure 1:

This implies that the information will be acquired iff the distribution of individuals is “relatively symmetric” along the northwest-southeast direction, and “relatively asymmetric” along the northeast-southwest direction.

Note that agents whose preference points lie in area *C* are those who are opposed to the proposal regardless of the signal, while those in *A* are in favour of it regardless of the signal. Individuals whose preferences lie in other areas vote for or against the project depending on the signal that the committee receives. The result says that information will be acquired when the number of those who are generally in favour of the proposal is close to the number of those who are generally against it; while out of those individuals whose decision depends on the state, the number of those who favour the project under one signal is much greater than the number of those who expect to gain from it under the other signal.

Returning to the airport example described in the Introduction, we can say that the information will be acquired if the number of people who fly very often is close to the number of those who never travel; while out of those who travel moderately often, far more live near one of the prospective locations than near the other one.

3 Generic Information Structure

The above discussion has looked at a case in which there are two payoff-relevant states of the world, and the information that can be acquired is a noisy signal about the state. A more general approach to the information acquisition problem would be to see the state of the world as an element of a generic set. The information acquisition decision can then be represented by a mapping from the set of states to some set of messages. This information structure can be described as a partition of the set of states, in which states that are mapped to

the same message belong to the same element of the partition.

Suppose that there is a finite set of states Ω . Each state $j \in \Omega$ occurs with a prior probability p^j , which is common knowledge. If the project is approved, then in state j each agent $i \in I$ receives payoff x_i^j - throughout this section, subscripts will denote agents, while superscripts will denote states. Let x^j be a vector representing the payoffs of all agents if the proposal is approved and the state is j . The committee first chooses whether to acquire information structure \mathcal{P} , which is a partition of Ω . Let us denote by S a generic element of \mathcal{P} ; I will refer to S as a *message*.

If the information is not acquired, the committee bases its decision on the prior. Hence, it will approve the project if and only if $g \left[\sum_{j \in \Omega} p^j x^j \right] = 1$. Then ex ante, if the committee chooses to stay ignorant, agents will receive the expected payoff vector $\sum_{j \in \Omega} p^j x^j g \left[\sum_{j \in \Omega} p^j x^j \right]$.

Now suppose that the information structure P is acquired. If the committee receives a message $S \in P$, the posterior probability that the state is j will, by Bayes law, be $\frac{p^j}{\Pr(S)}$, where $\Pr(S)$ denotes the prior probability of receiving the message S . Then, upon receiving the message S , the committee will vote in favour of the proposal iff $g \left[\sum_{j \in S} \frac{p^j x^j}{\Pr(S)} \right] = 1$. The ex ante expected payoff vector to all agents will then equal

$$\sum_{S \in P} \left(\Pr(S) g \left[\sum_{j \in S} \frac{p^j x^j}{\Pr(S)} \right] \sum_{j \in S} \frac{p^j x^j}{\Pr(S)} \right) = \sum_{S \in P} \left(g \left[\sum_{j \in S} \frac{p^j x^j}{\Pr(S)} \right] \sum_{j \in S} p^j x^j \right)$$

To avoid the awkward case in which every agent is indifferent between acquiring and not acquiring information, I will make the following assumption:

A5. Non-triviality of information. *There exists an $S \in P$ such that $g \left[\sum_{j \in S} \frac{p^j x^j}{\Pr(S)} \right] \neq g \left[\sum_{j \in \Omega} p^j x^j \right]$.*

This says that there is at least one message that induces a decision different from the one that is made without information. In other words, information can at least potentially have some effect.

Then the following result can be derived:

Proposition 3. *Assume that A1, A2, and A5 hold. Then the information partition P will be acquired iff $g \left[\sum_{j \in M} p^j x^j \right] \neq g \left[\sum_{j \in \Omega} p^j x^j \right]$, where M is the*

union of all $S \in P$ for which $g \left[\sum_{j \in S} p^j x^j \right] \neq g \left[\sum_{j \in \Omega} p^j x^j \right]$.

Proof. See Appendix.

Proposition 4 says the following. Take all the messages in the information structure P that induce a decision different from the one made without information. Now suppose that the committee only knows that one of such messages will be received, without knowing which one. If, given this knowledge, the committee still makes the same decision (i.e. a decision different from the one they make in ignorance), then the committee will vote to acquire information structure P .

4 Effect of Information Release

In the above analysis, information acquisition was solely the committee's decision. However, it is possible for an outside party to intervene by making the information public regardless of the committee's decision. For instance, in the case described in the Introduction, the government can disclose the future location of the proposed airport. This section looks at welfare effect of such interventions.

Let us say that the outside party makes the decision based on a welfare function $w : \mathbb{R}^I \rightarrow \mathbb{R}$ which maps expected payoffs of individuals (given the information available to the designer) to social welfare. As a normalisation, suppose $w(0, 0, \dots) = 0$. Let $sign(a)$ be the sign (positive or negative) of a scalar a . To simplify notation, denote $k(z) \equiv g(z) - \frac{1}{2}$, so that a positive $d(z)$ indicates a positive social decision.

Proposition 4. *Suppose that A1 and A2 hold. Then, releasing information is weakly socially preferable if $sign \left[d \left(\frac{x+y}{2} \right) \right] \neq sign \left[w \left(\frac{x+y}{2} \right) \right]$, and it is weakly harmful if $sign \left[d \left(\frac{x+y}{2} \right) \right] = sign \left[w \left(\frac{x+y}{2} \right) \right]$.*

Proof. See Appendix.

Intuitively, this proposition says that information release is weakly preferable whenever the decision that the committee makes in ignorance is different from the welfare-maximising decision.

Suppose that the social choice function is a simple majority rule, and that the welfare function is the sum of payoffs. Then information release is optimal when the distribution of $x+y$ across players has a mean and a median that are of different signs. Referring to Figure 1 above, this happens when the distribution of payoffs is skewed along the Southwest-Northeast axis.

5 Optimal Voting Rule

This part looks at the problem of choosing the optimal decision rule. For this purpose I simplify the set of possible preference distributions. Specifically, I assume that accepting a proposal produces winners and losers. Whether a particular agent is a winner or a loser depends on the state of the world. This setup is similar to the one described in the literature on economic reform (Fernandez and Rodrik [1991]), in which a reform benefits some while hurting others, but agents do not know ex ante whether they will win or lose. Accordingly, this section of the paper describes the voting rule that maximises the expected welfare, in situations when the committee can choose whether to learn the state.

Suppose that each agent's preferences are characterised by her type, which can be X or Y . Accepting the proposal gives an agent a payoff of $k > 0$ if the state corresponds to her type, and a payoff of -1 if it does not. Thus, k measures the magnitude of gains relative to that of losses. Before deciding on the proposal, the committee chooses whether to acquire information; in this part I assume that acquiring information means learning the state of the world precisely.

For simplicity, I assume that the set of agents I is a continuum with mass 1. Let $s \in [0, 1]$ be the share of agents whose type is X . Nature randomly draws s from some distribution f with cdf F over the unit interval². Let E_f be the expectation taken over f . Assume that f is strictly positive over $[0, 1]$.

The set of possible decision-making procedures is restricted by the following assumption:

A5. *Decisions are made by voting. For any $z \in R^I$, $g(z) = 1$ iff $h(u^0, u^1) = 1$ iff $|i \in I : z > 0| > t$ for some $t \in [0, 1]$*

In words, the committee votes on the alternative, and the alternative (acquiring information, or adopting the proposal) is selected whenever the number of votes in favour of it is greater than some t . The choice of an optimal voting rule is thus reduced to choosing the optimal t ; denote it by t^* . I assume that the choice is made by a social planner that maximises the expected sum of agents' payoffs, denoted by W .

The timing of the interaction is as follows. First, a planner chooses t . Then Nature draws s from cdf F ; all agents are informed about s . Following this, Nature selects the state. After that, agents vote on whether to learn the state; if more than t vote for it, they all learn the state of the world. Finally, the committee votes on whether to adopt the project; it is adopted if more than t vote for it.

This setup applies well to situations in which the committee will have to make examine a number of different proposals in future, and a constitutional rule describing the decision-making procedure needs to be chosen. That is why it is reasonable to assume that the distribution of agents across types is unknown

²A more natural way of thinking about this is to assume that Nature determines whether each voter wins or loses. Then F is the resulting distribution of the share of winners

at the time the constitutional rule is selected (as it can vary depending the nature of each proposal) but is known when the time comes to actually make the decision. Similarly, in such cases it is realistic to assume that the decision on information acquisition and on a proposal is made using the same procedure, as there are many decisions to be made in future, and the constitutional rule needs to be relatively simple.

Let $d_X, d_Y \in \{0, 1\}$ denote the decision on the project when the state is known to be X and Y . Let d_0 denote the decision on the project made without information. Note that if $d_X = d_Y = d_0$, utility is the same regardless of the information acquisition decision. Hence, the planner can ignore such cases when choosing the optimal t .

For other cases, Section 2 has already established the condition under which information will be acquired when $t = 0.5$. However, if payoffs are such that each voter wins in one state and loses in the other, that result can be generalised for other voting thresholds, as the following proposition states:

Proposition 5. *Assume that A5 holds. Then the committee will vote to acquire information iff $d_X \neq d_Y$.*

Proof. See Appendix.

In the subsequent analysis, I will start with a benchmark case in which s , the share of agents of type X , is not known ex ante, but there is no uncertainty about the state of the world (and hence no information acquisition decision). I will then look at a setup described above, in which s and the state are not known ex ante, but the committee can choose to learn the state. Finally, I will examine the setup in which, in addition, k - the relative magnitude of the winners' gain from the proposal - is unknown at a time when the constitutional rule is selected.

5.1 The Case without Information Acquisition

Let us look at the case when the committee will always know the state, but s is ex ante unknown (but known at a time when the vote is made). Suppose the planner has selected some $t \geq \frac{1}{2}$. Then, when Nature draws s from pdf F , and the committee makes a vote knowing the state, the following cases can emerge:

1. $s < 1 - t$. This happens with probability $F(1 - t)$. In this case, $d_Y = 1$ and $d_X = 0$. Thus, in state X every agent gets zero, and in state Y agents of type X receive -1 , and agents of type Y receive k . Since there are s agents of type X and $1 - s$ agents of type Y , the expected sum of payoffs, conditional on $s < 1 - t$, will equal $\frac{1}{2}E_f[-s + k(1 - s) \mid s < 1 - t]$.
2. $s > t$. This happens with probability $1 - F(t)$. In this case, $d_Y = 0$ and $d_X = 1$. Thus, in state Y every agent gets zero, and in state X agents of type X get k , and agents of type Y get -1 . The expected sum of payoffs, conditional on $s > t$, will equal $\frac{1}{2}E_f[ks - (1 - s) \mid s > t]$.

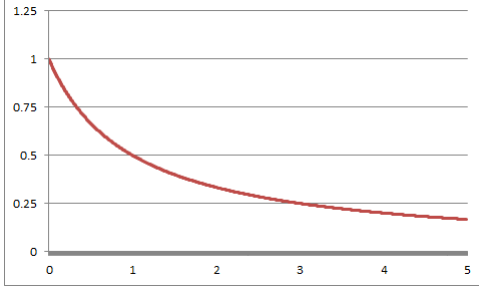


Figure 2:

3. $s \in [1 - t, t]$. In this case the proposal is rejected in either state, and every agent receives zero.

Putting these cases together, we get

$$\begin{aligned}
 W &= F(1-t) \mathbb{E}_f \left[\frac{-(k+1)s+k}{2} \mid s < 1-t \right] + [1-F(t)] \mathbb{E}_f \left[\frac{(k+1)s-1}{2} \mid s > t \right] = \\
 &= \frac{1}{2} \left\{ -(k+1) \int_0^{1-t} s dF(s) + kF(1-t) + (k+1) \int_t^1 s dF(s) - [1-F(t)] \right\}
 \end{aligned}$$

It is easy to verify that, when the planner selects $t < \frac{1}{2}$, we get a similar expression.

Proposition 6.1. *If information is always available, then $t^* = \frac{1}{1+k}$ for any f*

Proof. Straightforward maximisation of the above expression.

Figure 1 shows the optimal voting threshold as a function of k . Intuitively, if the gains of winners are small relative to losses of the others, it is socially optimal to accept the proposal only when the share of winners is large, and vice versa. Hence, the optimal voting threshold decreases in the magnitude of k .

5.2 The Case with Information Acquisition

Now let us look at the case in which the committee can vote on whether to learn the state of the world. Suppose the planner has selected some $t \geq \frac{1}{2}$. Then, when Nature draws s from pdf F , and the committee makes a vote knowing the state, we can have the following situations:

1. $s < 1 - t$. This happens with probability $F(1-t)$. In this case, $d_Y = 1$ and $d_X = 0$, so the committee chooses to learn the state. If the state turns out to be X , every agent gets zero. If it happens to be Y , agents of type X receive -1 , and agents of type Y receive k . The expected sum of payoffs, conditional on $s < 1 - t$, will equal $\frac{1}{2} \mathbb{E}_f [-s + k(1-s) \mid s < 1 - t]$, as before.
2. $s > t$. This happens with probability $1 - F(t)$. In this case, $d_Y = 0$ and $d_X = 1$, so the committee chooses to learn the state. If it is X ,

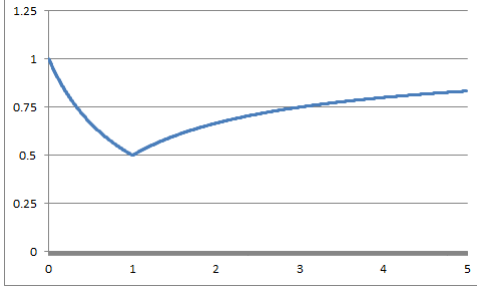


Figure 3:

agents of type X get k , and agents of type Y get -1 . If it is Y , everyone gets zero. The expected sum of payoffs, conditional on $s > t$, will equal $\frac{1}{2} \mathbb{E}_f [ks - (1 - s) \mid s > t]$.

3. $s \in [1 - t, t]$. This happens with probability $F(t) - F(1 - t)$. In this case, $d_X = d_Y = 0$, so the committee declines to learn the state. When they make the decision in ignorance, every agent's payoff is $\frac{k-1}{2}$ if $k > 1$ and 0 if $k < 1$.

Thus, the expected sum of payoffs when $k > 1$ equals

$$W = F(1 - t) \mathbb{E}_f \left[\frac{-(k+1)s+k}{2} \mid s < 1 - t \right] + [1 - F(t)] \mathbb{E}_f \left[\frac{(k+1)s-1}{2} \mid s > t + [F(t) - F(1 - t)] \frac{k-1}{2} \right] = \frac{1}{2} \left\{ -(k+1) \int_0^{1-t} s dF(s) + kF(1 - t) + (k+1) \int_t^1 s dF(s) - [1 - F(t)] + [F(t) - F(1 - t)](k-1) \right\}$$

and when $k < 1$, it equals

$$W = F(1 - t) \mathbb{E}_f \left[\frac{-(k+1)s+k}{2} \mid s < 1 - t \right] + [1 - F(t)] \mathbb{E}_f \left[\frac{(k+1)s-1}{2} \mid s > t \right] = \frac{1}{2} \left\{ -(k+1) \int_0^{1-t} s dF(s) + kF(1 - t) + (k+1) \int_t^1 s dF(s) - [1 - F(t)] \right\}$$

Again, it is easy to see that expected welfare as a function of t is the same when $t < \frac{1}{2}$

Proposition 6.2. *If information acquisition is an endogenous decision, then, for any f ,*

$$\begin{cases} t^* = \frac{1}{1+k} & \text{if } k < 1 \\ t^* = \frac{k}{1+k} & \text{if } k > 1 \end{cases}$$

Proof. Straightforward maximisation of the above expression.

Figure 3 shows the optimal voting threshold as a function of k . As we can see, the optimal voting rule is a simple majority rule when $k = 1$, i.e. when gains and losses have the same weight. Otherwise, it increases as k moves away from 1.

The reason for this non-monotonicity is that, unlike in the previous case, the committee here can choose whether they want to acquire information. If k is close to zero, then it is optimal to accept the proposal only if there are many winners - just as before. If k is very large, it is optimal for the proposal to go ahead in a large number of cases. However, in this case the committee will adopt the proposal in ignorance when k is above one. Thus, it is optimal to set a high voting threshold t , because it will make it more likely that the committee declines to learn the state - and for high values of k , this will induce a positive decision on the proposal.

5.3 The Case with Information Acquisition and Random Gains

In the preceding analysis, the distribution of winners and losers was uncertain when the constitutional rule was selected, but the magnitude of the winners' gain relative to that of the losers' loss was assumed to be known. In this section I relax that assumption.

Suppose that k is drawn (simultaneously with s but independently) from some random distribution with support on $[-\infty, +\infty]$. For simplicity, I assume that this distribution has no mass points at $k = 1$ or at $k = 0$. Each agent is informed about the realisation of k and s prior to voting, but the planner does not know them when choosing t . If the planner has chosen $t \geq \frac{1}{2}$, then from her point of view, the expected payoffs are as follows:

1. If $s < 1 - t$ and $k > 0$ - this happens with probability $F(1 - t) \Pr(k > 0)$ - the information is acquired and the proposal is adopted in state Y . The ex ante expected sum of payoffs in that case is $\frac{1}{2} \mathbb{E}[-s + k(1 - s) \mid s < 1 - t, k > 0]$.
2. If $s > t$ and $k > 0$ - this happens with probability $[1 - F(t)] \Pr(k > 0)$ - the information is acquired and the proposal is adopted in state X . The ex ante expected sum of payoffs is $\frac{1}{2} \mathbb{E}[ks - (1 - s) \mid s > t, k > 0]$.
3. If $1 - t < s < t$ and $k > 1$, the information is not acquired, and, as every voter's payoff from the proposal is $\frac{k+1}{2}$, the proposal is adopted in either state. The expected sum of payoffs is $\frac{1}{2} \mathbb{E}[k - 1 \mid 1 - t < s < t, k > 1]$
4. In all other cases, the proposal will be rejected, so the payoff of all agents is zero.

Proposition 6.2. *If information acquisition is an endogenous decision, and k is not known ex ante, then, for any f ,*

$$t^* = \frac{\Pr(k > 0) + \Pr(k > 1) (\mathbb{E}[k \mid k > 1] - 1)}{\Pr(k > 0) (\mathbb{E}[k \mid k > 0] + 1)}$$

Proof. We can obtain this result by maximising the sum of expected payoffs.

Suppose k is always positive ($\Pr(k > 0) = 1$), so there are always some agents who benefit from the proposal. If k is very likely to be large, then $\Pr(k > 1) \approx 1$, and $E[k | k > 1] \approx E[k | k > 0] = E[k]$. Thus, $t^* \approx \frac{1+E[k]-1}{E[k]+1} = \frac{E[k]}{E[k]+1}$. On the other hand, if k is likely to be close to zero, then $\Pr(k > 1) \approx 0$, and $E[k | k > 0] \approx E[k]$. Thus, $t^* \approx \frac{1}{E[k]+1}$. We can thus see that the earlier result is a special case of this result.

6 Conclusions

The aim of this paper was to analyse a committee's choice between acquiring information - a signal about the state of the world - and remaining uninformed, prior to voting on a proposal. Information is costless, and, when acquired, becomes known to all committee members. Because information can change the eventual collective decision, some committee members may be against acquiring information, and under some conditions, the share of these members may be enough for the committee to choose ignorance.

It turned out that this choice depends on the group's decision under different signals. When different signals induce identical decisions, the committee weakly prefers to stay uninformed. When these decisions are, additionally, different from the decision made without information, the preference for ignorance becomes strict.

Specific types of payoff distributions induce a collective preference for ignorance. It was found that the decision on the information acquisition depends on the committee members' attitudes towards the proposal under different signals. The committee will choose to remain uninformed if and only if the number of members who support the proposal and who oppose it, regardless of information, are similar; while the number of those who support it under one signal and oppose it under the other is much greater than the number of agents with the opposite preferences. The paper also looked at a general case when the set of states is arbitrary and the committee can acquire a partition of it. It was found that a partition will be acquired if and only if all messages that induce a decision different from a decision of an uninformed committee can be pooled together without changing the outcome.

Turning to normative aspects of the problem, this work looked at the effect of releasing information regardless of the committee's decision. Such a release is optimal when the decision made in ignorance is different from a welfare-maximising decision - which, in the case of majority voting, happens when the distribution of average payoffs across states is skewed.

The optimal voting rule depends on the magnitude of gains relative to losses - but not on the distribution of the share of winners and losers. The welfare-maximising voting rule is a simple majority rule when each agent gains the same in the state in which he wins as the amount he loses in the unfavourable state. As the ratio of gains to losses moves away from one in either direction, the

optimal rule requires a larger plurality of votes to make a positive decision.

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Appendix

Proof of Proposition 1a.

Note that

$$v = \frac{1}{2} [px + (1-p)y] g [px + (1-p)y] + \frac{1}{2} [(1-p)x + py] g [(1-p)x + py] - \frac{x+y}{2} g \left(\frac{x+y}{2} \right)$$

1. If $g [px + (1-p)y] = g [(1-p)x + py] = g \left(\frac{x+y}{2} \right)$, then $v_i = 0$ and $g(v) = 0$.
2. If $g [px + (1-p)y] = g [(1-p)x + py] = 0$ and $g \left(\frac{x+y}{2} \right) = 1$, then $v = -\frac{x+y}{2}$. Thus, $g(v) = g \left(-\frac{x+y}{2} \right) = 0$.
3. If $g [px + (1-p)y] = g [(1-p)x + py] = 1$ and $g \left(\frac{x+y}{2} \right) = 0$, then $v = \frac{1}{2} [px + (1-p)y] + \frac{1}{2} [(1-p)x + py] = \frac{x+y}{2}$, so $g(v) = g \left(\frac{x+y}{2} \right) = 0$.
4. If $g [px + (1-p)y] = 1$ and $g [(1-p)x + py] = g \left(\frac{x+y}{2} \right) = 0$, then $v = \frac{1}{2} [px + (1-p)y]$, so $g(v) = g \left(\frac{1}{2} [px + (1-p)y] \right) = 1$.
5. In a similar way, it can be shown that when $g [(1-p)x + py] = 1$ and $g [px + (1-p)y] = g \left(\frac{x+y}{2} \right) = 0$, $g(v) = 1$.
6. If $g [px + (1-p)y] = 0$ and $g [(1-p)x + py] = g \left(\frac{x+y}{2} \right) = 1$, then $v = \frac{1}{2} [(1-p)x + py] - \frac{x+y}{2} = -\frac{1}{2} [px + (1-p)y]$, so $g(v) = 1 - g \left(\frac{1}{2} [px + (1-p)y] \right) = 1$.
7. In a similar way, it can be shown that $g(v) = 1$ when $g [(1-p)x + py] = 1$ and $g [px + (1-p)y] = g \left(\frac{x+y}{2} \right) = 1$.

Proof of Proposition 1b

Same as in Proposition 1a, except that in case 1, $g(v)$ now equals 1, so the only cases when information will not be acquired are cases 2 and 3.

Proof of Proposition 2

Let us first prove that for information to be acquired, the condition above needs to hold. From Proposition 1 we know that information will be acquired either if $g [px + (1-p)y] = 1$ and $g [(1-p)x + py] = 0$, or if $g [px + (1-p)y] = 0$ and $g [(1-p)x + py] = 1$. The first case implies that $A + D > \frac{1}{2}$ and $C + D > \frac{1}{2}$. Thus, $D + \min(A, C) > \frac{1}{2}$, which also means that $\max(B + D) + \min(A + C) >$

$1/2$. The second case implies that $B + C > \frac{1}{2}$ and $A + B > \frac{1}{2}$. Hence, $B + \min(A, C) > \frac{1}{2}$, and therefore $\max(B + D) + \min(A + C) > 1/2$.

To prove that the condition above is sufficient for information to be acquired, note that if $B > D$, the condition implies that $B + A > \frac{1}{2}$ and $B + C > \frac{1}{2}$ - thus, $g[(1 - p)x + py] = 1$ and $g[px + (1 - p)y] = 0$ so the information will be acquired. Similarly, if $B < D$, the condition implies that $D + A > \frac{1}{2}$ and $D + C > \frac{1}{2}$, meaning that $g[px + (1 - p)y] = 1$ and $g[(1 - p)x + py] = 0$, so the committee will also choose to acquire information.

Proof of Proposition 3

To be added (available upon request).

Proof of Proposition 4

If $g[px + (1 - p)y] = g[(1 - p)x + py] = g(\frac{x+y}{2})$, then information is irrelevant to the eventual decision, and thus to welfare. If $g[px + (1 - p)y] \neq g[(1 - p)x + py]$, then information is acquired anyway, so releasing it has no effect. The only case when releasing it can have an effect is when $g[px + (1 - p)y] = g[(1 - p)x + py] \neq g(\frac{x+y}{2})$.

If $g[px + (1 - p)y] = g[(1 - p)x + py] = 1$ and $g(\frac{x+y}{2}) = 0$ (so $d(\frac{x+y}{2}) < 0$), then without information being released, the expected payoff to each player is zero (the project is not adopted). If it is released, the expected payoff vector is $\frac{x+y}{2}$, so information release is socially optimal iff $w(\frac{x+y}{2}) > 0$.

In the similar way we can show that when $g[px + (1 - p)y] = g[(1 - p)x + py] = 0$ and $g(\frac{x+y}{2}) = 1$ (so $d(\frac{x+y}{2}) < 0$), information release is socially preferable iff $w(\frac{x+y}{2}) < 0$.

Putting it together, whenever $sign[d(\frac{x+y}{2})] \neq sign[w(\frac{x+y}{2})]$, information release either has no effect, or is socially preferable. Similarly, when $sign[d(\frac{x+y}{2})] = sign[w(\frac{x+y}{2})]$, information release is weakly harmful.

Proof of Proposition 5

To be added (available upon request).