When consensus hurts: experts' advice and electoral support

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Abstract

In this paper, I analyze how voters optimally aggregate and use the information provided by informed experts. I find that, when citizens do not observe the vested interest of each expert and their interests are sufficiently correlated, the relationship between the share of experts endorsing an alternative and the share of citizens voting for it is non-monotonic. The explanation is that consensus among experts can be reached either because all experts share the same information or because they ignore the information they have and provide their advice according to their interests. The non-monotonic result holds even if experts are strategic.

Keywords: Voting; Experts; Consensus.

JEL Codes: D72, D83.

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1 Introduction

One of the major concerns about the democratic system is that citizens may not have enough information about the issues they are called to vote upon. This concern has usually been overcome by the use of heuristics or information short-cuts (Lupia, 1994). Voters do not need to fully understand the consequences of their vote in each election; they just need to employ information short-cuts, for example, following the advice of better informed citizens and experts in particular.

Recently, however, we have witnessed several situations where voters have voted against the consensus of experts. One of the most striking examples was the Brexit referendum. The market research company Ipsos MORI asked about the economic consequences of Brexit to members of the Royal Economic Society and standard citizens.[1] Regarding the short run consequences, 88% of these experts replied that Brexit would have a negative impact on UK's GDP. This opinion was only shared by 49% of standard citizens. When it comes to the long run, 72% of experts predicted a negative effect for only 35% of citizens. On June 23rd, 52% of British citizens voted in favour of leaving the EU.

Another well-known example is the 2016 US Presidential Election. The Wall Street Journal reached out all forty five surviving former members of the White House Council of Economic advisers under the past eight presidents and none of them expressed support for Donald Trump. One week before the elections, three hundred and seventy economists, including eight Nobel Prize winners, co-signed a letter alerting that Trump was a dangerous choice for the country and advising voters not to vote for him. On November 9th, Donald Trump won the 2016 Presidential Elections.

Distrust of experts' consensus also affects natural sciences. Cook et al. (2013) examined 11944 abstracts of climate peer-reviewed papers and they found that, among abstracts expressing a position on global warming, 97% endorsed the position that humans are causing

[1] `https://www.ipsos-mori.com/researchpublications/researcharchive/3739/Economists-Views-on-Brexit.aspx`

global warming. Moreover, according to Benestad et al. (2016) the remaining 3% are all flawed. However, only 41% of US citizens believe that global warming is happening and human caused (Leiserowitz, 2006). As of 2017, the USA has still not ratified the Kyoto Protocol.

If voters do not follow the advice of those who know the most in circumstances where they all agree, the logic of the heuristic device might be more complex than previously thought. When after the Brexit Referendum, Paul Johnson, director of the Institute for Fiscal Studies stated "It is clear that economists' warnings were not understood or believed by many. So we economists need to be asking ourselves why that was the case, why our near-unanimity did not cut through." he was implicitly assuming that broader consensus among experts should lead to larger persuasion of voters. This assumption is consistent with a set of models of Bayesian learning. Consider, for example, a simple model of Bayesian learning where experts get an independent signal of a state of the world and reveal that signal. In such environment, the largest the consensus of experts, the higher the probability that their advice is correct. Moreover, this result is robust to the introduction of biased experts who always provide the same advice no matter the signal they receive.

The goal of this paper is to provide an explanation of why the relation between the share of experts endorsing an alternative and the share of citizens voting for it can be non-monotonic. More precisely, I propose a model of expert advice and voting over two alternatives where imperfectly informed experts have potentially some vested interest affected by the decision to be voted. I show that as long as the likelihood that an expert has vested interests is constant, the share of votes of each alternative increases with the number of experts who endorse it. However, when vested interests are more likely in some type of decisions (critical) than in others (standard) and citizens do not know the type of the decision, the relationship is non-monotonic. In particular, an alternative endorsed by a bare majority can receive more electoral support than an alternative endorsed by a larger majority.

The intuition for this result is that consensus among experts can be reached either because

(a) all of them received the same signal or (b) because the decision was critical and they were all biased towards the same alternative. In (a) this consensus is informative of the correctness of experts' advice but in (b) it is not. When there is no consensus, it means that experts were not biased towards the same decision and they advised according to the signals they received. When there is a consensus, whether it is reached because of (a) or (b) it clearly makes a lot of a difference. Given that voters do not observe neither the signal received by experts nor their bias, they cannot distinguish between (a) and (b).

How does this result depend on the information of voters? I extend the model to allow citizens to get unbiased but imperfect information by their own in addition to the advices of experts and I show that the non-monotonicity still holds. Moreover, when citizens are moderately confident about their information, an alternative can only obtain the majority of votes if most experts, but not all of them, endorse it. Interestingly, when voters are overconfident of their own information, this can happen even when it would optimal for citizens to always follow the majoritarian advice of experts.

2 Related Literature

The puzzle that citizens may be more persuaded by experts who share some sort of disagreement has been addressed empirically by Sapienza and Zingales (2013). In their paper, they compare the answers to a common set of policy questions from experts drawn from the Economic Expert Panel at the University of Chicago Booth School of Business (EEP) and common US citizens drawn from the representative sample of US population used for the Chicago Booth/Kellogg School Financial Trust Index (FTI). They find that, on average, the percentage of agreement differs 35 percentage points among these groups. Interestingly, this difference is even larger when there is strong consensus among the experts. Moreover, whether citizens are informed or not about the consensus among experts about a particular policy before the question is asked, changes the differences very little. In particular, the belief that stock prices are hard to predict goes down from 55% to 42% when citizens are informed that all experts' experts agree that it is. The present paper offers an explanation of why this may happen.

Another two closely related papers are Darmofal (2005) and Johnston and Ballard (2016). Darmofal (2005) studies the factors that induce citizens to disagree with expert opinion on public policy questions and he finds that citizens are more likely to disagree with expert opinion when the political elites they favor challenge this opinion. Johnston and Ballard (2016) show how American citizens react to the consensus of experts on different economic policy issues. They find moderate changes in public opinion when citizens are informed of economists consensus. Interestingly, when this consensus is not attributed to economists but to a generic sample of people, the responsiveness is larger.

Regarding the theoretical literature, this article is related to the literature on information transmission between informed experts and an uninformed decision maker. The seminal paper of Crawford and Sobel (1982) on strategic information transmission has been extended to study situations with multiple experts such as Gilligan and Krehbiel (1989), Austen-Smith (1993), Battaglini (2002), Wolinsky (2002), Krishna and Morgan (2004) and Gerardi et al. (2009). Nevertheless, all these articles study cheap talk environments and the issue of non-monotonicity between the number of experts endorsing a decision and the likelihood that this decision is preferred by the decision maker is not present.

Callander and Hörner (2009)

This article also relates to the recent literature on disagreement. There is a number of theories that attempt to explain why people disagree and why this disagreement persists: confirmation bias (Rabin and Schrag, 1999), overconfidence (Ortoleva and Snowberg, 2015), correlation neglect (Levy and Razin, 2015) or pre-screening (Cheng and Hsiaw, 2016). The latter shares two important features with this article: experts are not strategic and citizens face a joint uncertainty of the desirable alternative and the expert credibility. However, the results and the mechanisms of their paper are substantially different.

3 The Model

An electorate composed by a continuum of voters has to choose between passing a reform $R \in (0,1)$ or keeping status quo $S = -R$. We will assume a simple majority rule: the reform can only pass if it obtains the majority of votes [2]. Each voter i has a preference parameter towards the status quo v_i distributed[3] according to a uniform distribution on $[-1,1]$. In addition to this parameter, the utility of a voter i also depends on the realization of a state of the world $\omega \in \{-1,1\}$ and both states are equally likely [4]. More precisely, the utility of a voter i when a decision $d \in S, R$ is taken in a state of the world ω is given by:

$$u_i(\omega, d) = -(\omega + v_i - d)^2 \tag{1}$$

Voters do not observe the state of the world but they receive the advices of n informed experts. Each expert j receives an individual private signal $s_j \in \{-1,1\}$ of the state of the world. More precisely $Pr(s_j = \omega|\omega) = q$. In addition to this signal, each expert j can have some vested interest on status quo. When an expert j has an interest over the status quo[5] we will say that the expert is biased and $\beta_j = -1$, otherwise we will say that the expert is neutral and $\beta_j = -1$. Some decisions are more likely to affect the interests of experts than others. With probability $p_H \in [0,1]$ the decision is critical for experts ($b = H$) and the probability that each expert is biased is $\sigma_H \in [0,1]$ and with probability $1 - p_H$ the decision is standard ($b = L$) and the probability that each expert is biased is $\sigma_L \in [0, \sigma_H]$. Notice that when $\sigma_L = \sigma_H$, biases are fully uncorrelated and when $\sigma_L = 0$ and $\sigma_H = 1$ biases are fully correlated. Voters do not observe the type of the decision.

Given that the correlation among experts' bias is a key feature of our modelling assumptions, it is important to clarify its interpretation. The rationale for assuming this correlation

[2]When both alternatives obtain the same number of votes we will assume that status quo is implemented.

[3]As it will become clear later, this heterogeneity is only needed to guarantee that the share of votes for the reform take values in $(0,1)$.

[4]Fixing one state more likely would reduce tractability but would not affect qualitatively the outcome.

[5]The case where experts can be biased towards both alternatives is discussed in one of the extensions.

is that experts are not representative of the whole population (they work in particular economic sectors such as universities, think tanks or institutions) and they can have particular interests that differ with those of the rest of the society. The importance of these interests are captured by the type of the decision: when the decision is critical, the decision to be taken has large impact on these interests and it is more likely that experts will advise according to them, whereas when the decision is standard, we may think that the relative importance of these interests are lower and experts will be more likely to advise according to the interests of society.[6]

The utility of an expert j with private interest β_j is:

$$u_j(\omega, d) = -(\omega + \beta_j - d)^2 \tag{2}$$

Notice that the optimal decision of a biased expert is S regardless of the state of the world and the optimal decision of a neutral expert is ω. We will assume that each expert j provides an advice $a_j \in \{S, R\}$ and, for simplicity, this advice always coincides with his optimal decision [7]. Thus, the advice a_j of an expert j is:

$$a_j(\beta_j, s_j) = \begin{cases} S & \text{if } \beta_j = -1 \\ s_j & \text{if } \beta_j = 0 \end{cases} \tag{3}$$

We will assume that $n = 3$ which is the simplest environment that allows us to distinguish between majority and consensus in expert's advice and, given that we have a continuum of voters and we will assume that voters vote sincerely, that is, each voter chooses the alternative that he expects to provide higher utility to himself. The timing of the model is the following:

1. State of the world ω and the type of the decision b are realized.

[6]Instead of assuming that biases are correlated we could assume that the precision of the signals they receive are correlated. For example, experts could be informed or uninformed and, when decisions are easy, the probability of being informed is higher than when they are difficult. Informed experts advise according to the information they have and uninformed ones simply advise according to their bias.

[7]We will discuss what happens when experts are strategic in the extensions.

2. Experts receive signals s_j of the state of the world and observe their bias β_j.

3. Experts give advices a_j to voters.

4. Elections are held and each voter elects the alternative that maximizes his utility.

4 Results

First of all we will prove that, despite the heterogeneity of voters' preferences, in each state of the world the optimal decision of all voters coincides:

Lemma 1 *Let $d_i^*(\omega)$ be the optimal decision of a voter i. For all i,*

$$d_i^*(\omega) = \begin{cases} S & \text{if } \omega = -1 \\ R & \text{if } \omega = 1 \end{cases} \tag{4}$$

The intuition is that the salience of the common component of citizens' preferences overweights the private one. Given that all citizens share the same optimal decision in each state of the world, we will say that a decision d is correct when $d = d^*$ and wrong otherwise. Notice that despite all voters prefer a correct decision with respect to a wrong one, given that voters do not know the realization of the state ω and they have different individual parameters, they will vote different alternatives. In particular, a voter with preference parameter $v_k = -1$ will always vote for status quo whereas a voter with preference parameter $v_l = 1$ will always vote for the reform.

The only relevant information a voter i has before casting his vote is the number of experts advising each alternative. Let Π_k be the perceived probability that the state of the world is status quo conditional on k experts supporting it. Given that voters are sincere, a voter i votes for status quo if and only if $E[U_i(s)|(k, n-k)] \geq E[u_i(r)|(k, n-k)]$ and this happens if and only if:

$$v_i \leq 2\Pi_k - 1 \tag{5}$$

.

Lemma 2 *The share of votes for status quo is* $2\Pi_k - 1$ *which is increasing in* Π_k.

Not surprisingly, given that voters value taking correct decisions, an increase in the probability that the decision is correct increases the electoral support for that decision. In the next sections we will concentrate our attention on the relationship between the number of experts advising an alternative and the probability that this alternative is correct. In particular we will study what happens when $\sigma_L = \sigma_H$ (uncorrelated bias) and when $\sigma_L = 0$ and $\sigma_H = 1$ (fully correlated bias).

4.1 Uncorrelated Bias

When $\sigma_H = \sigma_L = \sigma$, the probability that an expert j advises status quo when $\omega = S$ is $\sigma + (1-\sigma)q$ and in state of the world R is $\sigma + (1-\sigma)(1-q)$. Therefore,

$$\Pi_k = \frac{\pi(S,k)}{\pi(S,k) + \pi(R,k)} \tag{6}$$

where

$$\pi(S,k) = \binom{3}{k}(\sigma + (1-\sigma)q)^k(1-(\sigma+(1-\sigma)q))^{3-k} \tag{7}$$

$$\pi(R,k) = \binom{3}{k}(\sigma + (1-\sigma)(1-q))^k(1-(\sigma+(1-\sigma)(1-q)))^{3-k} \tag{8}$$

Lemma 3 *When experts' biases are uncorrelated, the share of votes for status quo is increasing in the number of experts advising it.*

Notice that this result applies both when experts are always neutral ($\sigma = 0$) or when they are biased with some probability ($\sigma > 0$). In both scenarios, the likelihood of a policy being correct increases on the number of experts advising for it. Increasing the probability of being biased ($\sigma > 0$) makes the advice of experts less informative but does not change the monotonicity.

4.2 Correlated Bias

In this section we introduce correlation between the bias of experts. For simplicity, we will study the fully correlation case such that $\sigma_L = 0$ and $\sigma_H = 1$. That is, all experts are neutral when $b = L$ and all experts are biased when $b = H$. Now, suppose that $k < 3$, that is, at least one expert advises the reform. This expert has to be necessarily neutral but if this expert is neutral, this means that all experts are neutral and voters know for certain that $b = L$ and the expression of Π_k is the one we derived when we studied the uncorrelated bias for $\sigma = 0$. In particular, when one expert endorses the reform and two experts endorse status quo, given that the prior probability is symmetric, the first two advices cancel out and the posterior probability that status quo is the correct decision is simply the precision q.

Thus, we can restrict our analysis to the case $k = 3$. There are different situations where all agents advise status quo, either all agents received a status quo signal independently of the type of the decision or decision is critical and all experts are biased. When the decision is standard, the probability that the state of the world is S is just the ex-ante probability which we assumed it was $\frac{1}{2}$. Therefore the probability that status quo is correct when all experts advise it is:

$$\Pi_3 = \frac{(1 - p_H)\pi(S, 3) + \frac{p_H}{2}}{(1 - p_H)(\pi(S, 3) + \pi(R, 3)) + p_H} \tag{9}$$

Clearly, when p_h gets close to 1, Π_3 gets close to $\frac{1}{2}$ and it can occur that $\Pi_3 < q = \Pi_2$. The next result formalizes this intuition:

Proposition 1 *When experts biases are correlated, there exists a $\hat{p} \in (0, 1)$ such that:*

(i) When $p_H \leq \hat{p}$, the share of votes for status quo is increasing in the number k of experts

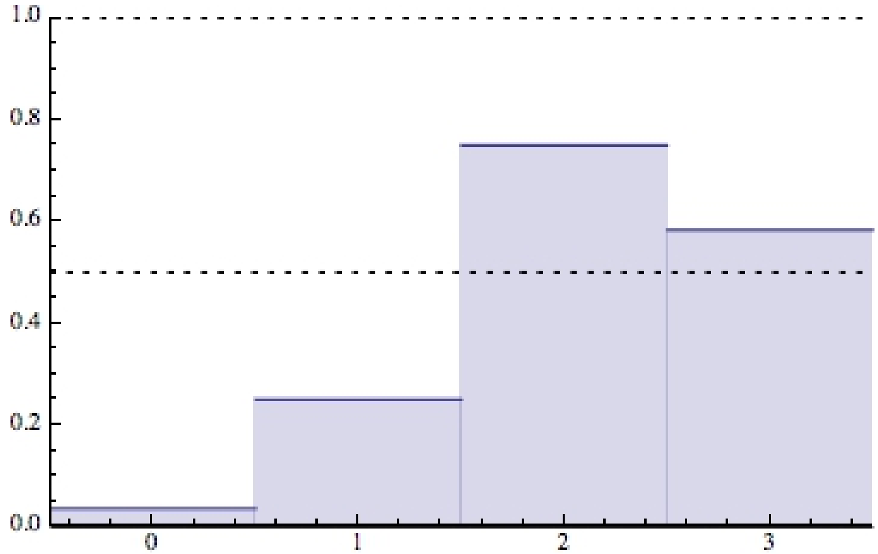

Figure 1: Π_k for $n = 3$, $q = .85$, $p_H = .5$ and biases fully correlated

advising it.

(ii) When $p_H > \hat{p}$*, the share of votes for status quo is non-monotonic in the number* k *of experts advising it. In particular, it is increasing when* $k < 3$ *but the share of votes for status quo is higher when* $k = 2$ *than when* $k = 3$*.*

Interestingly, when $p_H \geq \hat{p}$, there is a non-monotonic relationship between the number of experts supporting status quo and the probability that status quo is the correct decision. In particular, unanimity makes status quo less likely to be correct than a majority with one dissent expert. The intuition is that, when some decisions are critical and other are standard, that is when interests are correlated, consensus among experts is informative of the likelihood of the state of the world but also of the likelihood of the decision being critical. When the probability that the decision is critical is higher than $\hat{p}$, the second phenomenon dominates the first.

Corollary 1 *The threshold* $\hat{p}$ *is decreasing in* q *and* $\lim_{q\to 1} \hat{p} = 0$

The previous result means that, ceteris paribus, an increase in the quality of the signals of experts makes the non-monotonic result more likely because when the precision of the

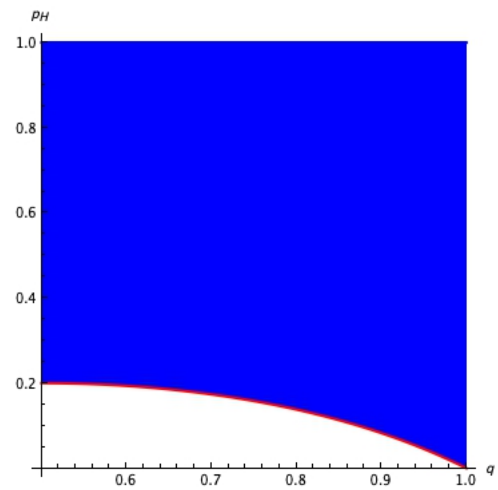

Figure 2: Area where $p_h \geq \hat{p}$

signal increases, the posterior of status quo being correct increases both for consensus and for simple majority but that increase is always larger for the latter.

Moreover, when experts tend to be perfectly informed, the non monotonic result holds for any positive probability of a critical decision.

5 Informed citizens and overconfidence

So far we assumed that experts were the only source of information of citizens and even when consensus was less informative than a simple majority, a majority of voters would still follow the advice of experts. Therefore, the non-monotonicity result had no effect for elections with majority vote. In this section we will assume that voters have access to other information to illustrate why some reforms that wouldn't pass when a simple majority of experts advise against them, can pass when all experts advise against them. Let's assume that, in addition to observing experts' advices, all citizens get a common signal $\theta_c \in \{-1, 1\}$ of the state of the world with precision $q_c = Pr(\omega = \theta_c|\theta_c) > \frac{1}{2}$. We allow citizens to be overconfident about the precision of their signal, that is, instead of thinking that their precision is q_c, they think that their precision is $q'_c \geq q_c$. Nevertheless, they are aware that $q'_c < q$ (which implies

$q_c < q$), that is, not only their signal is less informative than the signal of an expert but they are aware of it. Let $\pi_k(\theta_c)$ denote the probability that status quo is the correct decision when citizens receive a signal θ_c and k experts advise it and let $\pi'_k(\theta_c)$ be the subjective probability of citizens.

We will concentrate on the case where biases are correlated since this is the one that can hold the non-monotonicity result. In particular, we will derive the conditions such that citizens only follow experts advice when there is a simple majority and follow their signal otherwise despite the fact that following expert's consensus would increase their welfare.

Lemma 4 *When most experts advise the reform, the reform is implemented independently of the prior of voters.*

When most experts advise the reform, given that citizens know that experts are better informed than them and they can't be biased towards the reform, citizens think that the reform is more likely to be correct and a majority of citizens vote for the reform. Thus, the interesting case is what happens when most experts advise status quo.

Proposition 2 *When most experts advise status quo,*

1. *if $\theta_c = -1$, status quo is implemented.*

2. *if $\theta_c = 1$ and and one expert advises the reform, status quo is implemented.*

3. *if $\theta_c = 1$ and all experts advise status quo, there exists a $\underline{p} \in (0, 1)$ such that status quo is implemented if and only if $p_H \leq \underline{p}$.*

We have just proven that the reform can be implemented when all experts advise status quo but, given the correlation of experts' biases, it could be the case that voters maximize the probability of taking correct decisions and, therefore, we shouldn't worry when voters ignore experts' consensus. However, in the following corollary we show that this is not always the case.

Corollary 2 *When $q_c' > q_c$, there exists a $\bar{p} \in (\underline{p}, 1)$ such that if $p_H \in (\underline{p}, \bar{p})$ the reform is implemented when all experts advise status quo and status quo is more likely to be correct than the reform.*

This result shows that when voters are poorly informed but they they are very overconfident about their information, voters ignore expert's consensus when they would be better off by following their advice. The intuition is that overconfident voters do not aggregate correctly the advice of experts and overestimate the probability that all experts are biased when experts' unanimous advice does not coincide with voters' prior. When there is no consensus, even overconfident voters follow experts' majoritarian advice because disagreement among experts proves that they are not biased and, despite being overconfident, voters think that experts are still better informed than them.

6 Extensions

6.1 Larger number of experts and partially correlated bias

We have already shown that the relationship between the number of experts advising status quo and the probability that status quo is correct can be non-monotonic. In particular we have shown that it can decrease when we move from two experts advising status quo to all experts advising status quo. A reasonable concern is that when the number of experts n is arbitrarily large, the non-monotonic result only holds for the very extreme case of unanimity. In this section we will assume that the bias is not fully correlated, that is $\sigma_L < \sigma_H$ and we will show that non-monotonicity is not only a property of unanimity but, more generally, it can also be a property of less demanding majorities.

When biases are not fully correlated, even in critical decisions it can happen that some expert advises Reform. Given that having some expert advising Reform is not fully informative about the type of the decision anymore, all Π_k change with respect to the neutral experts benchmark (recall that when bias was fully correlated, the only probability that changed was Π_n). In order to derive Π_k, we need to compute $Pr(\omega, b, k)$, that is the joint probability that the state of the world is ω, the type of the decision is b and k experts advise status quo. Conditional on state of the world ω and type of the decision b, the probability that an expert j advises status quo is:

$$\alpha(\omega, b) = \begin{cases} \sigma_b + (1-\sigma_b)q & \text{if } \omega = S \\ \sigma_b + (1-\sigma_b)(1-q) & \text{if } \omega = R \end{cases} \tag{10}$$

Thus the joint probability that k experts advise status quo and state of the world is ω and type of the decision is b

$$Pr(\omega, b.k) = \frac{p_b}{2} Pr(k|\omega, b) = \frac{p_b}{2} \binom{n}{k} (\alpha(\omega, b))^k (1-\alpha(\omega, b))^{n-k} \tag{11}$$

Once we have computed $Pr(\omega, b.k)$, we apply Bayesian updating and we obtain the probability that the state of the world is status quo conditional on the number of experts advising it:

$$\Pi_k = \frac{p_H Pr(S, H, k) + (1-p_H) Pr(S, L, k)}{p_H Pr(S, H, k) + (1-p_H) Pr(S, L, k) + p_H Pr(R, H, k) + (1-p_H) Pr(R, L, k)} \tag{12}$$

In figure 2 we can observe what can happen when biases are partially correlated. In particular we see that the non-monotonicity is not only a problem of the extreme case $k = n$ but it is a property that can appear for all $k > \frac{n+1}{2}$. The intuition is the following. If k is close to unanimity, it means that there is a huge fraction of biased experts ($b = H$) and neutral agents receive status quo signals ($\omega = S$). If k is slightly above the simple majority threshold, experts are neutral ($b = L$) and they receive status quo signals $\omega = S$. If k is under the majority, experts are neutral $b = L$ and they receive Reform signals. Finally, when k is above small majority and under unanimity, there is a huge fraction of biased experts $b = H$ and neutral experts receive Reform signals ($\omega = R$).

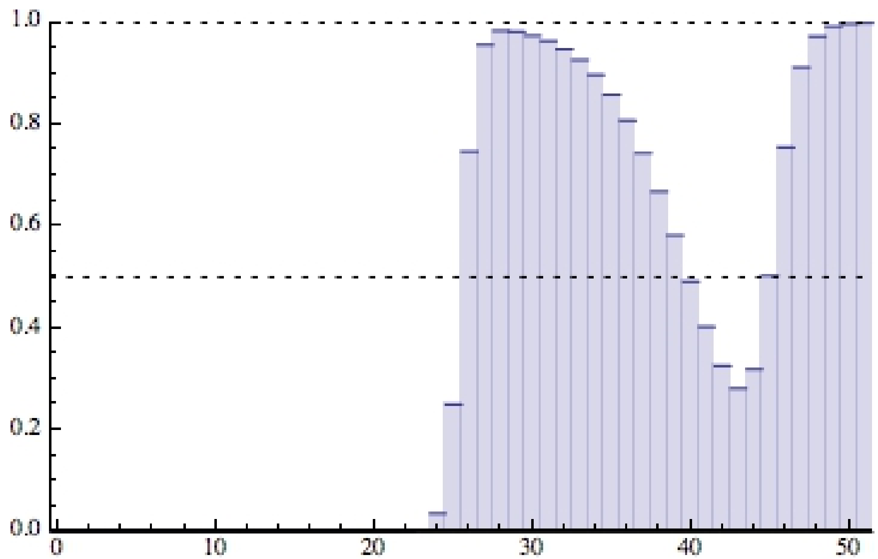

Figure 3: Π_k for $n = 51$, $q = .75$, $p_H = .5$, $\sigma_H = .75$ and biases partially correlated

When q is larger, that is, when neutral decision makers receive more precise signals, there is a compression of the distribution towards the right that can potentially erase the sink between simple majority and consensus.

6.2 Symmetric bias

In all the article we have assumed that experts could only be biased towards one of the options that we have labeled as status quo. The underlying idea is that experts, as an intellectual elite, may have some common interests that voters can ex-ante identify. In this section we relax this assumption allow experts to be biased to both directions.

That is we will extend the model such that the bias β_j of expert j can take values $\{-1, 0, 1\}$ and the type of the decision can also take values $S, 0, R$. Conditional on the type of the decision S (R), the probability that an expert has bias $\beta_j = S$ ($\beta_j = R$) is σ_S (σ_R) and the probability that he has bias 0 is $1 - \sigma_S$ ($1 - \sigma_S$). When $b = 0$ all experts are neutral. When the bias of experts can go on both directions, the non-monotonicity can also apply to the situations where $k < \frac{n}{2}$. The reason is that, when the bias was only towards status quo, consensus advice for Reform could only happen when all experts received a signal for

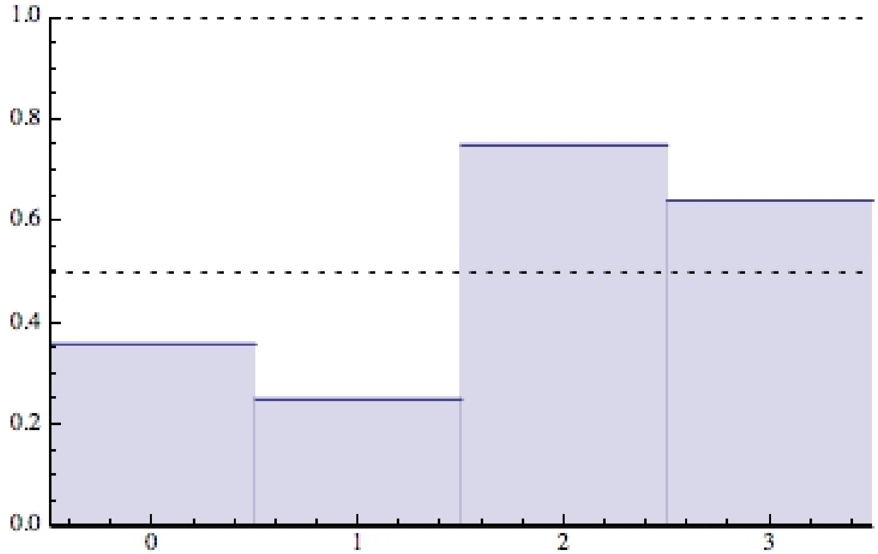

Figure 4: Π_k for $n = 3$, $q = .75$, $p_H = .5$ when biases are fully correlated and can go in both directions

Reform. This is not the case anymore if experts can also be biased towards Reform. Figure 4 shows this non-monotonicity when biases are fully correlated.

6.3 Strategic experts

One of the critical assumptions of the model is that experts are not strategic and they simply advise the reform they prefer without anticipating the electoral effect of their advice. We have seen that ,under this assumption, there can exist an equilibrium such that the relationship between the number of experts endorsing a policy and the votes for that policy is non-monotonic. Does this equilibrium survive when experts are strategic?

Let's suppose that experts' biases are correlated and $p_H > \hat{p}$, that is, when experts are not strategic, the share of votes for status quo is non-monotonic in the number of experts advising it. This can't be an equilibrium outcome because strategic biased experts have incentives to deviate. Given that biases are fully correlated, if an expert is biased, he knows that all other experts are biased too. The biased expert knows that the other two experts are already endorsing status quo, and he has incentives to endorse the reform because the share of votes for status quo increases when the number of experts endorsing it goes from 3 to 2. Does it mean that the non-monotonic result vanishes when we consider strategic experts? Not necessarily.

We will restrict our analysis to symmetric equilibria (i.e. equilibria such that all experts play the same strategy given their signal and their vested interest) and we will only allow biased experts to be strategic. If there exists a symmetric equilibrium where biased experts use mixed strategies, it has to be that they are indifferent between advising status quo or advising the reform and this indifference condition requires a non-monotonic relationship between the number of experts endorsing status quo and support for status quo. Suppose that the relationship was monotonic and increasing, then an extra endorsement can only increase the support for status quo and this violates the indifference condition.

Regarding the existence, notice that if biased experts advise status quo with probability q, that is, they mimic the behaviour of neutral experts when the state of the world is -1, they have incentives to advise always the status quo. On the contrary, as we have discussed before, if biased experts always endorse status quo, they have incentives to endorse the reform. By continuity there exists a $\hat{q} \in (q, 1)$ such that, in equilibrium, biased experts endorse the status quo with probability $\hat{q}$. The following proposition formalizes the previous reasoning:

Proposition 3 *When experts biases are correlated and $\hat{p} < p_H$, there exists an equilibrium where biased experts endorse status quo with probability $x > q$ and the share of votes for status quo is non-monotonic on the number of experts endorsing it.*

7 Conclusion

Democracies require citizens to take a stand on many policy debates that are complex. Academics and experts can play a crucial role at shaping citizens positions on these policies. In the recent years, however, we have witnessed that voters do not always follow the advice of experts, in particular, when there is a strong consensus among them. This paper provides a novel explanation to this phenomenon. In particular, it shows that the relationship between the number of experts endorsing an alternative and the electoral support to this alternative can be non-monotonic.

The explanation is that consensus among experts can be reached either because all experts share the same information or because experts ignore the information they have and provide their advice according to their own interests. Citizens can not distinguish between these two scenarios and when they expect experts to share common interests with high probability, they infer that consensus is not informative of the suitability of the policy they advise. On the contrary, when there is no consensus, they discard that experts are motivated by their common interests and they infer that the majoritarian advice is informative of the suitability of the advised policy.

The fact that the support for a policy can be higher when a simple majority of experts endorse it rather than when all of them agree is also a case for pluralism. Having some dissenting views in panels of experts can help voters to disregard the idea that experts have private interest and advise according to them. Moreover, making citizens believe that experts are well informed does not overcome the non-monotonicity but it exacerbates it.

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Appendix: Proofs

Proof of Lemma 1. When $\omega = -1$, a citizen i prefers S to R if and only if $u_i(-1, S) > u_i(-1, R)$. And,

$$\begin{aligned} u_i(-1,S) - u_i(-1,R) &= -(-1 + v_i - S)^2 + (-1 + v_i - R)^2 \\ &= (-1 + v_i - S)^2 + (-1 + v_i + S)^2 \\ &= -((-1 + v_i)^2 - 2(-1 + v_i)S + S^2) + ((-1 + v_i)^2 + 2(-1 + v_i)S + S^2) \\ &= 4(-1 + v_i)S > 0 \end{aligned}$$

Analogously when $\omega = 1$. ■

Proof of Lemma 2. Given π_k, the indifferent voter between status quo and the reform is $2\pi_k - 1$. Given that voter's preferences follow a uniform distribution this is also the share of voters of status quo and is increasing in π_k ■

Proof of Lemma 3.

$$\Pi_k < \Pi_{k+1} \leftrightarrow \frac{\pi(S,k)}{\pi(S,k+1)} < \frac{\pi(R,k)}{\pi(R,k+1)} \tag{13}$$

Now we just have to plug the expressions of $\pi(\omega, k)$:

$$\frac{\binom{n}{k}(\sigma + (1-\sigma)q)^k(1 - (\sigma + (1-\sigma)q))^{n-k}}{\binom{n}{k+1}(\sigma + (1-\sigma)q)^{k+1}(1 - (\sigma + (1-\sigma)q))^{n-k-1}} < \frac{\binom{n}{k}(\sigma + (1-\sigma)(1-q))^k(1 - (\sigma + (1-\sigma)(1-q)))^{n-k}}{\binom{n}{k+1}(\sigma + (1-\sigma)(1-q))^{k+1}(1 - (\sigma + (1-\sigma)(1-q)))^{n-k-1}} \leftrightarrow \tag{14}$$

$$\frac{(p + (1-\sigma)q)^k(1 - (\sigma + (1-\sigma)q))^{n-k}}{(\sigma + (1-\sigma)q)^{k+1}(1 - (\sigma + (1-\sigma)q))^{n-k-1}} < \frac{(\sigma + (1-\sigma)(1-q))^k(1 - (\sigma + (1-\sigma)(1-q)))^{n-k}}{(\sigma + (1-\sigma)(1-q))^{k+1}(1 - (\sigma + (1-\sigma)(1-q)))^{n-k-1}} \leftrightarrow \tag{15}$$

$$\frac{(1 - (\sigma + (1-\sigma)q))}{(\sigma + (1-\sigma)q)} < \frac{(1 - (\sigma + (1-\sigma)(1-q)))}{(\sigma + (1-\sigma)(1-q))} \leftrightarrow \tag{16}$$

$$\frac{(1-\sigma)(1-q)}{(\sigma + (1-\sigma)q)} < \frac{(1-\sigma)q)}{(\sigma + (1-\sigma)(1-q))} \leftrightarrow \tag{17}$$

$$(1-q)(\sigma+(1-\sigma)(1-q)) < q(\sigma+(1-\sigma)q) \leftrightarrow \tag{18}$$

$$\sigma(1-2q) < (1-\sigma)(q^2-(1-q)^2) \tag{19}$$

Which from $\sigma \in [0,1]$ and $q \in (\frac{1}{2}, 1)$ always holds because the LHS is negative and the RHS is positive. ■

Proof of Proposition 1.

(i) When $k < n-1$, the proof is analogous to the proof of Lemma 3 for $\sigma = 0$.

(ii) When $k = n$,

$$\Pi_{n-1} < \Pi_n \leftrightarrow \tag{20}$$

$$\Pi_{n-1} < \frac{(1-p_H)\pi(S,n)+\frac{p_H}{2}}{(1-p_H)(\pi(S,n)+\pi(R,n))+p_H} \leftrightarrow \tag{21}$$

$$\Pi_{n-1}\left((1-p_H)(\pi(S,n)+\pi(R,n))+p_H\right) < (1-p_H)\pi(S,n)+\frac{p_H}{2} \leftrightarrow \tag{22}$$

$$\Pi_{n-1}\left((\pi(S,n)+\pi(R,n))+p_H\left(1-(\pi(S,n)+\pi(R,n))\right)\right) < \pi(S,n)+p_H\left(\frac{1}{2}-\pi(S,n)\right) \leftrightarrow \tag{23}$$

$$p_H < \hat{p} = \frac{\pi(S,n)-\Pi_{n-1}\left((\pi(S,n)+\pi(R,n))\right)}{\left(\Pi_{n-1}\left(1-(\pi(S,n)+\pi(R,n))\right)-\left(\frac{1}{2}-\pi(S,n)\right)\right)} \tag{24}$$

Finally we have to show that $\hat{p} \in [0,1]$. But notice that $\lim_{p\to 0}\Pi_n = \frac{\pi(S,n)}{\pi(S,n)+\pi(R,n)} > \Pi_{n-1}$ and $\lim_{p\to 1}\Pi_n = \frac{1}{2} < \Pi_{n-1}$. Therefore, $\hat{p} \in [0,1]$.

(iii) We want to show that $\frac{1}{2} < \Pi_n$.

$$\frac{1}{2} < \Pi_n \leftrightarrow \tag{25}$$

$$\frac{1}{2} < \frac{(1-p_H)\pi(S,n)+\frac{p_H}{2}}{(1-p_H)(\pi(S,n)+\pi(R,n))+p_H} \leftrightarrow \tag{26}$$

$$(1-p_H)(\pi(S,n)+\pi(R,n))+p_H < 2(1-p_H)\pi(S,n)+p_H \leftrightarrow \tag{27}$$

$$\pi(R, n) < \pi(S, n) \tag{28}$$

Which always holds.

■

Proof of Corollary 1.

$$\Pi_{n-1} = q \tag{29}$$

$$\Pi_n = \frac{p_h + (1 - p_h)q^3}{1 + p_h - 3(1 - p_h)(q - q^2)} \tag{30}$$

And $\Pi_n \leq \Pi_{n-1}$ if and only if

$$\frac{p_h + (1 - p_h)q^3}{1 + p_h - 3(1 - p_h)(q - q^2)} \leq q \tag{31}$$

Rearranging,

$$\hat{p} := 1 - \frac{1}{1 + (1 - q)q} \leq p_h \tag{32}$$

And $\hat{p}$ is decreasing in q and $\lim_{q \to 1} \hat{p} = 0$. ■

Proof of Lemma 4.

Suppose that three experts advise the reform. Given that experts only advise the reform if they are unbiased and they received a signal in favour of the reform, this means that two experts have received and the third has received a signal in favour of status quo.

$$\pi'_0(s) = \frac{q'_c(1 - q)^3}{q'_c(1 - q)^3 + (1 - q'_c)q^3} \tag{33}$$

And $\pi'_0(s) < \frac{1}{2}$ if and only if:

$$q'_c(1 - q)^3 < (1 - q'_c)q^3 \tag{34}$$

$$q'_c(1 - q)^3 < (1 - q'_c)q^3 \tag{35}$$

From $q'_c < q$, we have that $1 - q'_c > 1 - q$ and, from both inequalities we have $\frac{q'_c}{1-q'_c} < \frac{q}{1-q}$ and, therefore $q'_c(1 - q) < q(1 - q'_c)$. Now, we multiply both sides by $(1 - q)^2$ and we get $q'_c(1 - q)^3 < q(1 - q)^2(1 - q'_c)$ and the RHS is smaller than $q^3(1 - q'_c)$. Thus, $\pi'_0(s) < \frac{1}{2}$ and, from the previous lemma, $\pi'_0(r) < \pi'_0(s) \leq \frac{1}{2}$.

If only two experts advise the reform, we have that $\pi_1'(s) < \frac{1}{2}$ if and only if $q_c'(1-q) < (1-q_c')q$ which always holds. ■

Proof of Proposition 2. The first three statements are trivial and follow a proof similar to the one of the previous lemma. Regarding the third one,

$$\pi_3'(r) = \frac{(1-q_c')(p_H+(1-p_H)q^3)}{(1-q_c')(p_H+(1-p_H)q^3)+q_c'(p_H+(1-p_H)(1-q)^3)} \tag{36}$$

And status quo is implemented if and only if $\pi_3'(r) \geq \frac{1}{2}$ which happens if and only if:

$$(1-q_c')(p_H+(1-p_H)q^3) \geq q_c'(p_H+(1-p_H)(1-q_c)^3) \tag{37}$$

$$p_H \leq \underline{p} = \frac{(1-q_c')q^3 - q_c'(1-q)^3}{(1-(1-q)^3)q_c' - (1-q^3)(1-q_c')} \tag{38}$$

Finally we have to prove that $\underline{p} \in (0,1)$.

When $p_H = 0$,

$$\pi_3'(r) = \frac{(1-q_c')q^3}{(1-q_c')q^3+q_c'(1-q)^3} \tag{39}$$

And $\pi_3'(r) > \frac{1}{2}$ if and only if:

$$(1-q_c')q^3 > q_c'(1-q)^3 \tag{40}$$

And, from the proof of the previous proposition, this is always satisfied.

When $p_H = 1$,

$$\pi_3'(r) = \frac{(1-q_c')}{(1-q_c')+q_c'} \tag{41}$$

And $\pi'3(r) < \frac{1}{2}$ if and only if $q_c' > \frac{1}{2}$ which always holds.

Therefore, $\underline{p} \in (0,1)$.

■

Proof of Corollary 2. The proof is analogous to the proof of the previous proposition. ■

Proof of Proposition 3.

We know Proposition 1 that when $\hat{p} < p_H$, $x = 1$ can't be an equilibrium because an individual expert has incentives to deviate and sustain the reform because it will move support from Π_3 to Π_2. Hence it can't be an equilibrium.

Now, let's suppose that $x = q$, we will prove that this can't be an equilibrium either because an individual expert would have incentives to deviate and sustain status quo. Suppose all biased experts are supporting status quo with probability q. In this situation,

$$\pi(S,k) = \binom{3}{k}(p_h \cdot q + (1-p_h)q)^k(1-(p_h \cdot q + (1-p_h)q))^{3-k} = \binom{3}{k}q^k(1-q)^{3-k} \tag{42}$$

$$\pi(R,k) = \binom{3}{k}(p_h \cdot q + (1-p_h)(1-q))^k(1-(p_h \cdot q + (1-p_h)(1-q)))^{3-k} \tag{43}$$

Now we'll prove that for all k, $\Pi_k < \Pi_{k+1}$

$$\Pi_k < \Pi_{k+1} \leftrightarrow \frac{\pi(S,k)}{\pi(S,k+1)} < \frac{\pi(R,k)}{\pi(R,k+1)} \tag{44}$$

We plug in the expression we computed before:

$$\frac{q^k(1-q)^{3-k}}{q^{k+1}(1-q)^{3-(k+1)}} < \frac{(p_h \cdot q + (1-p_h)(1-q))^k(1-(p_h \cdot q + (1-p_h)(1-q)))^{3-k}}{(p_h \cdot q + (1-p_h)(1-q))^{k+1}(1-(p_h \cdot q + (1-p_h)(1-q)))^{3-(k+1)}} \tag{45}$$

Simplifying,

$$\frac{1-q}{q} < \frac{(1-(p_h \cdot q + (1-p_h)(1-q)))}{(p_h \cdot q + (1-p_h)(1-q))} \tag{46}$$

$$\frac{1}{q} < \frac{1}{(p_h \cdot q + (1-p_h)(1-q))} \tag{47}$$

$$p_h \cdot q + (1-p_h)(1-q) < q \tag{48}$$

$$1 < 2q \tag{49}$$

Which always holds.

Now, given that Π_k is increasing in k for all k, an individual expert has incentives to advise status quo.

Finally, by continuity, there exists an $x \in (q,1)$ such that an expert is indifferent to support status quo or the reform given that the other two biased experts are endorsing status quo with probability x. Moreover, for this x, Pi_k can't be monotonic in k because if it was, the expert would not be indifferent. ■