Local Evidence and Diversity in Minipublics*

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Abstract

We study optimal minipublic design with endogenous evidence. A policymaker selects a group of citizens—a minipublic—for advice on the desirability of a policy. Citizens can discover local evidence at no cost but might be deterred by uncertainty about the policymaker's adoption standard. The key driving force is the curse of too little information: a citizen hesitates to contribute his evidence if and only if neither his evidence nor that contributed by the rest of the minipublic is sufficiently novel. Evidence discovery is hardest to sustain under moderate political uncertainty. Relative to the first-best minipublic, the optimal minipublic generically features a greater range of demographics, overrepresenting demographics at the margins of the citizenry while selecting more diversely around the median demographic. Our findings bear implications for the link between the representativeness and the policy impact of minipublics.

JEL: D71, D72, D83

Keywords: minipublic, evidence discovery, curse of too little information, political uncertainty, demographic diversity, representativeness

1 Introduction

Evaluating the impact of a novel public policy is a complex task, especially in diverse societies. Citizens of different socio-economic backgrounds are affected by the policy in varied, far-reaching, and uncertain ways. What is more, the evidence critical for evaluation is often quintessentially local: lay citizens can claim privileged insight into how the policy is likely to impact them and fellow citizens of similar background.[1] Accordingly, policymakers often must rely on citizens' willingness

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[1] This is especially the case for policy decisions that involve normative and societal values, rather than mere technical knowledge, and that entail complex tradeoffs, e.g., tradeoffs across generations of citizens, as in the case of climate policy.

to discover and bring forth local evidence as a crucial input into the policy decision. Indeed, over the last few decades, policymakers have actively sought ways to induce higher citizen participation in evidence-based policymaking (Michels and De Graaf (2010), Jacobs and Kaufmann (2019)).[2]

This paper studies a policy environment in which (i) a small number of citizens is targeted by the policymaker to contribute their local evidence, and (ii) citizens face prior uncertainty about the standard that the policymaker follows when making the policy decision. First, we examine how the presence of uncertainty about how demanding the policymaker will be toward the policy—which we refer to as *political uncertainty*—distorts citizens' incentives to contribute evidence. Are citizens less willing to contribute evidence in the presence of greater political uncertainty? Second, we analyze the policymaker's problem of assembling a group of citizens—which, for reasons that become clear below, we refer to as a *minipublic*—to learn as much as possible about the policy in question. To what extent is the optimal minipublic demographically representative of the citizenry at large? How much evidence does it endogenously produce? Does the policymaker target citizens from more diverse backgrounds in the presence of greater political uncertainty?

Our framework is motivated by the increased popularity of a particular form of citizen participation: minipublics.[3] Conceptualized first by Dahl (1989), a minipublic is a small group of ordinary citizens selected from the entire citizenry, tasked with gathering information on an issue of public interest in order to inform policymaking. A recent illustrious minipublic is the Citizens' Convention on Climate (CCC), implemented in France between October 2019 and June 2020. The CCC was initiated by French President Emmanuel Macron to engage citizens in formulating France's climate policy. It consisted of 150 citizens, drawn by lot and representative of the French population along six criteria: gender, age, education, occupation, residence, and geographical area. Strikingly, political uncertainty accompanied the CCC throughout its proceedings. At the onset, Macron vowed that the citizens' policy recommendations would be enacted "without filter." In January 2020, he invoked provisions of the French Constitution to narrow down the meaning of "without filter" by reserving the option to not act upon some of the recommendations. Consequently, after the CCC issued its recommendation in June 2020, Macron stated he would ignore at most three recommendations of his own choosing. The uncertainty about Macron's response was further heightened by the ongoing pandemic. Ultimately the government accepted only 10% of the CCC's recommendations, modified or watered down another 37%, and rejected the remaining 53%. In light of the French

[2]Such efforts have taken many forms, from collaborative governance, citizens' advisory committees, and participatory budgeting, to deliberative bodies of citizens such as consensus conferences, deliberative polls, citizen juries, and planning cells. In 2017, the OECD launched the Innovative Citizen Participation Project, aiming to record and analyze all cases worldwide of deliberative, collaborative, and participatory decision making.

[3]Since the early 1990s, minipublics, as an innovative form of citizen participation, have been drawing increased attention from policymakers and academics alike. Breckon, Hopkins and Rickey (2019) reviews case studies of minipublics around the world.

experience, concerns about political uncertainty and about limited impact accompanied subsequent minipublics such as Scotland's Climate Assembly and the UK Climate Assembly.[4] A key takeaway of these examples is that political uncertainty is a first-order consideration when the minipublic's role is strictly advisory.

Our main insight is that political uncertainty can be detrimental to the production of evidence in minipublics, especially in small ones, and leads to the policymaker choosing minipublics that are not sufficiently representative of the citizenry. We formalize this insight in a setting that, a priori, is arguably conducive of more, rather than less, evidence production: (i) the policymaker and the citizens agree ex ante on the decision threshold to be followed; (ii) minipublic citizens are not self-interested, i.e., like the policymaker, they evaluate the policy for its citizenry-wide impact; and (iii) evidence is costless to discover. A citizen hesitates to discover evidence when both the rest of the minipublic is sufficiently uninformative and he cannot contribute substantially to it—we refer to this incentive problem as *the curse of too little information.* The policymaker controls the citizens' incentives through designing the size and the composition of the minipublic. We first propose a benchmark for the ideal minipublic of a given size—the one that maximizes the welfare of both the policymaker and the citizens in the absence of political uncertainty—which is also the most informative minipublic of that size. If this ideal minipublic is not feasible in the presence of political uncertainty, the policymaker's only instrument for inducing citizens to discover evidence is to make the most peripheral citizens in the minipublic, who are the ones most hesitant to discover evidence, less marginally informative. We show that, relative to the ideal minipublic, the generic pattern of the optimal minipublic is one that overrepresents citizens closer to the periphery while making the selection of citizens around the median citizen more diverse.

Even though our results are cast in terms of the optimal design of minipublics, the framework applies beyond this specific application. The assignment of members to legislative committees, the appointment of faculty to university committees, and the drawing by lot of the Council of 500 (the Boule) in ancient Athens are other natural applications of our framework. We essentially study the design of an advisory committee in which the designer and the committee members share a common value for a multi-attribute object available for adoption. Decision-making power rests with the designer rather than the committee. Each member is an expert on a single attribute and chooses whether to discover evidence about it. Therefore, by choosing members, the designer chooses which

[4]For early coverage of the CCC, see https://www.theguardian.com/world/2020/jan/10/citizens-panels-ready-help-macron-french-climate-policies. On the criticism that Macron faced about his response to the recommendations and the referenced percentages, see https://www.publicdeliberation.net/the-promises-and-disappointments-of-the-french-citizens-convention-for-climate/. On concerns about political uncertainty in Scotland's Climate Assembly and the UK Climate Assembly, see https://www.opendemocracy.net/en/can-europe-make-it/scrutiny-and-citizens-assemblies-a-missing-piece-of-the-democratic-puzzle/ and https://www.wfd.org/commentary/how-has-uk-climate-assembly-impacted-parliament-0.

attributes to learn about.

Framework. The baseline model features a unit mass of citizens and a single policymaker. A citizen's position in $[0,1]$ indexes his demographic background. The policymaker chooses a finite set of citizens—a minipublic—from this unit mass. She is constrained by a maximal capacity for the minipublic: she can costlessly target up to, but no more than, n citizens. First, the policymaker chooses a minipublic. Subsequently, each minipublic citizen observes the rest of the minipublic and then decides whether to discover his local evidence. Finally, the policymaker observes the citizens' discovered evidence and decides whether to adopt the policy.

Each minipublic citizen i can exclusively discover his local evidence which is informative about the true value of the policy. This can, for instance, be interpreted as the local impact of the policy for citizen i's demographic background. A key ingredient of our model is the correlation of local evidence across demographic backgrounds, which allows the policymaker to extrapolate from the evidence of the minipublic to the larger citizenry. The baseline model allows for general Gaussian correlation across local evidence, whereas the specification of Section 4.2.2 uses the sample path of an Ornstein-Uhlenbeck process to model correlation that is positive between any two citizens and weakens with distance between their demographics. Moreover, if the citizens discover evidence, it becomes publicly observable—that is, evidence is fully transparent and the players are symmetrically informed at all times. This structure captures in a stylized way the intricate processes of information gathering and deliberation that take place in real-world minipublics.

The game features both common interest and heterogeneous evidence about the policy. That is, both the policymaker and the citizens care about the true value of the policy, which in the stylized model of Section 4.2.2 corresponds to the average local impact across citizens. The only friction between the citizens and the policymaker arises due to a random threshold of adoption, which captures in reduced form any wedge between the contribution of the policy to the public interest—the evaluation of which is the minipublic's task—and the impact of the policy on other idiosyncratic interests of the policymaker. This threshold is realized after the policymaker chooses the minipublic but before she makes a decision. The more variable this threshold is, the greater is the political uncertainty that the citizens face.

Main results. The conflict between the policymaker and the citizens boils down to whether a more informative minipublic is preferred. We identify a sufficient *minipublic informativeness* statistic, which equals the variance in the posterior value of the policy given the minipublic's evidence. All players' expected payoffs from a minipublic depend only on this statistic. Notably, the policymaker's payoff strictly increases in informativeness: the more informative the evidence provided by the minipublic, the more precise the estimate of the policy's value. Hence, the problem of the policymaker reduces to identifying the most informative minipublic of at most n citizens in which each citizen is willing to discover his local evidence. Correspondingly, any first-best minipublic attains the highest informativeness among all minipublics of size at most n and provides a benchmark for the informativeness-maximizing level of demographic diversity.

By contrast, the citizen's payoff is quasiconvex—that is, U-shaped—in informativeness. This is due to two opposing effects. On the one hand, a more informative minipublic leads to a better-informed adoption decision, which benefits the citizen. On the other, when starting from a prior value of the policy for which the expected misalignment due to the uncertain threshold is low, an informative minipublic introduces the downside of posterior values with high expected misalignment becoming more likely. We show that the second effect dominates when two conditions are met. First, when starting from no information, the citizen's marginal value from an infinitesimally small amount of information must be negative. Second, both the total informativeness of the minipublic and the marginal informativeness of each of its citizens must be sufficiently low. We refer to these two conditions in tandem as *the curse of too little information*. Identifying this key driving force in a general Gaussian framework of local evidence is a first contribution of our analysis.

A second contribution is leveraging the curse of too little information in order to characterize precisely how the optimal minipublic is distorted relative to any first-best minipublic. If no first-best minipublic is feasible, the policymaker has two instruments available to incentivize evidence discovery: distortion in minipublic size and distortion in its composition. We establish that the first instrument—distortion in size—is counterproductive for the policymaker. The optimal minipublic, if nonempty, consists of exactly n active citizens. If the policymaker is able to incentivize a minipublic of fewer than n citizens to be active, then she is also able to incentivize a strictly more informative minipublic of exactly n citizens to be active as well. The addition of new citizens strengthens the incentives of the original citizens, while the new citizens are willing to discover evidence since they are joining a minipublic that has already escaped the curse of too little information.

A key implication of the curse of too little information is that the passive citizens in a minipublic are those with the highest marginal informativeness. For the Ornstein-Uhlenbeck correlation, these are the leftmost citizen and the rightmost citizen in a minipublic. We show that if no first-best minipublic is feasible, the policymaker distorts the composition so as to ensure that all citizens are less marginally informative than their passive fellow citizens in the first-best minipublic. That is, the way out of the curse of too little information is to make minipublic citizens "informationally smaller." We then flesh out the implications of such reduced marginal informativeness for optimal demographic diversity, understood as the distances between demographics in the optimal minipublic, in the context of the Ornstein-Uhlenbeck correlation. The immediate neighbors of the most peripheral citizens shift further away from the median citizen and towards the periphery so as to be more similar to the peripheral citizens and hence less marginally informative. The substantial step is to show that there are only two patterns of distortions that can arise: (i) an equidistant pattern in which all citizens are uniformly further away from the median citizen than their first-best counterparts, or (ii) an alternating pattern in which immediate neighbors in the minipublic are, two by two, more similar to each other that their first-best counterparts. We further show that, of these two patterns, the equidistant one is predominant: the alternating pattern can arise for at most one capacity, and only if no equidistant minipublic is feasible.

This characterization allows us to study how the composition of the optimal minipublic varies with primitives of the environment: political uncertainty, minipublic capacity, policy sentiment, and homogeneity of the citizenry. On a cautionary note, our analysis reveals that what discourages evidence discovery and forces the policymaker towards a distorted minipublic is the presence of moderate, rather than high, political uncertainty. The first-best minipublic is optimal if political uncertainty is either sufficiently high or sufficiently low. Against a first intuition that greater uncertainty makes evidence discovery more challenging, distortions are greatest—that is, the equidistant minipublic is more diverse and shifted furthest away from the median citizen—for moderate uncertainty. It is under such level of uncertainty that both the likelihood of misalignment is sufficiently high and each citizen's evidence significantly influences such likelihood. Therefore, higher political uncertainty is not always detrimental to evidence production in minipublics. Besides political uncertainty, we also show that the distortions in composition are greatest in smaller minipublics, for stronger policy sentiment, and for more heterogeneous citizenries.

2 Baseline model

Players. A policymaker ("she") and a unit mass of citizens, each ("he") indexed by $i \in [0,1]$, evaluate the desirability of an uncertain policy. This evaluation takes place within a minipublic, which is an arbitrary finite selection of distinct citizens $\mathbf{m} = \{i_1, i_2, ..., i_n\} \subset [0,1]$. Without loss, let $i_1 < i_2 < \ldots < i_n$. The set of all minipublics of size at most $n \geqslant 0$ is denoted by $\mathcal{M}_n$.

Policy evaluation. The uncertain value of the policy $B \in \mathbb{R}$ follows a Gaussian distribution:

$$B \sim \mathcal{N}(\bar{B}, \sigma^2). \tag{1}$$

The prior value $\bar{B}$ determines the ex ante desirability of the policy, whereas σ^2 corresponds to how uncertain the policy is ex ante. We refer to $|\bar{B}|$ as *policy sentiment* because, as the payoff structure below makes clear, the higher $|\bar{B}|$ is, the more strongly all players lean either in favor of or against the adoption of the policy.

Citizen i has access to local evidence $\beta(i) \in \mathbb{R}$, which is informative about the true value B. For instance, the local evidence $\beta(i)$ can be interpreted as the realized local impact of the policy for citizen i's demographic group.[5] We let $\beta(\mathbf{m}) := (\beta(i_1), \ldots, \beta(i_n))$ denote the vector of local evidence accessible to citizens in minipublic $\mathbf{m} = \{i_1, \ldots, i_n\}$. For any minipublic $\mathbf{m}$ and realized local evidence $\beta(\mathbf{m})$, the expected value of the policy is updated from $\bar{B}$ to a *post-minipublic value* $B_{\mathbf{m}} := \mathbb{E}[B \mid \mathbf{m}, \beta(\mathbf{m})]$. We assume that for any $\mathbf{m}$, the joint distribution of B and $\beta(\mathbf{m})$ is multivariate Gaussian; this allows for flexible correlation across the citizens' local evidence. By standard Bayesian updating, this post-minipublic value is also Gaussian:

$$B_{\mathbf{m}} \sim \mathcal{N}(\bar{B}, \Sigma(\mathbf{m})). \tag{2}$$

The post-minipublic value $B_{\mathbf{m}}$ is centered at the prior value $\bar{B}$, and its variance is determined by the composition of the minipublic. Minipublics that result in a more variable post-minipublic value are more informative (in the Blackwell order) because that implies lower residual uncertainty about B. Thus, we refer to $\Sigma(\mathbf{m})$ as the *minipublic informativeness* of $\mathbf{m}$. Assumption 1 imposes regularity conditions on Σ. Let $\mathcal{M}$ denote the set containing all finite subsets from $[0, 1]$.

Assumption 1. *The minipublic informativeness given by the function $\Sigma : \mathcal{M} \to [0, \sigma^2]$ satisfies the following properties:*

(i) $\Sigma(\emptyset) = 0$*;*

(ii) for any $\mathbf{m} \subsetneq \mathbf{m}'$, $\Sigma(\mathbf{m}) < \Sigma(\mathbf{m}')$*;*

(iii) Σ *is continuous at any* $\mathbf{m} \in \mathcal{M} \setminus \emptyset$.[6]

Actions and strategies. The game proceeds in three stages: (i) policymaker's choice of a minipublic, (ii) citizens' evidence discovery, and (iii) policymaker's policy adoption. We solve for the set of policymaker-preferred Perfect Bayesian equilibria of this game.[7] In the first stage, the policymaker chooses a minipublic $\mathbf{m} \in \mathcal{M}_n$, where $n \in \mathbb{N}$ is an exogenous capacity constraint on the size of the minipublic. The policymaker's minipublic choice strategy consists of a lottery over feasible minipublics $\Delta(\mathcal{M}_n)$. Each citizen in a realized minipublic $\mathbf{m}$ observes the entire $\mathbf{m}$.

In the second stage, each citizen $i \in \mathbf{m}$ in the realized minipublic $\mathbf{m}$ decides whether to costlessly and publicly discover his local evidence. If i is *active* in evidence discovery, then $\beta(i)$ is observed by all players. Otherwise, i is *passive*, and $\beta(i)$ remains unobserved by all.[8] Hence, each minipublic

[5] Section 4.2 expands on this interpretation by imposing more structure on the nature of local evidence: the value B is the policy's average local impact across all demographic groups, and local impact is correlated across groups.

[6] For a suitable notion of distance between any two minipublics, we take the Hausdorff distance $\delta_H(\mathbf{m}, \mathbf{m}') := \inf\{\epsilon \geqslant 0 : \mathbf{m} \subseteq \mathbf{m}'_\epsilon \text{ and } \mathbf{m}' \subseteq \mathbf{m}_\epsilon\}$, where $\mathbf{m}_\epsilon, \mathbf{m}'_\epsilon$ denote the ϵ-balls around citizens in $\mathbf{m}, \mathbf{m}'$, respectively.

[7] The focus on policymaker-preferred equilibria is common in the literature on information and mechanism design.

[8] In Section 6.2, we analyze noisy evidence discovery and establish that restricting attention to perfect discovery or no discovery is without loss.

citizen has an evidence discovery strategy $\delta_i : \mathcal{M}_n \to \Delta\{0,1\}$. All discovery decisions are taken simultaneously within $\mathbf{m}$. An *active minipublic* $\hat{\mathbf{m}}$ is a minipublic in which all citizens are active, hence $\beta(\hat{\mathbf{m}})$ is observed.

In the third stage, the policymaker decides whether to adopt or reject the policy. She makes this decision after observing $(\hat{\mathbf{m}}, \beta(\hat{\mathbf{m}}))$ as well as a random threshold of adoption c, whose value is realized at the beginning of the third stage, after all evidence discovery has taken place.

Payoffs. The payoff of the policymaker is given by B if the policy is adopted and c otherwise, where the threshold of adoption is drawn from $c \sim \mathcal{N}(\bar{c}, \tau^2)$. By contrast, the payoff of citizen $i \in [0,1]$ is given by B if the policy is adopted and by c_i otherwise, where c_i is a citizen-specific threshold of adoption drawn from $c_i \sim \mathcal{N}(0, \tau_i^2)$. All thresholds of adoption are realized simultaneously (after evidence discovery) and independently. We make two simplifications in this baseline model. First, we set the policymaker's ex ante bias to $\bar{c} = 0$ so as to focus on the role of threshold uncertainty rather than that of ex ante conflict between the policymaker and the citizens. Second, we observe that it is without loss to have $\tau_i = 0$ for all i; hence, all citizens obtain B from adoption and 0 otherwise. Appendix D.4.2 analyzes the richer model with an ex ante biased policymaker and heterogeneity in citizens' thresholds, and it establishes that the predictions of our baseline model extend qualitatively to it. We refer to τ as *political uncertainty*: the higher τ is, the higher is the likelihood that the citizens and the policymaker are in ex post disagreement about the policy.[9]

Interpretation of the policymaker's threshold and political uncertainty. The threshold c captures in reduced form any wedge between the contribution of the policy to the public interest—the evaluation of which is the minipublic's task—and the impact of the policy on other idiosyncratic interests of the policymaker. For example, at the time of policy adoption the policymaker might care disproportionally about the budgetary pressures that the implementation of the policy puts on certain sectors of the economy or on other policies in the policymaker's platform, about the bureaucratic friction underlying its implementation, and about the expected time to its implementation. Besides, an elected policymaker might be concerned with how adoption affects certain stakeholders—lobbyists, advocacy groups, key party supporters—and how the policy trades off current popularity for favorable political legacy. In the case of CCC, subsequent surveys suggest that almost all recommendations would have been approved by a supermajority of the French people, suggesting the presence of a wedge between Macron's preferred decision and that of the citizens.[10]

At the time of their proceedings, most minipublics face uncertainty about the eventual wedge

[9] The probability of ex post disagreement is $\Pr(0 < B < c) + \Pr(c < B < 0) = \arctan(\tau/\sigma)/\pi$, which is strictly increasing in τ.

[10] See the survey results at http://www.odoxa.fr/sondage/mesures-de-convention-citoyenne-seduisent-francais-a-lexception-notable-110-km-h/.

driving the policymaker's responsiveness to its recommendations. For example, the proceedings of CCC coincided with the early stages of the global pandemic, the domestic consequences of which were highly uncertain. In general, the uncertainty about this wedge is arguably greater in more economically volatile environments, in which the budgetary priorities of the policymaker are less clearly specified and likely to shift. Political uncertainty is greater the longer is the time frame specified for a formal response by a policymaker to the minipublic's report, the lower is the degree of scrutiny and oversight that the minipublic is allowed after issuing its report, and the lower is the public visibility of the minipublic and the public awareness about the policy issue. For example, in light of CCC's experience, Scotland's Climate Assembly did not disperse the minipublic after its report was issued and the government was required to present a formal response within six months.[11] Moreover, political uncertainty proxies citizens' trust in the policymaker based on past decisions on related issues and her responsiveness to minipublics in the past (Van Dijk and Lefevere (2022)).

3 Policymaker's problem

This section derives the players' expected payoffs, introduces the curse of too little information, which is a key driving force in the analysis, and simplifies the policymaker's problem of choosing a minipublic.

3.1 Conflict between the policymaker and the citizens

Players' expected payoffs. Fix a minipublic $\mathbf{m}$ and an evidence discovery strategy profile $\delta := (\delta_i)_{i\in\mathbf{m}}$. This strategy profile induces a lottery over active minipublics $\hat{\mathbf{m}} \subseteq \mathbf{m}$, and hence a lottery over different levels of minipublic informativeness $\Sigma(\hat{\mathbf{m}})$. We first characterize the expected payoffs of the policymaker and of the citizens from an active minipublic $\hat{\mathbf{m}}$. The expectation is taken with respect to both the local evidence $\beta(\hat{\mathbf{m}})$ and the threshold of adoption c: the policymaker adopts the policy if $B_{\hat{\mathbf{m}}} > c$ and keeps the status quo if $B_{\hat{\mathbf{m}}} < c$ (allowing for any tie-breaking rule in the zero-probability event $B_{\hat{\mathbf{m}}} = c$). An active minipublic introduces a lottery over post-minipublic values: if a minipublic is more informative than another, the distribution it induces over post-minipublic values is a mean-preserving spread of the distribution induced by the less informative one. The payoff characterization in Lemma A.1 establishes that $\Sigma(\hat{\mathbf{m}})$ is a sufficient statistic for the minipublic $\hat{\mathbf{m}}$ in the players' payoffs. This is a direct implication of the Gaussian distribution of the post-minipublic value. Therefore, we write the players' payoffs directly over minipublic informativeness as $V_P(\Sigma)$ for the policymaker and $V_C(\Sigma)$ for the minipublic citizens.

[11] See "Scrutiny and citizens' assemblies: A missing piece of the democratic puzzle?" (https://www.opendemocracy.net/en/can-europe-make-it/scrutiny-and-citizens-assemblies-a-missing-piece-of-the-democratic-puzzle/).

The citizens' expected payoff from adoption differs from that of the policymaker because the citizens do not internalize the realized threshold of adoption. For any $\tau > 0$, citizens face agency loss because policies with a negative (positive) post-minipublic value are adopted (rejected) with positive probability. The expected payoff of the policymaker is $\Pr[B_{\hat{\mathbf{m}}} > c]\mathbb{E}[B_{\hat{\mathbf{m}}} - c | B_{\hat{\mathbf{m}}} > c]$, whereas that of the citizens is $\Pr[B_{\hat{\mathbf{m}}} > c]\mathbb{E}[B_{\hat{\mathbf{m}}} | B_{\hat{\mathbf{m}}} > c]$. The probability of adoption is the same in both expression; however, they differ in the expected payoff conditional on adoption. The citizen's payoff can be rewritten in the following way so as to highlight the misalignment between him and the policymaker:

$$\begin{aligned} V_C(\Sigma(\hat{\mathbf{m}})) &= V_P(\Sigma(\hat{\mathbf{m}})) + \Pr\left[B_{\hat{\mathbf{m}}} > c\right] \mathbb{E}\left[c | B_{\hat{\mathbf{m}}} > c\right] \\ &= V_P(\Sigma(\hat{\mathbf{m}})) - \frac{\tau^2}{\sqrt{\tau^2 + \Sigma(\hat{\mathbf{m}})}} \phi\left(\frac{\bar{B}}{\sqrt{\tau^2 + \Sigma(\hat{\mathbf{m}})}}\right). \end{aligned} \tag{3}$$

The misalignment term in the right-hand side depends on both the probability of adoption and the expected threshold that the policymaker acts upon conditional on adoption. This expected threshold is strictly negative. The citizens perceive the policymaker as being too positively disposed towards the average adopted policy and too negatively disposed towards the average rejected policy. Hence, the payoff of the citizens is less than that of the policymaker for any informativeness $\Sigma(\hat{\mathbf{m}})$. As $\tau \to 0$, the misalignment vanishes because the distribution of the policymaker's threshold collapses to the citizen's threshold, so the expected threshold conditional on adoption tends to zero. As $\tau \to +\infty$, on the other hand, the probability of adoption approaches 1/2—it is as if a coin flip determines adoption—whereas the expected threshold conditional on adoption tends to $-\infty$.

We next examine the conflict between the policymaker and the citizens over the level of informativeness. Lemma 3.1 shows that the policymaker always prefers higher informativeness, whereas the minipublic citizens might not.

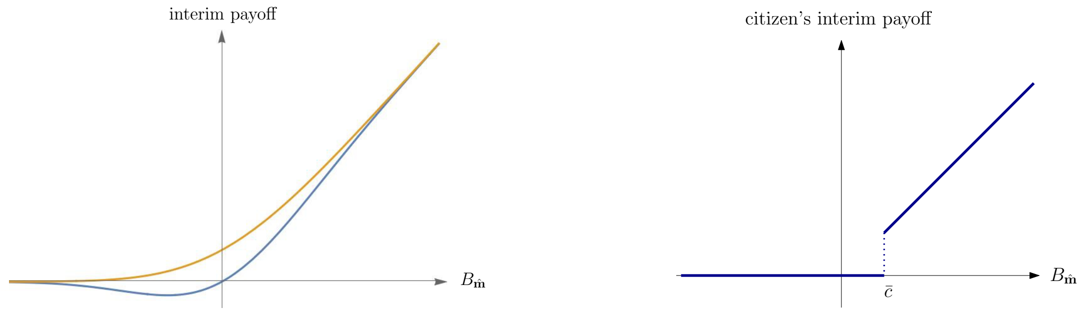
Lemma 3.1 (Dependence of payoffs on informativeness)**.**

(i) The expected payoff of the policymaker, $V_P(\Sigma)$, is strictly increasing in $\Sigma \in [0, \infty)$.

(ii) The expected payoff of any citizen, $V_C(\Sigma)$, is strictly quasiconvex in Σ, with a minimum at

$$\underline{\Sigma} = \max\left\{0, \frac{1}{2}\left(\sqrt{\tau^4 + 4\bar{B}^2\tau^2} - 3\tau^2\right)\right\}. \tag{4}$$

The policymaker aims to get as precise an estimate of the value of the policy as she can. For any realization of her threshold, higher informativeness leads to a more accurate decision, which strictly benefits her. Hence, the policymaker prefers all citizens in the minipublic to be active, as each citizen strictly adds to informativeness. In contrast, the citizen's payoff need not be increasing



(a) The citizen's expected payoff $B_{\hat{\mathbf{m}}}\Phi\left(B_{\hat{\mathbf{m}}}/\tau\right)$ (in blue) and the policymaker's expected payoff $B_{\hat{\mathbf{m}}}\Phi\left(B_{\hat{\mathbf{m}}}/\tau\right)+\tau\phi\left(B_{\hat{\mathbf{m}}}/\tau\right)$ (in yellow) for every realized post-minipublic value $B_{\hat{\mathbf{m}}}$.

(b) The citizen's expected payoff $B_{\hat{\mathbf{m}}}\mathbb{1}[B_{\hat{\mathbf{m}}} \geqslant \bar{c}]$ if the policymaker's threshold is known to be $\bar{c} > 0$ (i.e., $\tau = 0$).

Figure 1

in informativeness. Higher informativeness has two opposing effects on the citizen's payoff, which give rise to quasiconvexity. On the one hand, a more informative minipublic leads to a more precise estimate of the policy's value and a better informed adoption decision, which benefits the citizens. With no political uncertainty this effect is the only one present. In the presence of political uncertainty, on the other hand, higher informativeness might also increase the probability and the severity of the expected misalignment between the policymaker and the citizens.

To better understand the quasiconvexity of the citizen's payoff in informativeness, we contrast the interim payoff (i.e., before c is drawn) of the citizens with that of the policymaker for any realized post-minipublic value $B_{\hat{\mathbf{m}}}$ (Figure 1a). The policymaker's interim payoff is globally increasing and convex. Hence, for any prior value $\bar{B}$, the policymaker prefers a lottery over post-minipublic values induced by any active minipublic to a degenerate lottery with support $\{\bar{B}\}$ induced by the empty minipublic. On the other hand, the citizens' interim payoff is U-shaped.[12] A higher post-minipublic value unequivocally leads to a higher probability of adoption. For sufficiently negative post-minipublic values, a slight increase in the value is overshadowed by the increase in the probability of adoption, hence the citizen's interim payoff decreases in the post-minipublic value. The payoff approaches zero from below as $B_{\hat{\mathbf{m}}} \to -\infty$ since the probability of adoption goes to zero. Similarly, it approaches the line $B_{\hat{\mathbf{m}}}$ from below as $B_{\hat{\mathbf{m}}} \to +\infty$ since the probability of adoption goes to one. The wedge between the players' interim payoffs is most pronounced around zero—that is, the expected misalignment is highest—since it is for such post-minipublic values that the policymaker's decision is most likely to differ from the citizens' preferred one. The citizens' interim payoff is convex for post-minipublic values sufficiently close to zero (i.e., for $|B_{\hat{\mathbf{m}}}| < \sqrt{2}\tau$) and concave otherwise.

[12] Appendix D.2 extends this insight beyond the Gaussian framework: the citizens' interim payoff is U-shaped in the post-minipublic value for any log-concave density of c.

For $\bar{B}$ sufficiently far from zero, the citizen prefers the degenerate distribution $\{\bar{B}\}$ to any mean-preserving spread $B_{\hat{\mathbf{m}}} \sim \mathcal{N}(\bar{B}, \Sigma(\hat{\mathbf{m}}))$ with $\Sigma(\hat{\mathbf{m}}) > 0$ small, since the probability mass of such distributions is concentrated on post-minipublic values in the concave portion of the interim payoff. No information is strictly preferred to a small amount of information. However, for sufficiently high $\Sigma(\hat{\mathbf{m}})$, any further mean-preserving spread transfers probability mass from post-minipublic values around zero with high expected misalignment to extreme post-minipublic values with low expected misalignment. The downside of such a lottery gets closer to zero and the upside becomes even more positive due to the citizen's interim payoff being decreasing for sufficiently negative $B_{\hat{\mathbf{m}}}$ and increasing for positive $B_{\hat{\mathbf{m}}}$. Therefore, for $\bar{B}$ sufficiently far from zero, V_C is decreasing for low informativeness and increasing for high informativeness. For $\bar{B}$ close to zero, on the other hand, the convexity of the interim payoff implies that higher informativeness is always preferred, hence $\underline{\Sigma} = 0$. There is high expected misalignment around the prior value, and any lottery over post-minipublic values that transfers probability mass further away from the prior leads to lower expected misalignment.

This heuristic argument, as well as the qualitative finding of Lemma 3.1, extend to the case of a biased policymaker with $\bar{c} \neq 0$. In fact, Appendix D.4.2 shows that uncertainty about the policymaker's threshold is sufficient, but not necessary, for the citizen's expected payoff to be quasiconvex. Figure 1b illustrates the citizen's payoff for any given post-minipublic value if the policymaker's threshold is known to be $\bar{c} > 0$. For $\bar{B} < \bar{c}$, the citizen prefers any lottery $\mathcal{N}(\bar{B}, \Sigma)$ over post-minipublic values to the degenerate lottery at $\bar{B}$, since such a lottery has a significant upside but no downside. However, if $\bar{B} > \bar{c}$, a low-informativeness minipublic induces a lottery with a substantial downside for post-minipublic values in the disagreement interval $(0, \bar{c})$.

The curse of too little information. At the evidence discovery stage, citizen $i \in \hat{\mathbf{m}}$ induces *active informativeness* $\Sigma(\hat{\mathbf{m}})$ by being active and *passive informativeness* $\Sigma(\hat{\mathbf{m}} \backslash i)$ by being passive. The difference $M_i(\hat{\mathbf{m}}) := \Sigma(\hat{\mathbf{m}}) - \Sigma(\hat{\mathbf{m}} \backslash i)$ corresponds to the *marginal informativeness* of citizen i. By Assumption 1(ii), active informativeness is strictly higher than passive informativeness for any $\hat{\mathbf{m}}$ and $i \in \hat{\mathbf{m}}$. Moreover, while active informativeness is the same for all citizens in $\hat{\mathbf{m}}$, passive informativeness might vary. A citizen's decision of whether to be active, therefore, boils down to whether he prefers his active informativeness over his passive informativeness. We refer to this as the *evidence discovery* constraint (ED): citizen $i \in \hat{\mathbf{m}}$ prefers to be active if and only if $V_C(\Sigma(\hat{\mathbf{m}})) \geqslant V_C(\Sigma(\hat{\mathbf{m}} \backslash i))$.

Through the discovery of his local evidence, a minipublic citizen induces a mean-preserving spread of the distribution over post-minipublic values already induced by the rest of the minipublic. The citizen's evidence discovery decision, therefore, is one of choosing between two lotteries over

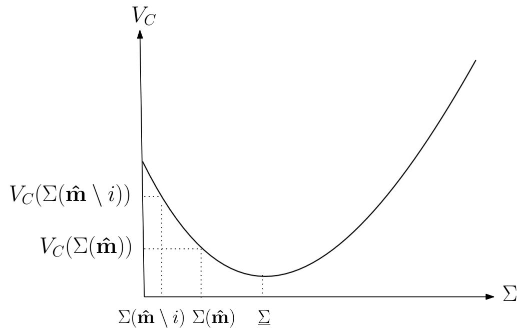


Figure 2: The curse of too little information.

post-minipublic values. As explained above, the citizen might not prefer a more spread out lottery if such a spread shifts mass to post-minipublic values with a high expected misalignment, for which the policymaker is likely to misuse the evidence by making the wrong adoption decision. Formally, when does the possibility of such misuse dominate the citizen's calculus, thus leading him to be passive? Two conditions must be met for this to arise, as illustrated in Figure 2. First, the minimum of the citizen's payoff must be to the right of zero. That is, the citizen's payoff must be decreasing in informativeness at $\Sigma = 0$: contributing a small amount of information to an otherwise entirely uninformed policymaker harms the citizen.[13] Second, both the citizen's passive informativeness and his marginal informativeness in the minipublic must be sufficiently low: $\Sigma(\hat{\mathbf{m}} \setminus i)$ must be lower than $\underline{\Sigma}$, and $\Sigma(\hat{\mathbf{m}})$ must not be too large relative to $\underline{\Sigma}$. Figure 2 illustrates the violation of (ED) for $\Sigma(\hat{\mathbf{m}}) < \underline{\Sigma}$.

3.2 The simplified problem of the policymaker

The following lemma establishes that it is without loss for the policymaker to restrict attention to a deterministic choice over active minipublics, thus significantly simplifying the policymaker's problem.

Lemma 3.2. *In the class of policymaker-preferred equilibria, it is without loss to restrict attention to deterministic minipublics* $\mathbf{m} \in \mathcal{M}_n$ *in which all citizens are active with probability one.*

Lemma 3.2 follows from three observations. First, the policymaker cannot encourage more evidence discovery by using lotteries over different minipublics. This is because each citizen observes the realized minipublic before deciding whether to be active. Second, for any minipublic and any

[13] Even though evidence discovery is costless, the marginal value of a small amount of informativeness can be negative due to the misuse of information. For a classic result on the negative marginal value of a small amount of information in single-agent settings with costly learning, see Radner and Stiglitz (1984) and Chade and Schlee (2002). In contrast to Martinelli (2006) and Strulovici (2010), the negative value of experimentation in our framework is not due to costly information or pivotality considerations in voting.

equilibrium in which a subset of citizens mix between being active and being passive, we can construct another equilibrium that guarantees a higher expected payoff to the policymaker: in this alternative equilibrium, all citizens who were active with a nonzero probability in the original equilibrium are active with probability one. The passive informativeness and the active informativeness of any citizen in such an equilibrium are weakly higher than in the original equilibrium. By the curse of too little information, all citizens with a weak preference for being active in the original equilibrium strictly prefer being active in the alternative one. Third, the policymaker cannot benefit from including passive citizens in the minipublic. Passive citizens affect neither the informativeness $\Sigma(\hat{\mathbf{m}})$ generated by the active citizens in $\hat{\mathbf{m}}$ nor the passive informativeness of any active citizens. Hence, they are inconsequential both for the policymaker's expected payoff and the (ED) constraints of other minipublic citizens.

From Lemma 3.1, the maximization of the policymaker's expected payoff consists of choosing the minipublic with the highest informativeness $\Sigma(\mathbf{m})$ among all active minipublics in $\mathcal{M}_n$. The (ED) constraints guarantee that each citizen in the minipublic is active. Thus, we can write the policymaker's minipublic choice problem as the following simplified problem:

$$\max_{\mathbf{m}\in\mathcal{M}_n} \quad \Sigma(\mathbf{m}) \tag{P}$$

$$\text{s.t.} \quad V_C(\Sigma(\mathbf{m})) \geqslant V_C(\Sigma(\mathbf{m}\backslash i)) \quad \forall i \in \mathbf{m}. \tag{ED}$$

We call a minipublic $\mathbf{m}$ *feasible* if (i) it consists of at most n citizens, and (ii) the (ED) constraint of each $i \in \mathbf{m}$ is satisfied.

The policymaker's unconstrained problem (P) consists of choosing a minipublic in $\mathcal{M}_n$ that maximizes informativeness $\Sigma(\mathbf{m})$. We let $\mathcal{M}_n^f$ denote the set of first-best minipublics that solve this problem. By the compactness of $\mathcal{M}_n$ and the continuity of Σ, a first-best minipublic always exists. By Assumption 1(ii), any first-best minipublic consists of exactly n citizens. In the absence of political uncertainty, any such first-best minipublic maximizes not only the payoff of the policymaker, but also that of the citizens. Hence, the set of first-best minipublics provides a natural benchmark for how diverse a minipublic should be absent any strategic considerations.

4 Characterization of the optimal minipublic

4.1 Optimal minipublic size

In designing a minipublic, the policymaker chooses both how large the minipublic is and which citizens it consists of. If no first-best minipublic in $\mathcal{M}_n^f$ is feasible, she has two instruments through which to satisfy all (ED) constraints: distorting the size and/or the composition of the minipublic.

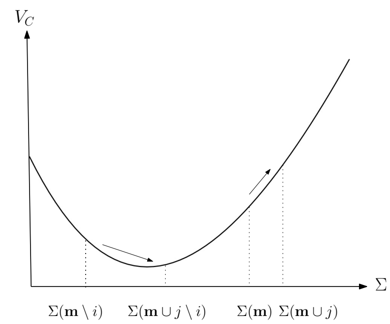


Figure 3: Citizen $i \in \mathbf{m}$ prefers to be active if citizen $j \notin \mathbf{m}$ is added to $\mathbf{m}$.

Our first observation concerns the size of the optimal minipublic. Does the policymaker ever choose fewer citizens than what her capacity allows? Proposition 4.1 rules out the possibility of any nonempty optimal minipublic consisting of fewer than n active citizens.[14] If the policymaker is able to incentivize a minipublic of fewer than n citizens to be active, then she is also able to incentivize a strictly more informative minipublic of exactly n citizens. Adding a new citizen into a minipublic increases both the active informativeness as well as the passive informativeness of all original citizens, providing even stronger incentives for them to continue to be active. Moreover, the newly added citizen strictly prefers to be active since he is joining an active minipublic that has already overcome the curse of too little information: his passive informativeness is the informativeness of the original minipublic, at which the citizen's payoff is already increasing.

Proposition 4.1 (No distortion in minipublic size)**.** *Given capacity n, the optimal minipublic either is empty or consists of exactly n active citizens.*

Proposition 4.1 thus narrows down the types of the optimal minipublic that can arise to these three: (i) a first-best minipublic for n citizens, (ii) a second-best minipublic of n active citizens, and (iii) the empty minipublic. We say that the optimal minipublic is *distorted in composition* if it is of type (ii). It is the characterization of such distortions in the composition that we turn to next.

4.2 Optimal minipublic composition

4.2.1 Marginal informativeness in the optimal minipublic

If no first-best minipublic is feasible, the policymaker is forced to choose a distorted minipublic that attains the highest informativeness among those feasible. What can be said about its composition? In any first-best minipublic that is not feasible, the passive citizens are those with the lowest passive informativeness, and hence the highest marginal informativeness. Because the policymaker cannot

[14]What makes this result nontrivial is its emphasis on the number of active citizens. Of course, if the optimal minipublic is empty, then any minipublic of n passive citizens is also optimal.

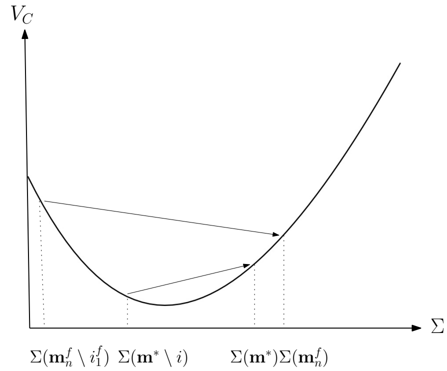


Figure 4: Any citizen i in the optimal minipublic $\mathbf{m}^*$ has strictly lower marginal informativeness than the passive citizen i_1^f in the first-best minipublic $\mathbf{m}_n^f$.

attain a higher active informativeness than that of a first-best minipublic, the only way through which she can incentivize citizens to be active is by reducing their marginal informativeness within the minipublic below that of the passive citizens in any first-best minipublic. That is, the way out of the curse of too little information is to make citizens "informationally smaller" than the passive citizens in any first-best minipublic.

Proposition 4.2 (Reduced marginal informativeness)**.** *If an optimal minipublic* $\mathbf{m}^*$ *is neither empty nor in* $\mathcal{M}_n^f$*, then the marginal informativeness* $M_i(\mathbf{m}^*)$ *for any* $i \in \mathbf{m}^*$ *is strictly lower than the highest marginal informativeness* $\max_{i \in \mathbf{m}_n^f} M_i(\mathbf{m}_n^f)$ *in any first-best minipublic* $\mathbf{m}_n^f \in \mathcal{M}_n^f$*.*

Figure 4 illustrates Proposition 4.2. Suppose that in a first-best minipublic $\mathbf{m}_n^f$, citizen i_1^f is passive. Since the informativeness of any minipublic other than the first-best is strictly lower, each citizen in the optimal minipublic must have strictly higher passive informativeness than $\Sigma(\mathbf{m}_n^f \setminus i_1^f)$ in order to be willing to be active. This implies that each citizen in $\mathbf{m}^*$ has strictly lower marginal informativeness than i_1^f in $\mathbf{m}_n^f$. If no first-best minipublic is feasible, there is least one passive citizen in every first-best minipublic. Then, each active citizen in the optimal minipublic must have strictly lower marginal informativeness than all such passive first-best citizens. If the curse of too little information is so severe that not just a subset but all citizens are passive in any first-best minipublic, then the marginal informativeness of each citizen in the optimal minipublic has to be strictly lower than the marginal informativeness of any citizen in the first-best minipublic.

The key insight emerging from Proposition 4.2 is that the policymaker reduces the marginal informativeness of citizens in the optimal minipublic in order to incentivize evidence discovery. The local evidence of each minipublic citizen has to be less novel than that of the passive citizens in any first-best minipublic. Building on Proposition 4.2, the next section analyzes the precise composition and demographic diversity of the optimal minipublic for a tractable correlation structure, for which

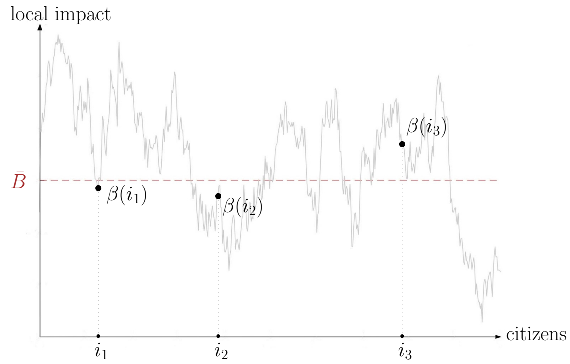


Figure 5: The grey mapping illustrates a particular realization of β satisfying Assumption 2.

marginal informativeness can be derived explicitly.

4.2.2 Ornstein-Uhlenbeck correlation in local evidence

We now impose additional structure on the value of the policy and on the correlation across citizens' local evidence. We interpret the random mapping $\beta : [0,1] \to \mathbb{R}$ as the realized *local impact* of the policy, where $\beta(i)$ is the realized local impact for demographic i. The value of the policy corresponds to the policy's average local impact[15]

$$B := \int_0^1 \beta(i)\,\mathrm{d}i.$$

We model the distribution over possible mappings from which β is drawn through a particular Gaussian process in which correlation weakens with distance between demographics.[16]

Assumption 2 (Distribution of the local impact mapping)**.** *The mapping β is drawn from the space of sample paths of an Ornstein-Uhlenbeck process on $[0,1]$, where*

- *(i) for each i, $\beta(i) \sim \mathcal{N}(\bar{B}, 1)$;*[17]
- *(ii) for any two citizens $i, j \in [0,1]$, the correlation between $\beta(i)$ and $\beta(j)$ is given by $e^{-|i-j|/\ell}$, where $\ell \in (0, +\infty)$.*

Figure 5 illustrates one such realization of the local impact mapping. For any two citizens $i, j \in [0,1]$, local impact $\beta(i)$ and $\beta(j)$ are positively correlated: higher impact for one demographic suggests higher impact for others as well. The marginal distribution of local impact $\beta(i)$ is identical

[15] For ease of interpretation, this formulation weighs equally all demographic groups; however, the analysis can be extended to a non-uniform measure over demographics.

[16] Appendix D.1 presents axioms on the correlation structure which are satisfied if and only if Assumption 2 holds. These axioms have a natural interpretation in our local impact interpretation.

[17] It is without loss for all subsequent analysis that the mean local impact is normalized to $\mathbb{E}[\beta(i)] = \bar{B}$ for all $i \in [0,1]$ instead of an arbitrary $\bar{\beta}(i)$ and that the variance is normalized to one.

across all $i \in [0,1]$. However, how informative a given $\beta(i)$ is about the average local impact B varies across citizens. Moreover, the greater ℓ is, the stronger is the correlation for any pair of citizens. Hence, ℓ measures the degree of *homogeneity* among citizens. As $\ell \to +\infty$ (or $\ell \to 0$), local impact becomes almost perfectly correlated (or almost independent) across citizens.

Minipublic informativeness. With the Ornstein-Uhlenbeck correlation structure in place, we derive the minipublic informativeness $\Sigma_{ou}(\mathbf{m})$ for any $\mathbf{m}$ as well as the marginal informativeness $M_j(\mathbf{m})$ of each minipublic citizen $i_j \in \mathbf{m}$.[18] In the post-minipublic value $B_{\mathbf{m}}$, the local impact of any minipublic citizen $\beta(i_j)$ is weighted monotonically with how far i_j is from immediate neighbors i_{j-1} and i_{j+1}: the further away the neighbors are from him, the more influential his evidence is because the less it overlaps with that of the neighbors. Taking this intuition further, Lemma B.1 shows that the informativeness of a minipublic can be expressed as a sum of the singleton informativeness of its citizens, each weighted by how novel the citizen's evidence is relative to that of the neighbors.

Crucially, the marginal informativeness of each minipublic citizen $M_j(\mathbf{m})$ depends only on i_j's immediate neighbors in the minipublic; in fact, it depends only on the distances from those neighbors. The further away i_j is from the neighbors, the more marginally informative he is in the minipublic. This monotonicity is due to two reasons. First, with greater distance, $\beta(i_j)$ is less correlated with $\beta(i_{j-1})$ and $\beta(i_{j+1})$. Second, as distance increases, the mass of citizens between i_j and his neighbors—i.e., citizens outside the minipublic about whom i_j is informative—also increases.

Lemma 4.1. *Fix $\mathbf{m} = \{i_1, \dots, i_n\}$. Citizen i_j's marginal informativeness $M_j(\mathbf{m})$ depends on $\mathbf{m}$ only through the adjacent distances $i_j - i_{j-1}$ and $i_{j+1} - i_j$, and it is strictly increasing in both.*

First-best minipublic. The first-best minipublic consists of n distinct citizens who solve the unconstrained problem (P) by jointly maximizing Σ_{ou}. Bardhi (2022) characterizes the solution to this problem, the steps of which are outlined in Remark 1 in Appendix B.

Corollary 4.1 (Proposition 3.5 in Bardhi (2022))**.** *For any n, there exists a unique first-best minipublic $\mathbf{m}_n^f := \{i_1^f, ..., i_n^f\}$ that satisfies the following:*

(i) it is symmetric about the median citizen: $i_k^f = 1 - i_{n-k+1}^f$ for every $k \in \{1, \dots, n\}$;

(ii) the distance between adjacent citizens Δ_n^f is constant: $i_k^f - i_{k-1}^f = \Delta_n^f$ for all $k \in \{2, ..., n\}$;

(iii) the distance Δ_n^f is such that the post-minipublic value $B_{\mathbf{m}_n^f}$ weighs equally the realizations $\beta(i_1^f), \dots, \beta(i_n^f)$.

This characterization builds on three observations. First, if a citizen is to be chosen between two citizens i and i', minipublic informativeness is maximized exactly at $(i + i')/2$. Hence, the

[18] The explicit expressions can be found in Lemma B.1 in Appendix B. It is straightforward to verify that Σ_{ou} satisfies Assumption 1.

distance between any two adjacent demographics included in the first-best minipublic is constant. Second, because correlation decreases in distance, the median citizen is the single most informative citizen. Hence, any minipublic with a constant distance between citizens becomes strictly more informative if centered around the median citizen. These two observations reduce the problem to choosing the leftmost citizen i_1^f so as to maximize informativeness. Third, such a minipublic in which the evidence of the peripheral citizens i_1 and i_n is weighted differently from that of the inner citizens $i_2, \ldots, i_{n-1}$ is suboptimal: the citizens' weights are complements from the perspective of informativeness.

Returning to the constrained problem, which citizens are more likely to be passive in the first-best minipublic whenever it is not feasible? We show that the structure of $\mathbf{m}_n^f$ is such that either (i) only the most peripheral citizens i_1^f and i_n^f are passive, or (ii) all citizens are passive. To establish this, Lemma 4.2 ranks the marginal informativeness of citizens in the first-best minipublic.

Lemma 4.2. *In the first-best minipublic $\mathbf{m}_n^f$, $M_1(\mathbf{m}_n^f) = M_n(\mathbf{m}_n^f)$ and $M_j(\mathbf{m}_n^f) = M_k(\mathbf{m}_n^f)$ for any $j, k \in \{2, \ldots, n-1\}$. If $n \geqslant 3$, then $M_1(\mathbf{m}_n^f) > M_2(\mathbf{m}_n^f)$.*

This result ranks the first-best citizens based on how "informationally small" each is. Inner citizens $i_2^f, \ldots, i_{n-1}^f$ are equally marginally informative because they are equidistant from their immediate neighbors. So if one inner citizen is passive, all inner citizens are passive. However, the peripheral citizens i_1^f and i_n^f carry strictly higher marginal informativeness than the inner citizens. This might seem surprising since all citizens' evidence is weighted equally in the post-minipublic value. However, what makes the marginal informativeness of i_1^f and i_2^f different is the extent to which they are correlated to their minipublic neighbors. The peripheral citizen i_1^f has only one neighbor, whereas i_2^f has two neighbors. If i_1^f remains passive, his only neighbor's evidence predicts his impact less accurately than if i_2^f stays passive and his two neighbors predict his evidence.[19] Therefore, if some citizens are passive in the first-best minipublic, i_1^f and i_n^f must be among them.

4.2.3 General characterization of the optimal minipublic

We first analyze the distortions in small minipublics, which turn out to be insightful for the general characterization for any capacity n. The optimal singleton minipublic is either the first-best one consisting of the median citizen $\mathbf{m}_1^f = \{1/2\}$ or empty. This is because the passive informativeness of any singleton minipublic is the same: $\Sigma(\emptyset) = 0$. If the most informative singleton minipublic is passive, any other less informative citizen is also passive. The smallest capacity for which a distorted minipublic arises is $n = 2$. If the first-best minipublic $\mathbf{m}_2^f$ is not feasible, it must be

[19]Formally, the residual variance of $\beta(i_1)$ given $\beta(i_2)$ is $1 - e^{-2(i_2-i_1)/\ell}$, whereas the residual variance of $\beta(i_2)$ given both $\beta(i_1)$ and $\beta(i_3)$ is $\left(1 - e^{-2(i_2-i_1)/\ell}\right)\left(1 - e^{-2(i_3-i_2)/\ell}\right) / \left(1 - e^{-2(i_3-i_1)/\ell}\right) < 1 - e^{-2(i_2-i_1)/\ell}$.

(a) $\mathbf{m}_2^f$ and $\mathbf{m}^*$ for $n = 2,\ \ell = 3, \tau = 1/2, \bar{B} = 2.45$

(b) $\mathbf{m}_4^f$ and $\mathbf{m}^*$ for $n = 4,\ \ell = 3, \tau = 1/2, \bar{B} = 2.518$

Figure 6: Distortions in small minipublics

that passive informativeness of at least one citizen is too low. But in a two-citizen minipublic, the passive informativeness of one citizen increases the closer the other citizen is to the median citizen. This results in an optimal minipublic in which both citizens are closer to the median citizen than the first-best citizens (Figure 6a). The insight that i_2^* must be to the left of i_2^f so as to ensure a sufficiently high passive informativeness for the peripheral citizen i_1^* generalizes beyond $n = 2$.

Lemma 4.3. *Let $n \geqslant 2$. In any optimal minipublic $\mathbf{m}^* \notin \{\mathbf{m}_n^f, \emptyset\}$, $i_2^* < i_2^f$ and $i_{n-1}^* > i_{n-1}^f$.*

Lemma 4.3 establishes that for the peripheral citizens i_1^* and i_n^* to be active, their neighbors i_2^* and i_{n-1}^*, respectively, must be shifted towards the periphery. The key observation, which generalizes the intuition from $n = 2$, is that shifting i_2^* to the right of its first-best counterpart strictly decreases i_1^*'s passive informativeness: even if all citizens to the right of i_2^* were chosen so as to maximize informativeness given i_2^*, the resulting minipublic $\mathbf{m}^* \setminus i_1^*$ would be further away from the first-best minipublic with $(n-1)$ citizens. For $n = 3$, this implies that no distortions in composition are possible. That is, i_2^* cannot be both to the left and to the right of the median citizen so as to induce both i_1^* and i_3^* to be active. For $n = 4$, however, it implies that the inner citizens are further apart than in the first-best minipublic (Figure 6b). While the patterns of distortions for $n = 2$ and $n = 4$ are seemingly different, they are manifestations of the same observation made in Lemma 4.3.

For inner citizens between i_2^* and i_{n-1}^*, we show that any optimal minipublic features at most two distances between adjacent citizens. First, it could be that all such inner citizens are equidistant from each other: $i_3^* - i_2^* = \ldots = i_{n-1}^* - i_{n-2}^* =: \Delta$ for some $\Delta > 0$. We refer to this as the Δ-*equidistant pattern.* Second, it could be that the distance between adjacent inner citizens alternates consecutively between a smaller distance $\delta > 0$ and a larger distance $\Delta > 0$. That is, $i_3^* - i_2^* = i_5^* - i_3^*$, $i_4^* - i_3^* = i_6^* - i_5^*$, and so on. We refer to this as the (δ, Δ)-*alternating pattern.* Proposition 4.3 characterizes the optimal minipublic in terms of these two patterns and Figure 7 illustrates them.

Proposition 4.3 (Distortions in the optimal minipublic)**.** *Let $n \geqslant 5$. Any optimal minipublic $\mathbf{m}^* = \{i_1^*, \ldots, i_n^*\} \notin \{\emptyset, \mathbf{m}_n^f\}$ satisfies the following properties:*

(i) for inner citizens $\{i_2^*, \ldots, i_{n-1}^*\}$, the minipublic is either of the Δ^*-equidistant pattern with $\Delta^* > \Delta_n^f$ or of the (δ^*, Δ^*)-alternating pattern with $i_3^* - i_2^* = i_{n-1}^* - i_{n-2}^* = \Delta^* > \Delta_n^f$;

(ii) the (ED) constraints of i_1^* and i_n^* bind; each is closer to their neighbor than in the first-best minipublic: $i_2^* - i_1^* < \Delta_n^f$ and $i_n^* - i_{n-1}^* < \Delta_n^f$; and each either maximizes informativeness given

(a) Δ-equidistant (b) (δ, Δ)-alternating

Figure 7: Two patterns in Proposition 4.3

the rest of the minipublic or is of distance δ^* away from his neighbor in the (δ^*, Δ^*)-alternating pattern;

(iii) it is symmetric: $i_k^* = i_{n-k+1}^*$ for $k = 1, \ldots, n$.

For any two citizens i_2^* and i_{n-1}^* distorted as in Lemma 4.3, the minipublic that attains the highest informativeness—which is the one that the policymaker prefers—has all inner citizens $i_3^*, \ldots, i_{n-2}^*$ positioned equidistantly. The marginal informativeness of each such inner citizen is higher than in the first-best minipublic because both his neighbors are further away from him. However, such an equidistant minipublic might not be feasible if the marginal informativeness of each such inner citizen is too high to incentivize him to be active. Whenever this is the case, the policymaker has to decrease this marginal informativeness by shifting the inner citizen closer to some neighbor, and hence, making his local evidence more redundant. In order to minimize the loss in informativeness due to such a shift away from the equidistant pattern, the optimal minipublic equalizes the marginal informativeness across all inner citizens $i_3^*, \ldots, i_{n-2}^*$ and makes their (ED) constraints bind by placing each of them δ^* away from one neighbor and Δ^* away from the other. Any other pattern—be that one that rearranges the two distances differently or one that features three or more distinct distances between inner citizens—is guaranteed to have at least some inner citizen from $\{i_3^*, \ldots, i_{n-2}^*\}$ strictly willing to be active, which leaves room for improvement for the policymaker.

If the first-best minipublic is not feasible, the marginal informativeness of its peripheral citizens is excessively high. The policymaker distorts the composition of the minipublic by just enough so as to make the peripheral citizens i_1^* and i_n^* indifferent between being active and being passive. Thus, their (ED) constraints must bind in the optimal minipublic. Moreover, any minipublic distorted in the ways described in parts (i) and (ii) must be symmetric around the median citizen; otherwise, the (ED) constraint of the peripheral citizen closer to the periphery would be slack, in which case the policymaker could strictly improve minipublic informativeness by shifting all citizens uniformly either to the left or to the right. Therefore, in the optimal minipublic the left half of the unit mass of citizens continues to be represented to the same extent as the right half.

Computing the optimal minipublic. From a computational perspective, this characterization greatly simplifies the task of solving for the optimal minipublic because it reduces the number of choice variables from n (citizens) to at most two (adjacent distances).

In any candidate solution of the Δ-equidistant pattern, the inner citizens are pinned down by the distance Δ and the symmetry about $1/2$, whereas the peripheral citizens exactly maximize informativeness given Δ.[20] Therefore, the entire minipublic can be expressed solely in terms of Δ, i.e., $\mathbf{m}(\Delta) = \{i_1(\Delta), \ldots, i_n(\Delta)\}$. To identify a candidate solution, we search for the smallest $\Delta \in (\Delta_n^f, 1/(n-3))$ that makes the (ED) constraint for the peripheral citizens bind, i.e.,

$$V_C\left(\Sigma(\mathbf{m}(\Delta))\right) = V_C\left(\Sigma\left(\mathbf{m}(\Delta) \setminus i_1(\Delta)\right)\right)$$

and satisfies the (ED) constraints of the inner citizens. Relative to the first-best minipublic, the optimal minipublic shifts towards the periphery just enough to leave i_1^* and i_n^* indifferent.

Similarly, in any candidate solution of the (δ, Δ)-alternating pattern, all citizens, including the peripheral ones, are fully described by the pair of distances (δ, Δ). In order to identify such candidate solutions, we solve for (δ, Δ) using two binding (ED) constraints, that of the peripheral citizens i_1^* and i_n^* and that of the inner citizens $i_3^*, \ldots, i_{n-2}^*$, respectively,

$$V_C\left(\Sigma(\mathbf{m}(\delta,\Delta))\right) = V_C\left(\Sigma\left(\mathbf{m}(\delta,\Delta) \setminus i_1(\delta, \Delta)\right)\right) = V_C\left(\Sigma\left(\mathbf{m}(\delta,\Delta) \setminus i_3(\delta,\Delta)\right)\right),$$

and select the solution that leads to the highest minipublic informativeness $\Sigma(\mathbf{m}(\delta, \Delta))$.

Finally, Lemma D.2 shows that if a Δ-equidistant minipublic is feasible, then the optimal minipublic must be of the Δ-equidistant pattern.[21] This further simplifies the computation as it warrants the search procedure starting with the Δ-equidistant pattern first: once a solution of the Δ-equidistant pattern is identified, there is no need to continue searching for a candidate solution of the (δ, Δ)-alternating pattern.[22] Moreover, in Section 5 we establish that the (δ, Δ)-alternating pattern is optimal for at most one capacity n—for all other capacities, it suffices to search for the Δ-equidistant pattern only. For these two reasons, the equidistant pattern is the predominant pattern of distortions.

Demographic diversity and representativeness. Given the characterization of Proposition 4.3, we can address the extent to which the optimal minipublic is representative of the citizenry. Representativeness and diversity are often referred to as desirable features of a minipublic in the

[20]From the first-order condition, $i_1(\Delta)$ must satisfy $1 - e^{-i_1(\Delta)/\ell} = \tanh\left(\frac{i_2(\Delta)-i_1(\Delta)}{2\ell}\right)$. In any optimal minipublic of the Δ-equidistant pattern, the peripheral citizens must maximize informativeness given the rest of the minipublic, whereas in any optimal minipublic of the (δ, Δ)-alternating pattern, either both peripheral citizens satisfy such an equation or they both are δ away from i_2^* and i_{n-1}^*, respectively. This is an immediate corollary of Proposition 4.3(ii).

[21]Appendix D.3.1 presents additional results on the characterization depending on whether n is odd or even and depending on which (ED) constraints are violated in the first-best minipublic. For example, we show that for n odd the optimal minipublic can only be of the Δ-equidistant pattern.

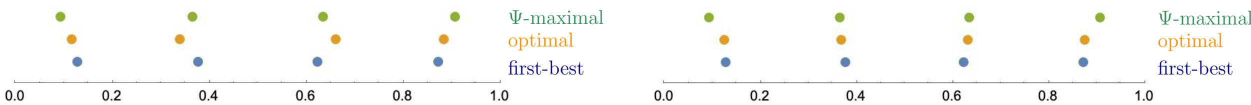
[22]For example, for $n = 6$, $\ell = 1$, $\tau = \frac{1}{2}$ and $\bar{B} = 2.19375$, no Δ-equidistant minipublic is feasible, but there exist feasible (δ, Δ)-alternating minipublics. Thus, the optimal minipublic is of the (δ, Δ)-alternating pattern.

literature on minipublic design (Flanigan et al. (2021), Steel et al. (2020), Fishkin (2011), Brown (2006)). However, as Steel et al. (2020) points out, "both of these concepts can be interpreted in more than one way, and furthermore the two can lead in different directions." In what follows, we present several natural measures of representativeness, discuss their implications for demographic diversity understood as distances between demographics in the minipublic, and evaluate how the first-best minipublic $\mathbf{m}_n^f$ and the optimal minipublic $\mathbf{m}^*$ compare according to such measures. The formal results for this discussion can be found in Appendix D.3.2.

A protocol often cited as leading to a statistically representative minipublic is that of random sampling of minipublic citizens, with all citizens having an equal chance of being sampled (Fishkin, 2009). Such uniform sampling of n citizens has $1/(n+1)$ as the expected leftmost citizen, $2/(n+1)$ as the expected second leftmost citizen, and so on up to $n/(n+1)$ as the expected rightmost citizen. Lemma D.4 shows that each first-best citizen is further away from the median citizen than his counterpart in the expected minipublic from such uniform sampling. Moreover, any optimal minipublic of the Δ-equidistant pattern is even further away. Then, according to any representativeness measure that decreases with each citizen's distance from their counterpart in the minipublic $\{1/(n+1), \ldots, n/(n+1)\}$, any optimal minipublic $\mathbf{m}^*$ of the Δ-equidistant pattern is always less representative than the first-best minipublic. However, such uniform sampling entirely disregards correlation in local impact, and so would any representativeness measure that relies on it. Our model of minipublics builds on the premise that local impact is correlated across demographics: a citizen is more representative of another citizen the stronger the correlation between their demographics. We turn now to notions of representativeness that take this into account.

The minipublic informativeness Σ measures how well the local impact of minipublic citizens predicts the *average* local impact across citizens, i.e., how well it approximates the estimate that the public would hold about the policy if all local evidence were available. In the minipublics literature, Steel et al. (2020) refer to this as "approximating the counterfactual public will" (p. 46). As such, minipublic informativeness maps the demographics of a minipublic into a measure of representativeness and introduces a benchmark for how dispersed the minipublic citizens should be in order for the minipublic to be maximally representative. By definition, then, any distorted minipublic is always less representative than the first-best minipublic according to this measure Σ.

Another plausible measure of representativeness captures how well the local impact of the minipublic citizens predicts the local impact of any randomly drawn citizen from $[0, 1]$. That is, to what extent would the local evidence gathered by the minipublic represent the local evidence of a hypothetical citizen who, as if behind a Rawlsian veil of ignorance, does not know his demographic belonging? Formally, this measure quantifies the average uncertainty explained by $\beta(\mathbf{m})$ about a



(a) $\mathbf{m}_4^f$ more Ψ-representative than $\mathbf{m}^*$

(b) $\mathbf{m}^*$ more Ψ-representative than $\mathbf{m}_4^f$

Figure 8: Ranking of $\mathbf{m}^*$ and $\mathbf{m}_4^f$ with respect to Ψ-representativeness

citizen's local impact, i.e., the representativeness of $\mathbf{m}$ is

$$\Psi(\mathbf{m}) := \int_0^1 \left(1 - \mathrm{var}\left[\beta(i) \mid \beta(\mathbf{m})\right]\right) \mathrm{d}i. \tag{5}$$

While Ψ is a well-defined measure of representativeness for any correlation structure in our baseline model, for the case of the Ornstein-Uhlenbeck correlation we derive an explicit expression for it in terms of the composition of $\mathbf{m}$. The Ψ-maximal minipublic—i.e., the minipublic that maximizes this representativeness measure—is more spread out than the first-best minipublic, in the sense that each citizen is further away from the median citizen, as shown in Figure 8. This might suggest that an optimal minipublic is more Ψ-representative than the first-best minipublic. However, we show that this ranking can go either way, as illustrated in Figures 8a and 8b for a minipublic of four citizens. Intuitively, what drives the ranking is the extent to which i_2^* and i_3^* are distorted relative to the first-best minipublic and the Ψ-maximal minipublic: for a large distortion in which i_2^* is sufficiently to the left of both i_2^f and his counterpart in the Ψ-maximal minipublic, the first-best minipublic is more representative than the optimal minipublic even though all its citizens are closer to the median citizen.

Lastly, the measure Ψ weighs citizens equally: the explained uncertainty about each citizen's local impact contributes in the same way to representativeness. In certain contexts, it might be reasonable to ask that citizens closer to the median citizen be more important for representativeness; other contexts might justify a greater weight for citizens at the margins of the society. Such weighting can be modeled, for instance, through a Beta distribution over citizens in (5). Naturally, this different weighting can reverse the ranking of the optimal minipublic and the first-best minipublic in terms of representativeness compared to the ranking under Ψ.

5 Comparative statics

We now turn to analyzing how the type of the optimal minipublic and the distortions in its composition vary with the primitives of the environment: political uncertainty, minipublic capacity, policy sentiment, and homogeneity of the citizenry. The formal results for this section are gathered in Appendix C.

Political uncertainty. Political uncertainty has a nonmonotonic effect on the type of the optimal minipublic. From the citizen's perspective, greater political uncertainty implies greater agency loss, and hence a lower expected payoff for any level of informativeness. A first intuition might suggest that the greater the political uncertainty that the citizens face, the more challenging it is for the policymaker to motivate evidence discovery. However, contrary to this intuition, Proposition 5.1 shows that the optimal minipublic is a first-best one for either sufficiently low or sufficiently high political uncertainty. The curse of too little information disappears at either extreme.

Proposition 5.1 (No distortions under high or low political uncertainty)**.** *Fix all parameters other than τ. There exist cutoffs $0 < \underline{\tau} \leqslant \bar{\tau} < \infty$ such that $\mathbf{m}^* \in \mathcal{M}_n^f$ if political uncertainty is either (i) sufficiently low (i.e., $\tau \leqslant \underline{\tau}$) or (ii) sufficiently high (i.e., $\tau \geqslant \bar{\tau}$).*

Political uncertainty determines the payoff-minimizing level of informativeness $\underline{\Sigma}$ for the citizen's payoff, which is single-peaked in τ. For τ either sufficiently close to zero or sufficiently high, $\underline{\Sigma}$ is exactly zero, so the citizen's payoff is strictly increasing in informativeness. As a result, any minipublic, and in particular any first-best one, is feasible. However, the intuition for why a citizen is willing to be active fundamentally differs across the two cases.

Under low political uncertainty, the expected misalignment vanishes for any realized post-minipublic value. All players' expected payoffs converge to $\max\{B_{\mathbf{m}}, 0\}$, which would be the citizen's payoff if they were in charge of adoption. In such a case, the citizens would always benefit from higher informativeness. By contrast, under high political uncertainty, the policymaker's decision becomes fully unpredictable from the citizens' perspective. The policy is adopted with probability close to $1/2$ for any post-minipublic value and the citizens can hardly affect the probability of adoption by being passive. As $\tau \to +\infty$, the citizens' interim payoff in Figure 1a approaches $B_{\mathbf{m}}/2$, whereas the interval for which this interim payoff is convex $B_{\mathbf{m}} \in (-\sqrt{2}\tau, \sqrt{2}\tau)$ expands to $(-\infty, \infty)$. Due to this convexity, although the expected misalignment of all post-minipublic values becomes unboundedly high as $\tau \to +\infty$, on the margin any mean-preserving spread of the prior value decreases expected misalignment. For τ sufficiently high, further increases in political uncertainty result in a weakly more informative minipublic.

Therefore, what hampers evidence discovery and forces the policymaker to distort the optimal minipublic is the presence of moderate, rather than high, political uncertainty. Unlike in the cases of excessively high or low political uncertainty, under moderate political uncertainty the expected misalignment varies substantially across post-minipublic values, thus discouraging further evidence discovery at prior values with low expected misalignment. Not only the expected misalignment is nonnegligible across all post-minipublic values but also each citizen's evidence can significantly influence the expected misalignment that is realized. Hence, the optimal minipublic might be distorted

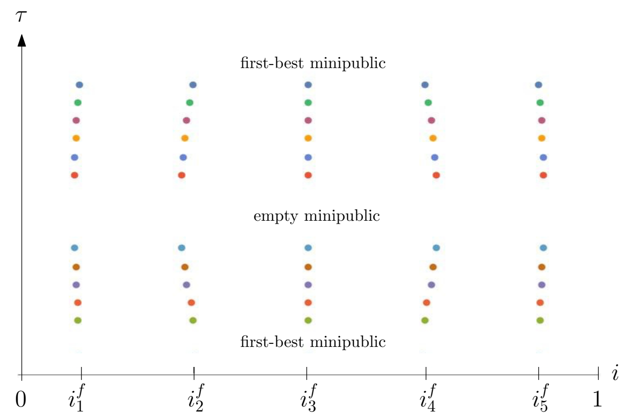


Figure 9: Optimal minipublic for $n = 5$, $\ell = 1$, $\bar{B} = 2.168$.

in composition, or even be empty. Figure 9 illustrates the distortions in the optimal minipublic relative to the first-best one for the Ornstein-Uhlenbeck correlation structure from Section 4.2.2. For $n = 5$, the optimal minipublic is always of the Δ-equidistant pattern. As τ becomes more moderate, the distortion—that is, the distance between adjacent inner citizens relative to that in the first-best minipublic—becomes larger, until the optimal minipublic collapses to the empty one.

Minipublic capacity. In the general model of Section 2, the set of feasible minipublics weakly expands as minipublic capacity increases. This suggests that distortions are more likely to arise for small minipublic capacity. On the one hand, if the optimal minipublic is empty for some capacity, it is empty for any lower capacity as well. On the other hand, however, the policymaker cannot always overcome the curse of too little information even with arbitrarily high capacity. The informativeness of any minipublic of any size is bounded above by the prior uncertainty about the policy $\text{var}(B) = \sigma^2$. If this uncertainty is lower than the payoff-minimizing level of informativeness $\underline{\Sigma}$ in the citizen's expected payoff, no minipublic is active. Even a minipublic of arbitrarily large size—namely, a referendum—cannot overcome the curse of too little information.

The Ornstein-Uhlenbeck structure of local evidence allows us to specify further how the type and the pattern of the optimal minipublic varies with the capacity. We establish that there exist cutoff capacities $0 \leqslant n_\emptyset \leqslant n_f \leqslant +\infty$ such that the optimal minipublic is empty for capacities $n \leqslant n_\emptyset$, distorted in composition for capacities between $n_\emptyset$ and n_f, and a first-best minipublic for capacities $n \geqslant n_f$ (Proposition C.1). Once a first-best minipublic is feasible for some capacity, then the corresponding first-best minipublic for any higher capacity is also feasible since it attains higher active informativeness while assigning lower marginal informativeness to each citizen. Moreover, the (δ, Δ)-alternating pattern, if it ever arises, does so for at most one capacity, $n_\emptyset + 1$ (Lemma C.3). For all other capacities $n_\emptyset + 2, \ldots, n_f - 1$, the optimal minipublic has the Δ-equidistant pattern. In these distorted Δ-equidistant minipublics, the distance between adjacent inner citizens decreases in n: with more citizens available, the policymaker does not need to spread the inner citizens as far out in order to reduce the marginal informativeness of the peripheral citizens (Proposition C.2).

Policy sentiment. A stronger policy sentiment—that is, a higher $|\bar{B}|$—makes it more challenging to incentivize evidence discovery. We show that there exist cutoff values $0 < \underline{b} \leqslant \bar{b} < \infty$ such that the optimal minipublic is a first-best one for $|\bar{B}| \leqslant \underline{b}$, distorted in composition for $|\bar{B}| \in (\underline{b}, \bar{b}]$, and empty for $|\bar{B}| > \bar{b}$ (Proposition C.3). If the policy sentiment is extremely strong, no minipublic, no matter its size or composition, is ever active. Strikingly, no minipublic is feasible precisely for policies with low expected misalignment.

The intuition follows from the shape of the interim payoff from Section 3.1. Weak policy sentiment goes hand in hand with high expected misalignment and locally convex interim payoff. Any mean-preserving spread of the prior value $\bar{B}$, both locally in this convex region but also to more distant post-minipublic values with low expected misalignment in the concave regions, increases the citizen's expected payoff. Therefore any citizen is willing to be active in any minipublic, so the first-best minipublic is feasible. In contrast, strong policy sentiment corresponds to low expected misalignment and a locally concave interim payoff. In the absence of any evidence, the citizens' preferred decision is made with high probability. For extremely strong policy sentiment, the prior value is so far out in the concave region of the interim payoff that even the maximal mean-preserving spread—the one corresponding to prior variance $\mathrm{var}(B) = \sigma^2$ which resolves all uncertainty about the policy— lies mostly in the concave region of the interim payoff. Therefore, no citizen is active in any minipublic for extremely strong policy sentiment.

Furthermore, in the context of the Ornstein-Uhlenbeck correlation structure we derive how the composition of an optimal minipublic of the Δ-equidistant pattern varies with policy sentiment. The optimal minipublic expands further away from the first-best one as $|\bar{B}|$ increases (Proposition C.4). This is because the set of feasible minipublics shrinks with $|\bar{B}|$, hence the policymaker has to resort to larger distortions in order to incentivize evidence discovery by the peripheral citizens.

Homogeneity of the citizenry. In the context of the Ornstein-Uhlenbeck correlation structure, for which ℓ proxies the homogeneity of the citizenry, the incentives for evidence discovery are weaker in a less homogeneous citizenry. We show that there exist cutoff levels of homogeneity $0 < \underline{\ell} \leqslant \bar{\ell} < +\infty$ such that the optimal minipublic is empty for a sufficiently heterogeneous citizenry $\ell < \underline{\ell}$, distorted in composition for a moderately heterogeneous citizenry $\ell \in [\underline{\ell}, \bar{\ell})$, and a first-best minipublic for a sufficiently homogeneous citizenry $\ell \geqslant \bar{\ell}$ (Proposition C.5).[23] The key

[23]The parameter ℓ does not enter V_C and $\underline{\Sigma}$, but only $\Sigma(\mathbf{m})$ and $\Sigma(\mathbf{m} \setminus \{i\})$. To restrict attention to nontrivial cases, Proposition C.5 imposes that $\underline{\Sigma} \in (0, 1)$. Otherwise, the citizens' payoff is either globally increasing or globally

observation is that the informativeness of any minipublic strictly increases in ℓ. Since this implies both greater passive informativeness and greater active informativeness for any minipublic citizen, incentives to be active become stronger the more homogeneous the citizenry is.

The marginal informativeness of any citizen in a non-singleton minipublic approaches zero both in an arbitrarily heterogeneous citizenry ($\ell \to 0$) and in an arbitrarily homogeneous one ($\ell \to +\infty$)—in the former because any citizen's evidence is uninformative and in the latter because the evidence of any citizen beyond the first is redundant. However, what makes the two cases fundamentally different is the fact that the informativeness of any minipublic collapses to zero as $\ell \to 0$ but approaches the unit variance of a single citizen's evidence as $\ell \to +\infty$. This determines whether the curse of too little information arises. As $\ell \to 0$, any minipublic carries a negligible amount of information and any single citizen in it contributes little to informativeness, hence the curse of too little information arises in any minipublic. In contrast, as $\ell \to +\infty$, the rest of the minipublic resolves all uncertainty about the policy, hence the citizen escapes the curse of too little information.

Therefore, distortions in composition arise if and only if the citizenry is neither too homogeneous nor too heterogeneous. Focusing on the optimal minipublics of the Δ-equidistant pattern, we show that the size of the distortion decreases with ℓ (Proposition C.6). The more homogeneous the citizenry is, the closer inner citizens are to each other and to the first-best minipublic. This is because the set of feasible minipublics strictly expands as ℓ increases. Therefore, smaller distortions relative to the first-best minipublic will suffice to restore incentives for evidence discovery.

6 Discussion and extensions

6.1 Practical implications for minipublic design

The question of how to optimally select minipublic citizens so as to strike tradeoffs between representativeness and other considerations—such as, for instance, guaranteeing equality in selection probabilities or counteracting historical inequities—has recently received increasing attention across disciplines (Flanigan et al. (2021), Steel et al. (2020)). Our focus is on how incentivizing evidence discovery in the face of political uncertainty imposes constraints on representativeness. Jacquet (2017) identifies "minipublic's lack of impact on the political system" as one of the key reasons why citizens choose not to participate in minipublics. In line with this insight, a recent report by OECD (2020) identifies *policy impact* and *representativeness* as two desiderata for minipublic design, where *impact* means that "the commissioning public authority should publicly commit to responding to or acting on participants' recommendations," and *representativeness* means that "the participants

decreasing in informativeness and citizens in any minipublic are either always active or always passive for any ℓ.

should be a microcosm of the general public." Our analysis, which proxies policy impact by political uncertainty, sheds light on the intricate interaction between these two desiderata.

Our results suggest that, on the one hand, there is no tension between the two desiderata under either sufficiently high or sufficiently low impact on the policy decision. Arguably, the CCC faced low political uncertainty when it was formed, as it was preceded by the Grand Débat National, a national effort that confirmed Macron's commitment to a greener economy, and as it was backed by his promise to enact the CCC's proposals "without filter." Our findings suggest that such low uncertainty might have contributed to citizens engaging with evidence in the CCC, which was arguably representative of the larger citizenry. On the other hand, it is when the minipublic's impact is moderately uncertain that part of a representative minipublic—starting with citizens at the margins of the society—self-selects out by not contributing its local evidence, ultimately leading to a poorly informed policy decision. This implies that if the policymaker can guarantee some, but not sufficient, impact, she has to sacrifice representativeness. If the tension is sufficiently severe so that no citizen engagement is possible, she finds it impossible to initiate a minipublic altogether. The two desiderata, impact and representativeness, must go hand in hand. Our findings further imply that this tension is easier to overcome the more resources the society has to afford a larger minipublic, as well as the more homogeneous the society is and the weaker the public sentiment is on the policy issue.

An example that suggests the presence of distortions in the minipublic composition is that of the UK Climate Assembly (CAUK). Shortly before CAUK was formed, there was a general election that "led to a change of Chairs and members of the six CAUK commissioning committees, with some of the newcomers less supportive of CAUK and the net zero target," which created a volatile political environment.[24] The selection process for CAUK aimed at a representative minipublic, but with some important caveats. First, about 5% of the seats were reserved for marginal groups more likely to drop out, such as citizens from Northern Ireland. Second, unlike in the case of CCC, attitudes towards climate change were used as an additional selection criterion—which likely led to more diversity in the sample—and citizens who are "not at all" or "not very concerned"' about climate change were over-represented relative to the UK population. Third, the process oversampled citizens with both low education ("No Qualification / Level 1") and high education ("Level 4 and above"), so CAUK was more diverse than the UK population in terms of educational background.[25] Such oversampling is consistent with our finding that a distorted minipublic generically includes a strictly larger range of demographics.

[24]See "How has the UK Climate Assembly impacted Parliament" (https://www.wfd.org/commentary/how-has-uk-climate-assembly-impacted-parliament-0).

[25]All data comes from https://www.climateassembly.uk/detail/recruitment/.

6.2 Robustness and extensions

The following discussion examines the robustness of the results, in particular the curse of too little information, with respect to several important modeling choices: the nature and the observability of evidence discovery, ex ante bias in the policymaker's threshold, preference heterogeneity among citizens, and opportunities for coordination in evidence discovery and delegation of the adoption decision. All formal results are gathered in Appendix D.4.

Noisy evidence discovery. The baseline model assumes that minipublic citizens either discover their local evidence or not, but does not allow for noise in the discovery. However, assuming away partial evidence might stack the deck against evidence discovery: citizens who are otherwise willing to discover some partial evidence might remain passive when only perfect evidence is available. To assess this conjecture, we consider an alternative setting in which each minipublic citizen $i \in \mathbf{m}$ publicly discovers a noisy signal $s(i) = \beta(i) + \epsilon_i$, where $\epsilon_i \sim \mathcal{N}(0, \xi_i^2)$ and the noise $\xi_i^2 \in \mathbb{R}_0^+ \cup \{+\infty\}$ is chosen by citizen i. In the baseline model, $\xi_i^2 = 0$ (or $\xi_i^2 = +\infty$) corresponds to the citizen being active (or passive). We continue to assume that any choice of ξ_i^2 is entirely costless to the citizen.

This richer noisy discovery model reveals that the all-or-nothing nature of evidence in the baseline model is in fact without loss. The informativeness of any minipublic continues to be the same as in the baseline model, and therefore the optimal minipublic is the same as well. This is due to the quasiconvexity of the citizens' payoff in informativeness. If a citizen has already escaped the curse of too little information for some finite $\xi_i^2 > 0$, then he prefers to increase informativeness even further by choosing the least noisy signal available $\xi_i^2 = 0$. Citizens never prefer to discover their outcomes partially if they can discover them perfectly.

Communication of a policy recommendation with private evidence discovery. Our baseline model imposes that all evidence discovery is public: citizens cannot withhold any discovered evidence from the policymaker. If only the empty minipublic is feasible in our baseline model of public evidence discovery, can some information be elicited from a minipublic that discovers evidence privately instead and communicates with the policymaker? We show that private discovery can partially overcome the curse of too little information. The optimal minipublic under private evidence discovery is a first-best one and all its citizens are active. Across all informative equilibria, this first-best minipublic communicates to the policymaker, through a binary recommendation, whether the realized post-minipublic value is positive or negative (Proposition D.3). In fact, the equilibrium recommendations in any informative equilibrium within any minipublic can be ranked strictly, up to relabeling, according to the probability of adoption that they induce. Any minipublic seeks to maximize the probability of adoption if the post-minipublic value that was discovered privately is positive and minimize it otherwise. Hence, any informative equilibrium in any minipublic, not just the first-best one, generically features two on-path recommendations, which correspond to policymaker's beliefs $\mathbb{E}[B \mid B_{\mathbf{m}} \geqslant 0]$ and $\mathbb{E}[B \mid B_{\mathbf{m}} < 0]$.[26] Binary recommendations is a feature of all nontrivial equilibria under private discovery. For this reason, while private discovery helps the policymaker if only the empty minipublic is feasible with public discovery, it also hurts her if a first-best minipublic is already feasible with public discovery by coarsening information about the post-minipublic value.[27]

Biased policymaker and uncertain thresholds for citizens. Appendix D.4.2 analyzes a richer environment in which (i) the policymaker is ex ante biased, in the sense that $\mathbb{E}[c] = \bar{c} \neq 0$ and (ii) not only the policymaker, but also the citizens have uncertain thresholds (centered at zero to capture ex ante alignment across citizens) which are realized at the same time as that of the policymaker. Although we allow for the citizens' thresholds to have heterogeneous variances, such heterogeneity turns out to be inconsequential for the citizen's payoff due to his ex post payoff being linear in his own threshold: the only payoff-relevant uncertainty is the political uncertainty τ about the policymaker's threshold. Importantly, the citizens' payoff continues to be quasiconvex in informativeness and the policymaker's payoff continues to be strictly increasing. Because the characterization of the distortions in the optimal minipublic in Proposition 4.3 depends on the players' payoffs only through such monotonicity, this characterization is still valid. What the presence of a bias does affect is whether any first-best minipublic is feasible. To see this, consider a baseline environment $(\bar{B}, \tau, \ell)$ with no bias $\bar{c} = 0$ in which no first-best minipublic is feasible. In any other environment with the same $(\bar{B}, \tau, \ell)$ but a large enough bias—that is, $\bar{c} > \bar{B} > 0$ for an ex ante favorable policy and $\bar{c} < \bar{B} < 0$ for an ex ante unfavorable one—any first-best minipublic is feasible. That is, for any degree of political uncertainty and any prior value of the policy, a sufficiently biased policymaker restores evidence discovery within any first-best minipublic.

Private interest. Citizens have common interest in the baseline model. In many contexts, however, it is realistic that citizen i's adoption payoff is a convex combination of both common and private interest, i.e., of the average impact B and the local impact $\beta(i)$. To the extent that this mixture puts sufficient weight on B, our qualitative results still hold. However, to understand the intricacies of modeling private interest, Appendix D.4.3 derives the (ED) constraints of a minipublic under pure private interest for the Ornstein-Uhlenbeck structure in Section 4.2.2. Unlike in the case of common interest, the expected payoff of citizen i depends on the minipublic $\mathbf{m}$ not only through

[26] Citizens are perfectly aligned on the best response communication strategy. This resonates with the fact that the citizens of CCC were almost unanimous on most of the issued recommendations (https://democracy-international.org/final-propositions-french-citizens-convention-climate).

[27] In Appendix D.4.5, we consider a disclosure game with hard evidence between the citizens in the minipublic and the policymaker. In contrast to the above results with private evidence discovery, we show that with hard evidence the policymaker can attain at least the same informativeness as in our baseline model.

its informativeness $\Sigma(\mathbf{m})$ but also through the covariance between $\beta(i)$ and the post-minipublic value $B_{\mathbf{m}}$ (Proposition D.5). As a result, the (ED) constraint of citizen i depends not only on the active informativeness $\Sigma(\mathbf{m})$ and the passive informativeness $\Sigma(\mathbf{m} \setminus i)$, but also on the active covariance $\text{cov}(\beta(i), B_{\mathbf{m}})$ and the passive covariance $\text{cov}(\beta(i), B_{\mathbf{m}\setminus i})$. This introduces a substantial increase in the dimensionality of the policymaker's problem. For $n = 1$, any nonempty optimal minipublic is the same both under private interest and under common interest: $\mathbf{m}_1^f = \{1/2\}$. Two or more citizens are necessary for the composition of the optimal minipublic, whenever nonempty, to differ across the two models. Numerical examples with $n = 2$ suggest that the policymaker obtains weakly higher informativeness under private interest. The first-best minipublic can be feasible under private interest even if not under common interest (Example 4), and the optimal minipublic under private interest can be distorted even if no minipublic is feasible under common interest (Example 5). Such preliminary simulations suggest that private interest helps the policymaker in alleviating the curse of too little information.

Coordination within a minipublic. Since minipublic citizens are aligned in their preferences, a natural question is whether they can be strictly better off from coordinating their evidence discovery rather than playing the policymaker-preferred equilibrium. By the quasiconvexity of the citizens' payoff, such a collusive outcome—that is, the outcome that maximizes all citizens' welfare—in any minipublic $\mathbf{m}$ must correspond to either $\Sigma(\emptyset) = 0$ or $\Sigma(\mathbf{m})$.[28] If $\mathbf{m}$ is feasible, so that the policymaker-preferred equilibrium outcome is $\Sigma(\mathbf{m})$, coordination strictly benefits the citizens if and only if $V_C(\Sigma(\emptyset)) > V_C(\Sigma(\mathbf{m}))$. In such a case, each minipublic citizen is sufficiently "informationally small" so as to prefer being active if all others are active, but he strictly benefits from all citizens remaining collectively passive. On the other hand, the citizens in any minipublic that is not feasible in our model cannot be made better off by coordinating: in equilibrium, at least some citizen finds that his passive informativeness leads to a higher payoff, which means that $\Sigma(\emptyset)$ must lead to even higher payoff. Coordination, therefore, shrinks the set of active minipublics and leaves the policymaker worse off. Because coordination reduces all evidence discovery to a single collective decision, the optimal minipublic under coordination is either empty or a first-best one. In practice, coordination into remaining collectively silent, especially in large minipublics, is challenging to achieve due to deliberation formats that encourage participation. These formats often feature deliberation in small groups (as was the case in the CCC). To the extent that citizens coordinate their evidence discovery within, but not across, these small groups, our analysis is valid for deriving

[28]This comparison between the informativeness of the collusive outcome and that of the equilibrium outcome is reminiscent of Gentzkow and Kamenica (2017*b*)—the minipublic citizens are senders, each with access to an experiment about their local evidence. We find that the collusive outcome is weakly less informative than the equilibrium one, similarly to their Proposition 1 (pg. 307), even though our informational environment is not Blackwell-connected.

the policymaker-preferred equilibria in the evidence discovery game across small groups.

Delegation of decisional authority. The curse of too little information arises because decisional authority rests with the policymaker rather than the minipublic. Transferring such authority to the minipublic induces any minipublic to be active, since there is no downside to discovering evidence. In that case, would the policymaker benefit from delegating the adoption decision to a first-best minipublic $\mathbf{m}_n^f \in \mathcal{M}_n^f$? Consider the extreme case in which the optimal minipublic is empty. Without delegation the policymaker is bound to act based on the prior value $\bar{B}$, whereas with delegation the policy is adopted if and only if $B_{\mathbf{m}_n^f} \geqslant 0$. In such a case, we show that the ratio $\tau^2/\Sigma(\mathbf{m}_n^f)$ determines whether the policymaker benefits from delegating decisional authority: delegation is preferred if and only if this ratio is less than one (Proposition D.6). By delegating, the policymaker trades her ability to fine-tune the adoption decision to her realized threshold for a more informed decision. Such ability to fine-tune is most valuable when political uncertainty is high relative to how informative the first-best minipublic is.[29] Therefore, delegation is a partially effective instrument in resolving the conflict between the policymaker and the citizens.

7 Related literature

Our work connects to several strands of the existing literature. First, it builds on a large literature on the optimal choice of statistical experiments. The evidence discovery game among minipublic citizens relates to models of *Bayesian persuasion with one and multiple senders* (Kamenica and Gentzkow, 2011; Gentzkow and Kamenica, 2017*b*,*a*; Li and Norman, 2018), since citizens do not have private information about the policy but can commit to experiments about its value. Our focus is on a class of experiments that are not Blackwell-connected: each citizen's experiment is either perfectly informative about his local evidence or entirely uninformative.[30] In this respect, our model shares with Koessler, Laclau and Tomala (2018), Boleslavsky and Cotton (2018), and Au and Kawai (2019, 2020) the premise that each sender designs information about only one dimension of a multidimensional state (in our case, infinite-dimensional).[31] As in Au and Kawai (2019), the dimensions in our model are positively correlated. Despite key modeling differences, one recurring focus that we share with this literature is whether the equilibrium becomes more informative as the number of senders increases.

The policymaker too designs a statistical experiment through her choice of minipublic. Absent evidence discovery constraints, her problem as posed in Section 4.2.2 is one of *selective learning about*

[29] Per Proposition 5.1, for τ^2 sufficiently high, the first-best minipublic is feasible even without delegation.

[30] The experiments are not Blackwell-connected because each citizen can discover his local evidence but not the evidence of others, hence our setting is not a special case of Gentzkow and Kamenica (2017*b*).

[31] It also shares this feature with the model of advocacy in Dewatripont and Tirole (1999), where each agent explores only one cause. Our model differs in that evidence is costless and transfers are assumed away.

multiple correlated attributes, where each citizen is an attribute and his local impact is the attribute realization. Our main difference with this line of work (Bardhi (2022), Liang, Mu and Syrgkanis (2020)), which also models attributes as jointly Gaussian, is that each attribute is a strategic player in our framework: attributes need to be incentivized to reveal their respective realizations. Our first-best benchmark for the Ornstein-Uhlenbeck correlation structure was solved in Bardhi (2022). Moreover, Bardhi (2022) also studies a principal-agent sampling game in which the principal has decisional authority and the agent has authority over which attributes are sampled. When cast in the attribute terminology, the main differences between this sampling game in Bardhi (2022) and the setting in Section 4.2.2 is that in our setting: (i) distortions arise in sampling despite the fact that all players weigh attribute realizations in the same way, (ii) the player in charge of adoption, i.e., the policymaker, also partakes in deciding which attributes are discovered through her minipublic choice, and (iii) the attributes chosen by the policymaker play an evidence discovery game in which each decides whether to reveal its realization. The sampling authority, thus, is shared between the policymaker and the citizens.

Because each citizen's local evidence is predictive of the local evidence of others, minipublic evidence is an example of social data as defined in Bergemann, Bonatti and Gan (2020), which studies data intermediation in a product market with correlated consumer preferences. Despite our vastly different settings, their design of a data policy is similar to our design of a minipublic insofar as consumers must be induced to volunteer their data while being aware of such data externality. As in our analysis, they also leverage the tractability of Gaussian data.

Second, in modeling correlation in local evidence through an Ornstein-Uhlenbeck process, our work is methodologically connected to a literature starting with Jovanovic and Rob (1990) and Callander (2011) that adopts the *Brownian motion to model uncertainty over a continuum of correlated alternatives* in a search framework. Agents choose which alternatives to explore sequentially so as to identify the best one. Callander and Clark (2017) is closer to us in that it studies the optimal selection of legal cases by a higher court under resource constraints, so as to guide decisions about all possible cases by a lower court. In contrast to the friction between citizens and the policymaker in our model, frictions between the two courts are assumed away. Callander, Lambert and Matouschek (2018) models expert advice over a large space of uncertain decisions through disclosure of hard evidence, whereas we model a binary policy decision and commitment in evidence discovery. Carnehl and Schneider (2022) models exploration in the knowledge space by a single researcher. Notably, both the Ornstein-Uhlenbeck process, which is a better fit for our application, and the Brownian motion are special cases of a large class of Gaussian processes recently explored in Bardhi (2022).

Third, our questions closely relate to those in the literature on the *optimal composition of a team of experts*. What differentiates our paper from this literature is (i) our focus on the citizens' incentives to discover evidence, and (ii) our rich modeling of the correlation between citizens' local evidence. Lamberson and Page (2012) considers the optimal composition of a team of forecasters from one of two statistical groups. In contrast to our model, the group forecast is assumed to weigh individual forecasts equally. Hong and Page (2001) studies the optimal diversity of a problem-solving team, in which agents differ in both perspectives and heuristics. Although our citizens also vary in perspectives, their task is one of evaluation rather than problem-solving. Prat (2002) also studies the optimal diversity of a team in the context of workforce recruitment and complementarities across workers. Chade and Eeckhout (2018) studies sorting of experts into teams in a model in which the precision of an expert's signal is his expertise and the correlation between any two experts is a constant, whereas we allow for flexible precision and correlation of the citizens' local evidence. Dong and Mayskaya (2022) studies the optimal composition of a team of two correlated experts in a setting with private information and communication costs.

Fourth, our paper shares themes with a large literature on *deliberation in voting committees* and *collective evaluation of multi-attribute proposals*, and in particular on committee models with interdependent values and heterogeneous information (Austen-Smith and Banks, 1996; Feddersen and Pesendorfer, 1997; Visser and Swank, 1999; Moldovanu and Shi, 2013; Gradwohl and Feddersen, 2018; Name Correa and Yildirim, 2020; Roesler, 2022, among others). The presence of private information and voting are two key differences with this line of work. Related work on endogenous collective information acquisition in committees and teams includes Gerardi and Yariv (2008), Cai (2009), Chan et al. (2018), Tan and Wen (2020), and Cetemen, Urgun and Yariv (2022).

Our paper also adds to a vast social science literature on minipublics (Dahl, 1989; Fishkin, 2011; Warren and Gastil, 2015), in particular to work that studies non-participation in minipublics (Jacquet, 2017). For a recent model of information acquisition in citizens' assemblies that consist of a single rationally inattentive representative citizen, see Kwiek (2020). To the best of our knowledge, we offer the first formal model of optimal minipublic composition. More broadly, our work relates to a growing economics literature on direct democracy and citizen participation (see, among others, Matsusaka and McCarty (2001), Matsusaka (2005), and Prato and Strulovici (2017)).

8 Concluding remarks

This paper studies how political uncertainty dampens the incentives of minipublic citizens to discover local evidence and thus limits the representativeness of the optimal minipublic. It does so in a framework with costless and transparent evidence, civic-minded citizens, and no initial conflict of interest between the citizens and the policymaker. We find that incentivizing evidence discovery is more challenging under moderate political uncertainty, in smaller minipublics, for strong policy sentiment, and in more heterogeneous citizenries. To restore incentives for evidence discovery, the policymaker distorts the minipublic composition relative to first-best minipublics in such a way that all citizens are less marginally informative than the passive first-best citizens. Under the Ornstein-Uhlenbeck structure of local evidence, this implies only two possible patterns of distortions: the equidistant pattern and the alternating pattern. Of the two, the former is predominant and features a greater range of demographics than the first-best minipublic, overrepresenting demographics at the margins of the citizenry while selecting more diversely around the median demographic.

Our framework can prove useful for answering several policy-relevant questions that are beyond the scope of this paper. First, in many minipublics, citizens vote on the policy recommendation. Our baseline model sidesteps this question since all minipublic citizens are fully aligned and would vote in the same way. But in a richer environment in which minipublic citizens face uncertainty regarding each other's preferences and thresholds of adoption, how does this voting stage impact the incentives of citizens to discover their local evidence? Second, a policymaker's consultation with a minipublic often precedes a citizenry-wide referendum in which all citizens vote on the policy decision. Examples include the Irish referendums on same-sex marriage in 2015 and on abortion in 2018, as well as a referendum which was tentatively planned for 2021 in France on a recommendation of the CCC to add environmental protection to the French constitution but eventually dropped.[32] It would be fruitful to study how the format of the referendum, as well as potential conflict among citizens of different backgrounds regarding the threshold for policy adoption, might curtail a minipublic's ability to discover useful evidence. Third, in our framework, the policymaker does not benefit from randomizing over minipublics. Yet, most sampling protocols for minipublics involve some form of randomization. Are there features of real-world minipublics that would rationalize randomization by the policymaker, or is randomization observed in practice because the policymaker cannot target citizens with arbitrary precision? We leave these questions for future work.

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[32]The Irish referendums were preceded, respectively, by the Constitutional Convention of 2012-14 and the Citizens' Assembly of 2016-18, set up by the Irish government to examine various constitutional reforms. For the planned French referendum, see https://www.politico.eu/article/macron-agrees-to-add-environmental-protection-as-a-constitutional-duty/.

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A Proofs for Section 3

Lemma A.1 (Players' payoffs)**.** *Fix an active minipublic* $\hat{\mathbf{m}}$ *with informativeness* $\Sigma(\hat{\mathbf{m}})$*. The expected payoff of the policymaker is*

$$V_P\left(\Sigma(\hat{\mathbf{m}})\right) := \bar{B}\Phi\left(\frac{\bar{B}}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\right) + \sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}\,\phi\left(\frac{\bar{B}}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\right), \tag{6}$$

and the expected payoff of every citizen $i \in \hat{\mathbf{m}}$ *is*

$$V_C\left(\Sigma(\hat{\mathbf{m}})\right) := \bar{B}\Phi\left(\frac{\bar{B}}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\right) + \frac{\Sigma(\hat{\mathbf{m}})}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\phi\left(\frac{\bar{B}}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\right). \tag{7}$$

Proof of Lemma A.1. Because c and $B_{\hat{\mathbf{m}}}$ are independent Gaussian variables, the policymaker's ex post payoff $B_{\hat{\mathbf{m}}} - c$ is distributed according to $B_{\hat{\mathbf{m}}} - c \sim \mathcal{N}(\bar{B}, \tau^2 + \Sigma(\hat{\mathbf{m}}))$. The policymaker observes $B_{\hat{\mathbf{m}}} - c$ and adopts the policy if $B_{\hat{\mathbf{m}}} - c > 0$. Hence, the probability of adoption is

$$\Pr\left[B_{\hat{\mathbf{m}}} - c > 0\right] = 1 - \Phi\left(\frac{-\bar{B}}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\right) = \Phi\left(\frac{\bar{B}}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\right).$$

Let $\lambda(x) := \phi(x)/(1-\Phi(x))$ denote the inverse Mills ratio. The following is a standard result about the conditional expectation of a joint Gaussian distribution.

Lemma A.2. *Let* X, Y *be two jointly Gaussian random variables with respective means* μ_x, μ_y*, respective variances* σ_x^2, σ_y^2*, and covariance* $\mathrm{Cov}[X,Y]$*. Then,* $\mathbb{E}[X|Y>y] = \mu_x + \frac{\mathrm{Cov}[X,Y]}{\sigma_y}\lambda\left(\frac{y-\mu_y}{\sigma_y}\right)$.

Applying Lemma A.2 for $X = Y = B_{\hat{\mathbf{m}}} - c$ and $y = 0$, the expected payoff of the policymaker conditional on adoption is

$$\mathbb{E}[B_{\hat{\mathbf{m}}} - c | B_{\hat{\mathbf{m}}} - c > 0] = \bar{B} + \sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}\,\lambda\left(\frac{-\bar{B}}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\right).$$

Applying Lemma A.2 for $X = B_{\hat{\mathbf{m}}}$, $Y = B_{\hat{\mathbf{m}}} - c$ and $y = 0$ (and thus, $\mathrm{Cov}[B_{\hat{\mathbf{m}}}, B_{\hat{\mathbf{m}}} - c] = \Sigma(\hat{\mathbf{m}})$), the expected payoff of the citizens conditional on adoption is

$$\mathbb{E}[B_{\hat{\mathbf{m}}} | B_{\hat{\mathbf{m}}} - c > 0] = \bar{B} + \frac{\Sigma(\hat{\mathbf{m}})}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\lambda\left(\frac{-\bar{B}}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\right).$$

The unconditional expected payoff is $\Pr\left[B_{\hat{\mathbf{m}}} - c > 0\right]\mathbb{E}[B_{\hat{\mathbf{m}}} - c | B_{\hat{\mathbf{m}}} - c > 0]$ for the policymaker, and $\Pr(B_{\hat{\mathbf{m}}} - c > 0)\mathbb{E}[B_{\hat{\mathbf{m}}} | B_{\hat{\mathbf{m}}} - c > 0]$ for the citizens. Plugging in the above expressions yields the result. ∎

Proof of Lemma 3.1. (i) From Lemma A.1, payoffs V_P and V_C are continuous and differentiable. Differentiating the expected payoff of the policymaker with respect to Σ, we obtain

$$\frac{\partial V_P(\Sigma)}{\partial \Sigma} = \frac{\phi\left(\frac{\bar{B}}{\sqrt{\tau^2+\Sigma}}\right)}{2\sqrt{\Sigma+\tau^2}} > 0.$$

(ii) Differentiating the expected payoff of the citizen with respect to Σ, we obtain

$$\frac{\partial V_C(\Sigma)}{\partial \Sigma} = \frac{\phi\left(\frac{\bar{B}}{\sqrt{\tau^2+\Sigma}}\right)}{2\sqrt{\Sigma+\tau^2}}\left(\Sigma^2 - (\bar{B}^2 - 3\Sigma)\tau^2 + 2\tau^4\right).$$

Because $\Sigma > 0$, the only admissible root of the quadratic $\left(\Sigma^2 - (\bar{B}^2 - 3\Sigma)\tau^2 + 2\tau^4\right)$ is

$$\Sigma_{root} = \frac{1}{2}\left(\sqrt{\tau^4 + 4\bar{B}^2\tau^2} - 3\tau^2\right),$$

which is positive if and only if $\bar{B}^2 \geqslant 2\tau^2$. Therefore, the payoff minimum is reached at 0 if $\Sigma_{root} < 0$ and Σ_{root} otherwise. V_C is strictly decreasing over $[0, \underline{\Sigma})$ and strictly increasing over $(\underline{\Sigma}, \infty)$. ■

Lemma A.3. *Fix Σ and $\tilde{\Sigma}$ such that $\Sigma < \tilde{\Sigma}$.*

(i) Suppose that $V_C(\Sigma) > V_C(\tilde{\Sigma})$. Then, for any Σ_1 and Σ_2 such that $\Sigma_1 \leqslant \Sigma$, $\Sigma_2 \leqslant \tilde{\Sigma}$ and $\Sigma_1 < \Sigma_2$, it holds that $V_C(\Sigma_1) > V_C(\Sigma_2)$.

(ii) Suppose that $V_C(\Sigma) \leqslant V_C(\tilde{\Sigma})$. Then, for any Σ_1 and Σ_2 such that $\Sigma_1 \geqslant \Sigma$, $\Sigma_2 \geqslant \tilde{\Sigma}$ and $\Sigma_1 < \Sigma_2$, it holds that $V_C(\Sigma_1) \leqslant V_C(\Sigma_2)$.

Proof. Suppose $V_C(\Sigma) > V_C(\tilde{\Sigma})$ for $\Sigma < \tilde{\Sigma}$. By Lemma 3.1, V_C must be strictly quasiconvex with a minimum at $\underline{\Sigma} > \Sigma$. If $\Sigma_2 \leqslant \Sigma$, the statement follows by the fact that V_C is strictly decreasing to the left of $\underline{\Sigma}$. If $\Sigma_2 \in (\Sigma, \tilde{\Sigma}]$ instead, then by the strict quasiconvexity of V_C, it follows that $V_C(\Sigma_1) \geqslant V_C(\Sigma) = \max\left\{V_C(\Sigma), V_C(\tilde{\Sigma})\right\} > V_C(\Sigma_2)$. This establishes part (i). Part (ii) follows by a similar argument. ■

Proof of Lemma 3.2. First, we show that the restriction to deterministic minipublics is without loss. Consider a lottery with at least two distinct minipublics $\mathbf{m} \neq \mathbf{m}'$ in its support. Given a minipublic $\mathbf{m}$, the citizen's equilibrium strategy δ induces a lottery over subsets of $\mathbf{m}$. Let $\hat{\mathbf{m}}$ and $\hat{\mathbf{m}}'$ denote the random subset of active citizens in $\mathbf{m}$ and $\mathbf{m}'$, respectively. The citizens observe the realized minipublic from the policymaker's lottery. Hence, the policymaker randomizes over minipublics only if she is indifferent between them, i.e., $\mathbb{E}_{\hat{\mathbf{m}}}[V_p(\hat{\mathbf{m}})] = \mathbb{E}_{\hat{\mathbf{m}}'}[V_p(\hat{\mathbf{m}}')]$. But then, the policymaker obtains the same payoff by choosing either $\mathbf{m}$ or $\mathbf{m}'$ deterministically.

Next, we show that the restriction to pure strategies at the evidence discovery stage, $\delta_i(\mathbf{m}) \in \{0, 1\}$ for all $\mathbf{m} \in \mathcal{M}_n$ and for all $i \in \mathbf{m}$, is without loss. Consider a minipublic $\mathbf{m} \in \mathcal{M}_n$ and an equilibrium δ in which $\delta_i \in (0, 1)$ for at least some $i \in \mathbf{m}$. Let $\mathbf{m}^A := \{i \in \mathbf{m} : \delta_i = 1\}$ be the set of active citizens, $\mathbf{m}^P := \{i \in \mathbf{m} : \delta_i = 0\}$ the set of passive citizens, and $\mathbf{m}^M := \{i \in \mathbf{m} : \delta_i \in (0, 1)\}$ the set of citizens who strictly mix between being active and passive, such that $\mathbf{m} = \mathbf{m}^A \cup \mathbf{m}^P \cup \mathbf{m}^M$. For the same minipublic $\mathbf{m}$, we can construct an alternative equilibrium $\tilde{\delta}$ in which $\tilde{\delta}_i = 1$ for all $i \in \mathbf{m}^A \cup \mathbf{m}^M$. With positive probability the set of active citizens under $\tilde{\delta}$ is a strict superset of the active citizens in δ, therefore $\tilde{\delta}$ guarantees a strictly higher informativeness with positive probability.

We claim that such a profile $\tilde{\delta}$ is an equilibrium. First if $\mathbf{m}^M \neq \emptyset$ then $V_C(\Sigma(\mathbf{m}^A \cup \mathbf{m}^M)) \geqslant V_C(\Sigma(\mathbf{m}^A \cup \mathbf{m}^M \backslash i))$ for every $i \in \mathbf{m}^A \cup \mathbf{m}^M$. By contradiction, suppose there exists $i \in \mathbf{m}^A \cup \mathbf{m}^M$ such that $V_C(\Sigma(\mathbf{m}^A \cup \mathbf{m}^M)) < V_C(\Sigma(\mathbf{m}^A \cup \mathbf{m}^M \backslash i))$. For any realized subset of active citizens $S \subset \mathbf{m}^M$ in the original equilibrium δ, it holds that (i) $\Sigma(\mathbf{m}^A \cup \mathbf{m}^M) \geqslant \Sigma(\mathbf{m}^A \cup S)$, (ii) $\Sigma(\mathbf{m}^A \cup \mathbf{m}^M \backslash i) \geqslant \Sigma(\mathbf{m}^A \cup S \backslash i)$, and (iii) $\Sigma(\mathbf{m}^A \cup S \backslash i) < \Sigma(\mathbf{m}^A \cup S)$. Lemma A.3(i) then implies that for any $S \subset \mathbf{m}^M$, $V_C(\Sigma(\mathbf{m}^A \cup S \backslash i)) > V_C(\Sigma(\mathbf{m}^A \cup S))$. So citizen i has a strictly profitable deviation in δ. We have thus reached a contradiction. Thus, in the strategy profile in which $\tilde{\delta}$ where $\tilde{\delta}_j = 1$ if $\delta_j \in (0, 1]$ and $\tilde{\delta}_i = 0$ if $\delta_i = 0$, none of the active citizen can profit from being passive.

However, it might be that the passive citizens in δ are active under $\tilde{\delta}$ and can distort the incentives of $\mathbf{m}^A \cup \mathbf{m}^M$. Lemma A.4 establishes that even if a subset of passive citizens in δ prefer to be active in $\tilde{\delta}$, this will not distort the incentives of the active citizens in $\tilde{\delta}$. Therefore, we have identified an equilibrium $\tilde{\delta}$ that is strictly preferred to δ, which contradicts the optimality of δ.

Lemma A.4. *Suppose citizen i prefers to be active when the set of active citizens is $\hat{\mathbf{m}}$. Then, citizen i prefers to be active for any larger set of active citizens $\hat{\mathbf{m}}'$ such that $\hat{\mathbf{m}}' \supsetneq \hat{\mathbf{m}}$.*
Proof. By the premise, $V_C(\Sigma(\hat{\mathbf{m}})) \geqslant V_C(\Sigma(\hat{\mathbf{m}}\backslash i))$. For any $\hat{\mathbf{m}}' \supsetneq \hat{\mathbf{m}}$, Assumption 1(ii) implies that $\Sigma(\hat{\mathbf{m}}') > \Sigma(\hat{\mathbf{m}})$, $\Sigma(\hat{\mathbf{m}}'\backslash i) > \Sigma(\hat{\mathbf{m}}\backslash i)$, and $\Sigma(\hat{\mathbf{m}}'\backslash i) < \Sigma(\hat{\mathbf{m}}')$. Then, Lemma A.3(ii) implies that for any $\hat{\mathbf{m}}' \supsetneq \hat{\mathbf{m}}$, $V_C(\hat{\mathbf{m}}'\backslash i) \leqslant V_C(\hat{\mathbf{m}}')$. ■

Finally, it is without loss to include only active citizens in the minipublic. Let $\mathbf{m}$ be an optimal minipublic in which a deterministic subset $\hat{\mathbf{m}} \subsetneq \mathbf{m}$ is active. Consider the alternative minipublic $\mathbf{m}' := \hat{\mathbf{m}}$. If every citizen in $\hat{\mathbf{m}}$ is active, then for each $i \in \hat{\mathbf{m}}$, $\Sigma(\mathbf{m}') = \Sigma(\mathbf{m})$ and $\Sigma(\mathbf{m}'\backslash i) = \Sigma(\mathbf{m}\backslash i)$. Hence, the (ED) constraint of $i \in \hat{\mathbf{m}}$ is the same in both minipublics and $V_P(\Sigma(\mathbf{m})) = V_P(\Sigma(\hat{\mathbf{m}})$. ■

B Proofs for Section 4

Proof of Proposition 4.1. First, observe that for $n = 1$, the optimal minipublic is either empty or it consists of one citizen, so the statement holds trivially. Next, let $n \geqslant 2$. By contradiction, suppose that the optimal minipublic consists of $n' < n$ distinct citizens, $\mathbf{m}^* = \{i_1, \ldots, i_{n'}\}$, where $i_1 < \ldots < i_{n'}$ and $n' \geqslant 1$. Consider a modified minipublic $\tilde{\mathbf{m}} := \mathbf{m}^* \cup \{\tilde{i}\}$, where $\tilde{i} \notin \mathbf{m}^*$. First, this modified minipublic $\tilde{\mathbf{m}}$ is strictly more informative than $\mathbf{m}^*$ by Assumption 1(ii). Moreover, for any $i_k \in \mathbf{m}^*$, $\Sigma(\tilde{\mathbf{m}} \setminus i_k) > \Sigma(\mathbf{m}^* \setminus i_k)$ because $\tilde{\mathbf{m}} \setminus i_k = (\mathbf{m}^* \setminus i_k) \cup \{\tilde{i}\}$. Therefore, by Lemma A.3(ii), all citizens in $\mathbf{m}^*$ continue to be active in $\tilde{\mathbf{m}}$. On the other hand, note that $\Sigma(\mathbf{m}^* \setminus i_k) < \Sigma(\tilde{\mathbf{m}} \setminus \tilde{i}) = \Sigma(\mathbf{m}^*) < \Sigma(\tilde{\mathbf{m}})$. Again invoking Lemma A.3(ii), because $i_k \in \mathbf{m}^*$ is active in $\mathbf{m}^*$, $\tilde{i}$ is also active in $\tilde{\mathbf{m}}$. Hence, all citizens are active in $\tilde{\mathbf{m}}$ and the policymaker strictly prefers $\tilde{\mathbf{m}}$ to $\mathbf{m}^*$, which contradicts the optimality of $\mathbf{m}^*$. ■

Proof of Proposition 4.2. Fix any $\mathbf{m}_n^f \in \mathcal{M}_n^f$ and let $i^f \in \arg\max_{i \in \mathbf{m}_n^f} M_i(\mathbf{m}_n^f)$. By the premise that $\mathbf{m}^* \notin \mathcal{M}_n^f \cup \{\emptyset\}$, it must be that $\underline{\Sigma} \in (\Sigma(\mathbf{m}_n^f \setminus i^f), \Sigma(\mathbf{m}_n^f))$. Because each citizen is active in the optimal minipublic, it must be that for any $i \in \mathbf{m}^*$, $\Sigma(\mathbf{m}^* \setminus i) > \Sigma(\mathbf{m}_n^f \setminus i^f)$. Moreover, by the definition of the first-best minipublic and the fact that all first-best minipublics in $\mathcal{M}_n^f$ are not feasible, $\Sigma(\mathbf{m}^*) < \Sigma(\mathbf{m}_n^f)$. Hence, for any $i \in \mathbf{m}^*$, $M_i(\mathbf{m}^*) < \max\limits_{i \in \mathbf{m}_n^f} M_i(\mathbf{m}_n^f)$. Because this is true for all $\mathbf{m}_n^f \in \mathcal{M}_n^f$, the result follows. ■

Lemma B.1 (Minipublic informativeness for the Ornstein-Uhlenbeck correlation)**.** *Let $\hat{\mathbf{m}} = \{i_1, \ldots, i_k\}$, where $1 \leqslant k \leqslant n$ and $0 \leqslant i_1 < \ldots < i_k \leqslant 1$, and let $d_j := i_{j+1} - i_j$ where $i_0 = 0$ and $i_{n+1} = 1$. The minipublic informativeness is given by*

(i) for $k = 0$, $\Sigma_{ou}(\emptyset) = 0$;

(ii) for $k = 1$, $\Sigma_{ou}(\{i_1\}) := \ell^2 \left(2 - e^{-i_1/\ell} - e^{-(1-i_1)/\ell}\right)^2$;

(iii) for $k \geqslant 2$,

$$\Sigma_{ou}(\hat{\mathbf{m}}) = \sum_{j=1}^{k} \gamma_j(\hat{\mathbf{m}}) \sqrt{\Sigma_{ou}(\{i_j\})}, \tag{8}$$

where $\Sigma_{ou}(\{i_j\})$ is the informativeness of the singleton minipublic $\{i_j\}$, and the weights $\gamma_j(\hat{\mathbf{m}})$ are given by

$$\gamma_j(\hat{\mathbf{m}}) = \begin{cases} \ell\left(1 - e^{-i_1/\ell} + \tanh\left(\frac{i_2 - i_1}{2\ell}\right)\right) & \textit{if } j = 1; \\ \ell\left(\tanh\left(\frac{i_j - i_{j-1}}{2\ell}\right) + \tanh\left(\frac{i_{j+1} - i_j}{2\ell}\right)\right) & \textit{if } j \in \{2, \dots, k-1\}; \\ \ell\left(1 - e^{-(1-i_k)/\ell} + \tanh\left(\frac{i_k - i_{k-1}}{2\ell}\right)\right) & \textit{if } j = k. \end{cases} \tag{9}$$

Proof of Lemma B.1. From Lemma 3.4 in Bardhi (2022), the post-minipublic value $B_{\hat{\mathbf{m}}}$ is

$$B_{\hat{\mathbf{m}}} = \bar{B} + \sum_{j=1}^{k} \gamma_j(\hat{\mathbf{m}}) \left(\beta(i_j) - \bar{B}\right),$$

with weights $\gamma_j(\hat{\mathbf{m}})$ as in (9). Because the pairwise covariance of $\beta(i_j)$ and $\beta(i_h)$ is $e^{-|i_j - i_h|/\ell}$, the variance of the linear combination $B_{\hat{\mathbf{m}}}$ is

$$\Sigma(\hat{\mathbf{m}}) = \sum_{j=1}^{k}\sum_{h=1}^{k} \gamma_j(\hat{\mathbf{m}})\gamma_h(\hat{\mathbf{m}}) e^{-|i_j - i_h|/\ell}.$$

The informativeness induced by the active minipublic $\hat{\mathbf{m}}$ can be rewritten as

$$\Sigma(\hat{\mathbf{m}}) = \sum_{j=1}^{k} \gamma_j(\hat{\mathbf{m}}) \left(\gamma_j(\hat{\mathbf{m}}) + \sum_{h \neq j} \gamma_h(\hat{\mathbf{m}}) e^{-|i_h - i_j|/\ell}\right).$$

We distinguish two cases, based on whether $j \in \{1, k\}$ or $j \in \{2, \dots, k-1\}$. First, let $j = 1$.

$$\begin{aligned} \left(\gamma_1(\hat{\mathbf{m}}) + \sum_{h \geqslant 2} \gamma_h(\hat{\mathbf{m}}) e^{-|i_h - i_1|/\ell}\right) &= \ell\left(1 - e^{-i_1/\ell} + \tanh\left(\frac{i_2 - i_1}{2\ell}\right)\right) \\ &\quad + \sum_{h=2}^{k-1} e^{-(i_h - i_1)/\ell} \ell\left(\tanh\left(\frac{i_h - i_{h-1}}{2\ell}\right) + \tanh\left(\frac{i_{h+1} - i_h}{2\ell}\right)\right) \\ &\quad + e^{-(i_k - i_1)/\ell} \ell\left(1 - e^{-(1-i_k)/\ell} + \tanh\left(\frac{i_k - i_{k-1}}{2\ell}\right)\right) \\ &= \ell\left(1 - e^{-i_1/\ell} - e^{-(1-i_1)/\ell}\right) + e^{-(i_k - i_1)/\ell}\ell \\ &\quad + \sum_{h=2}^{k} \ell\left(e^{-(i_{h-1} - i_1)/\ell} + e^{-(i_h - i_1)/\ell}\right) \tanh\left(\frac{i_h - i_{h-1}}{2\ell}\right) \\ &= \ell\left(1 - e^{-i_1/\ell} - e^{-(1-i_1)/\ell}\right) + e^{-(i_k - i_1)/\ell}\ell \\ &\quad + \sum_{h=2}^{k} \ell\left(e^{-(i_{h-1} - i_1)/\ell} - e^{-(i_h - i_1)/\ell}\right) \\ &= \ell\left(2 - e^{-i_1/\ell} - e^{-(1-i_1)/\ell}\right), \end{aligned}$$

where the second equality rearranges the last additive term $\gamma_k(\hat{\mathbf{m}})e^{-|i_k - i_1|/\ell}$ and the third equality uses the observation that for any $h \geqslant 2$,

$$\left(e^{-(i_{h-1}-i_1)/\ell} + e^{-(i_h-i_1)/\ell}\right)\tanh\left(\frac{i_h - i_{h-1}}{2\ell}\right) = \left(e^{-(i_{h-1}-i_1)/\ell} - e^{-(i_h-i_1)/\ell}\right).$$

The last equality follows from cancelling opposite-sign terms. For any singleton minipublic $\{i_1\}$, the informativeness is

$$\Sigma_{ou}(\{i_1\}) = \ell^2\left(2 - e^{-i_1/\ell} - e^{-(1-i_1)/\ell}\right)^2.$$

This gives us the result. The case of $j = k$ is similar and hence omitted. Next, suppose $j \in \{2, \ldots, k-1\}$. Rearranging terms in a similar way to the case of $j = 1$, we obtain

$$\begin{aligned}
&\left(\gamma_j(\hat{\mathbf{m}}) + \sum_{h\neq j}\gamma_h(\hat{\mathbf{m}})e^{-|i_h-i_j|/\ell}\right)\\
&= \ell(1-e^{-i_1/\ell})e^{-(i_j-i_1)/\ell} + \ell\left(1-e^{-(1-i_k)/\ell}\right)e^{-(i_k-i_j)/\ell} + \sum_{h=2}^{k}\ell\left(e^{-|i_h-i_j|/\ell} + e^{-|i_{h-1}-i_j|/\ell}\right)\tanh\left(\frac{i_h-i_{h-1}}{2\ell}\right)\\
&= \ell\left(e^{-(i_j-i_1)/\ell} + e^{-(i_k-i_j)/\ell} - e^{-i_j/\ell} - e^{-(1-i_j)/\ell}\right) +\\
&\qquad + \sum_{h=2}^{j}\ell\left(e^{-(i_j-i_h)/\ell} - e^{-(i_j-i_{h-1})/\ell}\right) + \sum_{h=j}^{k-1}\ell\left(e^{-(i_h-i_j)/\ell} - e^{-(i_{h+1}-i_j)/\ell}\right)\\
&= \ell\left(2 - e^{-i_j/\ell} - e^{-(1-i_j)/\ell}\right).
\end{aligned}$$

■

Proof of Lemma 4.1. Let $d_j := i_{j+1} - i_j$ where $i_0 = 0$ and $i_{n+1} = 1$. First, we establish the monotonicity for inner citizens. Let $d_{j-1} > 0, d_j > 0$. For any $j \in \{2, \ldots, n-1\}$, the marginal informativeness depends only on d_{j-1} and d_j, and it simplifies to

$$M_j(\mathbf{m}) = 4\ell^2\tanh\left(\frac{d_{j-1}}{2\ell}\right)\tanh\left(\frac{d_j}{2\ell}\right)\tanh\left(\frac{d_{j-1}+d_j}{2\ell}\right).$$

Differentiating with respect to $d_k \in \{d_{j-1}, d_j\}$, we obtain

$$\frac{\partial M_j(\mathbf{m})}{\partial d_k} = -2\ell\left(\operatorname{sech}^2\left(\frac{d_{j-1}+d_j}{2\ell}\right) - \operatorname{sech}^2\left(\frac{d_k}{2\ell}\right)\right) > 0$$

which is strictly positive because $\operatorname{sech}(x)$ strictly decreases in $x \in \mathbb{R}_+$ and $d_{j-1} + d_j > d_k$.

Second, consider the peripheral citizen i_1 with $d_0 > 0$ and $d_1 > 0$. The argument for i_n is symmetric. The marginal informativeness of i_1 simplifies to

$$M_1(\mathbf{m}) = \frac{\ell^2 e^{-\frac{2(d_0+d_1)}{\ell}}\left(e^{\frac{d_1}{\ell}} - 1\right)\left(1 + e^{\frac{d_1}{\ell}} - 2e^{\frac{d_0+d_1}{\ell}}\right)^2}{1 + e^{\frac{d_1}{\ell}}}.$$

Differentiating with respect to d_0, we obtain

$$\frac{\partial M_1(\mathbf{m})}{\partial d_0} = 2\ell e^{-\frac{2(d_0+d_1)}{\ell}}\left(e^{\frac{d_1}{\ell}} - 1\right)\left(e^{\frac{d_1}{\ell}}\left(2e^{\frac{d_0}{\ell}} - 1\right) - 1\right) > 0.$$

Hence, M_1 strictly increases in distance from citizen $i = 0$. On the other hand,

$$\frac{\partial M_1(\mathbf{m})}{\partial d_1} = 2\ell e^{-\frac{2d_1}{\ell}} \left(e^{-\frac{2d_0}{\ell}} - 2e^{\frac{d_1 - d_0}{\ell}} + \frac{4e^{3d_1/\ell}}{(1 + e^{d_1/\ell})^2} \right).$$

When evaluated at $d_0 = 0$, the RHS simplifies to

$$2\ell \left(e^{-\frac{2d_1}{\ell}} + \frac{4(\sinh(\frac{d_1}{\ell}) - 1)}{(1 + e^{d_1/\ell})^2} \right) > 0$$

because $\sinh(x) > 1$ for $x > 0$. Moreover,

$$\frac{\partial}{\partial d_0} \left(\frac{\partial M_1(\mathbf{m})}{\partial d_1} \right) = 4e^{-2(d_0+d_1)/\ell} \left(e^{(d_0+d_1)/\ell} - 1 \right) > 0$$

hence $\frac{\partial M_1(\mathbf{m})}{\partial d_1}$ is strictly positive at any $d_0 > 0$ as well. Therefore, M_1 strictly increases in distance of i_1 from i_2 as well. ■

Remark 1 (**Outline of argument for Corollary 4.1**). We outline here the main steps of the proof for Corollary 4.1, which is implied by the characterization (i)-(iii) in Proposition 3.5 of Bardhi (2022).

Minipublic informativeness Σ_{ou} as derived in Lemma B.1 is differentiable in any minipublic citizen. By the first-order condition with respect to any inner citizen i_j^f for $j = 2, \ldots, n-1$, it must be that $i_j^f - i_{j-1}^f = i_{j+1}^f - i_j^f$, which by a recursive argument implies that the distance between any two adjacent citizens in $\mathbf{m}_n^f$ is constant. This establishes part (ii) of Corollary 4.1.

Moreover, by the first-order conditions with respect to the leftmost citizen and rightmost citizen, we obtain that for any $i_2, \ldots, i_{n-1}$, informativeness is maximized at some $i_1 > 0$ and $i_n < 1$ such that $i_1 = 1 - i_n$. Therefore, $\mathbf{m}_n^f$ is symmetric, which establishes part (i) of Corollary 4.1.

This reduces the problem of maximizing Σ_{ou} with respect to n citizens to one of maximizing Σ_{ou} with respect to the leftmost citizen i_1^f. Combining first-order conditions, part (ii) of Proposition 3.5 of Bardhi (2022) derives the condition that pins down the leftmost citizen:

$$1 - e^{-i_1^f/\ell} = \tanh \left(\frac{1 - 2i_1^f}{2\ell(n-1)} \right).$$

Substituting this into the expressions in (9) of Lemma B.1 above, it is immediate that $\gamma_1(\mathbf{m}_n^f) = \gamma_2(\mathbf{m}_n^f) = \ldots = \gamma_n(\mathbf{m}_n^f)$.

Proof of Lemma 4.2. We first show that for any $j, k \in \{2, \ldots, n-1\}$, the passive informativeness of i_j^f is equal to that of i_k^f. From Corollary 4.1, distance $\Delta := i_{j+1}^f - i_j^f$ is the same for all $j \in \{1, \ldots, n-1\}$. The claim holds vacuously for $n \leqslant 3$. Let $n > 3$. Pick any four consecutive citizens $\{i_j^f, i_j^f + \Delta, i_j^f + 2\Delta, i_j^f + 3\Delta\}$, where $j \geqslant 1$. We compare the informativeness of the minipublic $\mathbf{m}_n^f \setminus (i_j^f + \Delta)$ with that of $\mathbf{m}_n^f \setminus (i_j^f + 2\Delta)$. Note that removing $i_j^f + \Delta$ or $i_j^f + 2\Delta$ from $\mathbf{m}_n^f$ does not affect γ_k for citizens outside this set of four consecutive citizens $k \notin \{j, j+1, j+2, j+3\}$. Therefore, using the characterization in Lemma B.1,

$$\begin{aligned}
&\Sigma(\mathbf{m}_n^f \setminus (i_j^f + \Delta)) - \Sigma(\mathbf{m}_n^f \setminus (i_j^f + 2\Delta)) = \\
&= \ell \left(\tanh\left(\frac{2\Delta}{2\ell}\right) - \tanh\left(\frac{\Delta}{2\ell}\right) \right) \left(\sqrt{\Sigma(i_j^f)} - \sqrt{\Sigma(i_j^f + 3\Delta)} \right)
\end{aligned}$$

$$
\begin{aligned}
&+\ell\left(\tanh\left(\frac{2\Delta}{2\ell}\right)+\tanh\left(\frac{\Delta}{2\ell}\right)\right)\left(\sqrt{\Sigma(i_j^f+2\Delta)}-\sqrt{\Sigma(i_j^f+\Delta)}\right)\\
=&\ \ell^2 e^{-(1+3\Delta+i_j^f)/\ell}\left(e^{3\Delta/\ell}-1\right)\left(e^{(3\Delta+2i_j^f)/\ell}-e^{1/\ell}\right)\operatorname{sech}\left(\frac{\Delta}{\ell}\right)\tanh\left(\frac{\Delta}{2\ell}\right)\\
&-\ell^2 e^{-(1+2\Delta+i_j^f)/\ell}\left(e^{\Delta/\ell}-1\right)\left(e^{(3\Delta+2i_j^f)/\ell}-e^{1/\ell}\right)\left(\tanh\left(\frac{\Delta}{2\ell}\right)+\tanh\left(\frac{2\Delta}{2\ell}\right)\right)\\
=&\ 0,
\end{aligned}
$$

where the second equality uses $\sqrt{\Sigma(i)} = \ell\left(2-e^{-i/\ell}-e^{-(1-i)/\ell}\right)$ and the last equality follows from the trigonometric identities $\operatorname{sech}(x) = 2/(e^x+e^{-x})$ and $\tanh(x) = (e^x-e^{-x})/(e^x+e^{-x})$. We proved that the passive informativeness of any two adjacent citizens k and $k+1$ such that $1<k<n-1$ is the same. Therefore, any two non-adjacent citizens $j,k \in \{2,\ldots,n-1\}$ have the same passive informativeness as well.

The fact that $\Sigma(\mathbf{m}_n^f \setminus i_1^f) = \Sigma(\mathbf{m}_n^f \setminus i_n^f)$ follows from the symmetry of $\mathbf{m}_n^f$ about $1/2$. To rank the passive informativeness of a peripheral citizen and that of an inner citizen, without loss we consider the difference $\Sigma(\mathbf{m}_n^f \setminus (i_1^f+\Delta)) - \Sigma(\mathbf{m}_n^f \setminus i_1^f)$. For this difference, we need to only consider the subset of citizens $\{i_1^f, i_1^f+\Delta, i_1^f+2\Delta\}$. That is,

$$
\begin{aligned}
&\Sigma(\mathbf{m}_n^f \setminus (i_1^f+\Delta)) - \Sigma(\mathbf{m}_n^f \setminus i_1^f)\\
&\quad=\ell\left(1-e^{-i_1^f/\ell}+\tanh\left(\frac{2\Delta}{2\ell}\right)\right)\sqrt{\Sigma(i_1^f)}+\ell\left(\tanh\left(\frac{\Delta}{2\ell}\right)+\tanh\left(\frac{2\Delta}{2\ell}\right)\right)\sqrt{\Sigma(i_1^f+2\Delta)}\\
&\quad\quad-\ell\left(1-e^{-(i_1^f+\Delta)/\ell}+\tanh\left(\frac{\Delta}{2\ell}\right)\right)\sqrt{\Sigma(i_1^f+\Delta)}-\ell\left(\tanh\left(\frac{\Delta}{2\ell}\right)+\tanh\left(\frac{\Delta}{2\ell}\right)\right)\sqrt{\Sigma(i_1^f+2\Delta)}
\end{aligned}
$$

From Corollary 4.1, the first-best i_1^f and Δ are given by

$$
1-e^{-i_1^f/\ell}=\tanh\left(\frac{1-2i_1^f}{2\ell(n-1)}\right), \qquad \Delta=\frac{1-2i_1^f}{n-1}.
$$

Therefore,

$$
e^{-i_1^f/\ell}=1-\tanh\left(\frac{\Delta}{2\ell}\right).
$$

This allows us to simplify the expression for $\Sigma(\mathbf{m}_n^f \setminus (i_1^f+\Delta)) - \Sigma(\mathbf{m}_n^f \setminus i_1^f)$. First, the coefficient in front of $\sqrt{\Sigma(i_1^f+\Delta)}$ becomes

$$
\ell\left(1-e^{-(i_1^f+\Delta)/\ell}+\tanh\left(\frac{\Delta}{2\ell}\right)\right)=2\ell(1-e^{-\Delta/\ell}).
$$

Second, the coefficient in front of $\sqrt{\Sigma(i_1^f)}$ becomes

$$
\ell\left(1-e^{-i_1^f/\ell}+\tanh\left(\frac{2\Delta}{2\ell}\right)\right)=\ell\left(\tanh\left(\frac{\Delta}{2\ell}\right)+\tanh\left(\frac{2\Delta}{2\ell}\right)\right).
$$

Therefore,

$$
\begin{aligned}
\Sigma(\mathbf{m}_n^f \setminus (i_1^f+\Delta)) - \Sigma(\mathbf{m}_n^f \setminus i_1^f) &= \ell\left(\tanh\left(\frac{\Delta}{2\ell}\right)+\tanh\left(\frac{2\Delta}{2\ell}\right)\right)\left(\sqrt{\Sigma(i_1^f)}+\sqrt{\Sigma(i_1^f+2\Delta)}\right)\\
&\quad -2\ell(1-e^{-\Delta/\ell})\sqrt{\Sigma(i_1^f+\Delta)}-2\ell\tanh\left(\frac{\Delta}{2\ell}\right)\sqrt{\Sigma(i_1^f+2\Delta)}
\end{aligned}
$$

$$= \frac{2\ell^2 e^{-(2\Delta+i_1^f)/\ell}(e^{\Delta/\ell}-1)^2(1+e^{2\Delta/\ell}-2e^{(\Delta+i_1^f)/\ell})}{1+e^{2\Delta/\ell}}.$$

This difference is strictly positive because $1+e^{2\Delta/\ell}-2e^{(\Delta+i_1^f)/\ell} = 1+e^{2\Delta/\ell}-\frac{2e^{\Delta/\ell}}{1-\tanh\left(\frac{\Delta}{2\ell}\right)} > 0$. This implies that $\Sigma(\mathbf{m}_n^f \setminus i_j^f) > \Sigma(\mathbf{m}_n^f \setminus i_1^f)$ for any $j = 2, \ldots, n-1$. ■

Proof of Lemma 4.3. By contradiction, suppose that $i_2^* \geqslant i_2^f$ and all citizens $i_3(i_2^*), \ldots, i_n(i_2^*)$ are placed so as to maximize the informativeness of the minipublic $\{i_2^*, i_3(i_2^*), \ldots, i_n(i_2^*)\}$ (if $i_2^* = i_2^f$, then $i_j(i_2^f) = i_j^f$ for any $j \geqslant 3$). If the capacity were $(n-1)$ instead of n, the leftmost citizen in $\mathbf{m}_{n-1}^f$ would be to the left of i_2^f in $\mathbf{m}_n^f$, hence the informativeness of $\{i_2^*, i_3(i_2^*), \ldots, i_n(i_2^*)\}$ strictly decreases in $i_2^* \in [i_2^f, 1)$. Therefore, the passive informativeness of i_1^* in $\mathbf{m}^*$ is weakly lower than the passive informativeness of i_1^f in $\mathbf{m}_n^f$. But $\Sigma(\mathbf{m}^*) < \Sigma(\mathbf{m}_n^f)$ as well. Therefore, if i_1^f is passive in $\mathbf{m}_n^f$, then i_1^* must be passive in $\mathbf{m}^*$, which contradicts the optimality of $\mathbf{m}^*$. This means that $i_2^* < i_2^f$. By a similar argument, $i_{n-1}^* > i_{n-1}^f$ as well. ■

Proof of Proposition 4.3. We first prove four auxiliary lemmata that are repeatedly invoked in this proof.

Lemma B.2. *Fix an arbitrary minipublic $\mathbf{m} = \{i_1, \ldots, i_n\}$ with adjacent citizens $i_j < i_{j+1}$. The informativeness $\Sigma(\mathbf{m} \cup \{i\})$ of the extended minipublic $\mathbf{m} \cup \{i\}$ is single-peaked in $i \in (i_j, i_{j+1})$, with the peak attained at $i^* = (i_j + i_{j+1})/2$.*

Proof of Lemma B.2. From the proof of Lemma 4.1, the marginal informativeness of citizen i in $\mathbf{m} \cup \{i\}$ is

$$M_i(\mathbf{m} \cup \{i\}) = 4\ell^2 \tanh\left(\frac{i - i_j}{2\ell}\right) \tanh\left(\frac{i_{j+1} - i}{2\ell}\right) \tanh\left(\frac{i_{j+1} - i_j}{2\ell}\right),$$

which is strictly increasing for $i \in (i_j, i^*)$ and strictly decreasing for $i \in (i^*, i_{j+1})$. On the other hand, the active informativeness of $\mathbf{m} \cup \{i\}$ is $\Sigma(\mathbf{m} \cup \{i\}) = \Sigma(\mathbf{m}) + M_{j+1}(\mathbf{m} \cup \{i\})$ and $\Sigma(\mathbf{m})$ does not depend on i, hence $\Sigma(\mathbf{m} \cup \{i\})$ is single-peaked in $i \in (i_j, i_{j+1})$ as well, with a peak at i^*. ■

Lemma B.3. *Fix an optimal minipublic $\mathbf{m}$ with $i_{k-1}, i_k, i_{k+1} \in \mathbf{m}$ such that $i_{k-1} < i_k < i_{k+1}$. If $i_k - i_{k-1} < i_{k+1} - i_k$ ($i_k - i_{k-1} > i_{k+1} - i_k$), then the ED constraint of i_{k-1} (of i_{k+1}) binds.*

Proof of Lemma B.3. Towards a contradiction, suppose $i_k - i_{k-1} < i_{k+1} - i_k$ and the (ED) constraint of i_{k-1} is slack. By Lemma B.2, shifting i_k to the right to $i_k + \epsilon$ for a sufficiently small $\epsilon > 0$ strictly increases the active informativeness of $\mathbf{m}$ while satisfying the (ED) constraint of i_{k-1}. By the same Lemma, it also strictly increases the passive informativeness of i_{k+1} since $i_k + \epsilon$ is closer to $(i_{k-1} + i_{k+2})/2$, hence if i_{k+1} is active in $\mathbf{m}$, he continues to be active after the shift as well. The (ED) constraints of all other citizens in $\mathbf{m} \setminus \{i_{k-1}, i_{k+1}\}$ are the same as before the shift. We have thus identified a strict improvement which contradicts the optimality of $\mathbf{m}$. So if $i_k - i_{k-1} < i_{k+1} - i_k$ then the (ED) constraint of i_{k-1} must bind. That $i_k - i_{k-1} > i_{k+1} - i_k$ implies that the (ED) constraint of i_{k+1} is binding follows by a similar argument. ■

For the next results, let $i^-(j) \coloneqq \arg\max_{i \leqslant j} \Sigma(\{j, i\})$ and $i^+(j) \coloneqq \arg\max_{i \geqslant j} \Sigma(\{j, i\})$.

Lemma B.4. *In any optimal minipublic, $i_1 \geqslant i^-(i_2)$ (with equality if the (ED) constraint of i_2 is slack), and $i_n \leqslant i^+(i_{n-1})$ (with equality if the ED constraint of i_{n-1} is slack).*

Proof for Lemma B.4. Fix an optimal minipublic $\mathbf{m}$. It is sufficient to show that $i_1 \geqslant i^-(i_2)$, as the argument for $i_n \leqslant i^+(i_{n-1})$ is symmetric. Suppose, by contradiction, that $i_1 < i^-(i_2)$. Shifting i_1 to $i_1 + \epsilon$, for $\epsilon > 0$ sufficiently small, strictly increases both the active informativeness $\Sigma(\mathbf{m})$ and the passive informativeness $\Sigma(\mathbf{m} \setminus \{i_2\})$ of citizen i_2. If i_1 and i_2 are active in $\mathbf{m}$, then $i_1 + \epsilon$ and i_2 are active in this modified minipublic too. This contradicts the optimality of $\mathbf{m}$. Moreover, if the (ED) of i_2 is slack in $\mathbf{m}$ but $i_1 < i^-(i_2)$, this improvement is available to the policymaker—hence, it must be that $i_1 = i^-(i_2)$. ■

Lemma B.5. *For any $j \in [0,1]$, (i) $i^-(j)$ and $j - i^-(j)$ are increasing in j, and (ii) $i^+(j)$ increases in j and $i^+(j) - j$ decreases in j.*

Proof of Lemma B.5. By the characterization of the first-best minipublic in Corollary 4.1, we know that $i^-(j)$ is pinned down by the equation $1 - e^{-i/\ell} = \tanh\left(\frac{j-i}{2\ell}\right)$. The RHS is increasing in j and decreasing in i, whereas the LHS is increasing in i. Therefore, $i^-(j)$ must be increasing in j. Moreover, substituting $d(j) := j - i \Rightarrow i = j - d(j)$ into the equation and implicitly differentiating with respect to j, we obtain

$$d'(j) = \frac{1}{1 + \frac{2e^{j/\ell}}{(1+e^{d(j)/\ell})^2}} > 0.$$

By a symmetric argument, $i^+(j)$ increases in j and $i^+(j) - j$ decreases in j. ■

Now we turn to the proof of the proposition statement.

(i) By Lemma 4.3, $i^*_{n-1} - i^*_2 > i^f_{n-1} - i^f_2$. Next, we rule out all but two patterns for inner citizens.

<u>Δ-equidistant pattern:</u> Suppose $i^*_{k+1} - i^*_k = i^*_{k+2} - i^*_{k+1} =: \Delta$ for some $k \in \{2, \dots, n-3\}$. We show that $i^*_{k+1} - i^*_k = \Delta$ for all k. Suppose first that $i^*_k - i^*_{k-1} > \Delta$. From Lemma B.3, it must be that the (ED) of i^*_{k+1} binds. But by Lemma 4.1, $M_k(\mathbf{m}^*) > M_{k+1}(\mathbf{m}^*)$, hence the (ED) of i^*_k is violated. We have reached a contradiction, hence $i^*_k - i^*_{k-1} \leqslant \Delta$. By a similar argument, we conclude that $i^*_{k+3} - i^*_{k+2} \leqslant \Delta$ as well. Next, suppose that $k > 2$ and $i^*_k - i^*_{k-1} < \Delta$. Lemma B.3 implies that the (ED) constraint of i^*_{k-1} must bind. In order for the (ED) of i^*_k not to be violated, it must be that $M_k(\mathbf{m}^*) \leqslant M_{k-1}(\mathbf{m}^*)$ which, by Lemma 4.1, implies that $i^*_{k-1} - i^*_{k-2} \geqslant \Delta$. By Lemma B.3, this means that the (ED) for i^*_k binds, which in turn implies that the (ED) of i^*_{k+1} must be violated because $M_{k+1}(\mathbf{m}^*) > M_k(\mathbf{m}^*)$. We have thus reached a contradiction, so it must be that for $k > 2$, $i^*_k - i^*_{k-1} = \Delta$. A similar argument establishes that for $k < n-3$, $i^*_{k+3} - i^*_{k+2} = \Delta$ as well. Finally, by Lemma 4.3, it is immediate that $\Delta > \Delta^f_n$.

<u>(δ, Δ)-alternating pattern:</u> Let $i^*_{k+1} - i^*_k =: \delta < \Delta := i^*_{k+2} - i^*_{k+1}$ for some $k \in \{2, \dots, n-3\}$. We show that the distances between adjacent inner citizens consecutively alternate between δ and Δ. By Lemma B.3, the (ED) of i^*_k must be binding. Consider first $i^*_k - i^*_{k-1}$. For the (ED) of i^*_{k+1} to be satisfied, it must be that $M_{k+1}(\mathbf{m}) \leqslant M_k(\mathbf{m})$. By Lemma 4.1, this implies that $i^*_k - i^*_{k-1} \geqslant \Delta$. Lemma B.3 again implies that the (ED) constraint of i^*_{k+1} must bind, which means that $M_{k+1}(\mathbf{m}) = M_k(\mathbf{m})$ and hence $i^*_k - i^*_{k-1} = i^*_{k+2} - i^*_{k+1} = \Delta$. In particular, this argument also implies that if $i^*_3 - i^*_2 = \delta$, then $i^*_2 - i^*_1 = \Delta$. Next, consider $i^*_{k+3} - i^*_{k+2}$. Because the (ED) constraint of i^*_{k+1} binds by the previous argument, it must be that $M_{k+2}(\mathbf{m}^*) \leqslant M_{k+1}(\mathbf{m}^*)$, which in turn implies that $i^*_{k+3} - i^*_{k+2} \leqslant \delta$ and the (ED) constraint of i^*_{k+3} binds. In particular, this means that $i^*_n - i^*_{n-1} \leqslant \delta$ if $i^*_{n-1} - i^*_{n-2} = \Delta$. If $k < n-3$, on the other hand, then by the first case we considered it must be that $i^*_{k+4} - i^*_{k+3} = \Delta$ and the (ED) constraint of i^*_{k+2} binds. Therefore $M_{k+2}(\mathbf{m}^*) = M_{k+1}(\mathbf{m}^*)$, which, because $i^*_{k+2} - i^*_{k+1} = i_{k+4} - i_{k+3} = \Delta$, implies that $i^*_{k+3} - i^*_{k+2} = \delta$. Finally, we show that in any optimal minipublic of (δ, Δ)-pattern, $i^*_3 - i^*_2 = i^*_{n-1} - i^*_{n-2} = \Delta$. By contradiction, let $i^*_3 - i^*_2 = \delta < \Delta$. Then, by the same argument as above, $i^*_2 - i^*_1 = \Delta$. However, because $\Delta > \Delta^f_n$ by Lemma 4.3, this implies $i^*_1 < i^-(i^*_2)$, which contradicts Lemma B.4. By the same argument, $i^*_{n-1} - i^*_{n-2} = \Delta$.

(ii) By Lemma 4.3, $i^*_2 < i^f_2$. Combining this with Lemma B.4 and Lemma B.5 yields $i^*_2 - i^*_1 \leqslant i^*_2 - i^-(i^*_2) < i^f_2 - i^f_1$. Furthermore, $i^*_2 - i^*_1 < \Delta^f_n < \Delta = i^*_3 - i^*_2$, where the second inequality and the last equality follow by part (i). Then, $i_2^* - i_1^* < i_3^* - i_2^*$, and so the (ED) constraint of i_1^* binds by lemma B.3. By the same arguments, $i_n^* - i_{n-1}^* < i_n^f - i_{n-1}^f$, and the (ED) constraint of i_n^* binds.

Next, we prove that $i_1^* = \min\{i_2^* - \delta, i^-(i_2^*)\}$. If $i_1^* \neq i^-(i_2^*)$, then the (ED) constraint of i_2^* binds by Lemma B.4. In an optimal Δ-equidistant minipublic, $M_2(\mathbf{m}^*) < M_3(\mathbf{m}^*)$, so the (ED) constraint of i_2^* is slack, therefore $i_1^* = i^-(i_2^*)$. In the (δ, Δ)-equidistant minipublic, $i_2^* - i_1^* \leqslant \delta$ as established in part (i). Moreover, because the (ED) constraint of i_3^* binds by the argument in part (i), the (ED) constraint of i_2^* binds if and only if $i_2^* - i_1^* = \delta$, in which case $M_2(\mathbf{m}^*) = M_3(\mathbf{m}^*)$. If $i_2^* - i^-(i_2^*) < \delta$, then by Lemma B.4, $i_1^* \geqslant i^-(i_2^*)$. Thus, the (ED) constraint of i_2^* is slack which in turn implies that $i_1^* = i^-(i_2^*)$. If $i_2^* - i^-(i_2^*) > \delta$, then $i_1^* > i^-(i_2^*)$. In this case, because $i_2^* - i_1^* \leqslant \delta$ and by the argument above, the (ED) constraints of i_2 ought to bind which requires $i_2^* - i_1^* = \delta$. By the same argument, $i_n^* = \min\{i_{n-1}^* + \delta, i^+(i_{n-1}^*)\}$.

(iii) To establish symmetry, we distinguish between three cases, depending on whether the (ED) constraints of i_2^* and i_{n-1}^* bind or are slack. First, let the (ED) constraints of both i_2^* and i_{n-1}^* bind. This is only possible if $\mathbf{m}^*$ is of the (δ, Δ)-alternating pattern and $i_2^* - i_1^* = i_n^* - i_{n-1}^* = \delta$. Without loss, let $i_1^* < 1 - i_n^*$. But then, $M_1(\mathbf{m}^*) < M_n(\mathbf{m}^*)$, contradicting the fact that the (ED) constraints of i_1 and i_n always bind by part (ii). Hence, $i_1^* = 1 - i_n^*$: the minipublic is symmetric.

Next, let the (ED) constraints of i_2^* and i_{n-1}^* be slack. By the same argument as that in part (ii), this implies that $i_1^* = i^-(i_2^*)$ and $i_n^* = i^+(i_{n-1}^*)$. Let $i_2^* < 1 - i_{n-1}^*$. By Lemma B.5, this implies that $i_1^* < 1 - i_n^*$ and $i_2^* - i_1^* < i_n^* - i_{n-1}^*$. Hence, $M_1(\mathbf{m}^*) < M_n(\mathbf{m}^*)$, contradicting that i_1^* and i_n^* both have binding (ED) constraints. By the same argument, $i_2^* > 1 - i_{n-1}^*$ is not possible in an optimal minipublic. Hence, if the (ED) constraints of both i_2^* and i_{n-1}^* are slack in $\mathbf{m}^*$, then $\mathbf{m}^*$ is symmetric.

Finally, let the (ED) constraint of i_2^* bind, and that of i_{n-1}^* be slack (the reverse case is without loss.) By the arguments in part (ii), $i_2^* - i_1^* = \delta$ and $i_n^* = i^+(i_{n-1}^*)$. This implies that $i^+(i_{n-1}^*) - i_{n-1}^* \leqslant \delta \leqslant i_2^* - i^-(i_2^*)$, and by Lemma B.5, $i_2^* \geqslant 1 - i_{n-1}^*$. We conclude that $i_2^* > 1 - i_{n-1}^*$, for otherwise both (ED) constraints are either binding or slack. Note that $M_1(\mathbf{m}^*) > M_n(\mathbf{m}^*)$: the distances from i_1^* to i_2^* and to 0 are higher than the distances of i_n^* to i_{n-1}^* and 1. But this contradicts that the (ED) constraint of i_1^* and i_n^* both bind. Hence, it cannot be that the (ED) of i_2^* binds while that of i_{n-1}^* is slack in $\mathbf{m}^*$. ■

Proposition B.1.

1. *Let $n \in \{1, 3\}$. The optimal minipublic cannot be distorted in composition, i.e., $m^* \in \{\emptyset, \mathbf{m}_n^f\}$.*
2. *Let $n = 2$ and $m^* \notin \{\emptyset, \mathbf{m}_n^f\}$. Then, the optimal minipublic is symmetric, $m^* = \{i^*, 1 - i^*\}$, and $i_1^f < i^* < \frac{1}{2}$.*
3. *Let $n = 4$ and $m^* \notin \{\emptyset, \mathbf{m}_n^f\}$. Then, the optimal minipublic is symmetric, $m^* = \{i_1^*, i_2^*, 1 - i_2^*, 1 - i_1^*\}$, and $i_2^* < i_2^f$ and $i_2^* - i_1^* < i_2^f - i_1^f$.*

Proof of Proposition B.1. 1. The argument is in the main text.

2. For $n = 2$, by Lemma 4.3, $i_2^* < i_2^f$ and $i_1^* > i_1^f$. Without loss, let $i_1^* < 1 - i_2^*$, and hence, $\Sigma(\mathbf{m}^* \backslash i_2^*) < \Sigma(\mathbf{m}^* \backslash i_1^*)$. Let $\tilde{\mathbf{m}} = \{i_1^* + \epsilon, i_2^* + \epsilon\}$ for $\epsilon > 0$ sufficiently small such that $i_1^* + \epsilon < 1 - i_2^* - \epsilon$. Then, $\Sigma(\tilde{\mathbf{m}}) > \Sigma(\mathbf{m}^*)$ and $\Sigma(\tilde{\mathbf{m}} \backslash \tilde{i}) > \Sigma(\mathbf{m}^* \backslash i_2^*)$ for all $\tilde{i} \in \tilde{\mathbf{m}}$. Because citizen i_2^* is active in $\mathbf{m}^*$, by quasiconvexity of V_C, both citizens are active in $\tilde{\mathbf{m}}$. But then, because $\tilde{\mathbf{m}}$ is feasible, $\mathbf{m}^*$ cannot be optimal. Hence, $i_1^* = 1 - i_2^*$.

3. For $n = 4$, by Lemma 4.3, $i_2^* < i_2^f$ and $i_3^* > i_3^f$. Then, by Lemmata B.4 and B.5, $i_2^* - i_1^* < i_2^f - i_1^f$ and $i_n^* - i_{n-1}^* < i_n^f - i_{n-1}^f$. Finally, we establish symmetry. Without loss, let $i_2^* < 1 - i_3^*$. If (ED) of i_3^* is slack, then $i_1^* \geqslant i^-(i_2^*)$ and $i_4^* = i^+(i_3^*)$ and $M_1(\mathbf{m}^*) < M_n(\mathbf{m}^*)$ by Lemma B.5. But by Lemma B.3, (ED) of i_1^* and i_4^* must both bind, leading to a contradiction. Hence, (ED) of i_3^* binds. This implies that $i_2^* - i_1^* \leqslant i_4^* - i_3^*$, because otherwise $M_3(\mathbf{m}^*) < M_2(\mathbf{m}^*)$ and (ED) of i_2^* is violated. But note that $\Sigma(\mathbf{m}^* \backslash i_4^*) = \Sigma(\{i_1^*, i_2^*, i_3^*\}) < \Sigma(\{i_2^*, i_3^*, i_3^* + (i_2^* - i_1^*)\}) \leqslant \Sigma(\{i_2^*, i_3^*, i_4^*\}) = \Sigma(\mathbf{m}^* \backslash i_1^*)$, which contradicts that (ED) of i_1^* and i_4^* both bind. ■

C Formal results and proofs for Section 5

Proof of Proposition 5.1. First, we examine how the V_C-minimizing informativeness $\underline{\Sigma}$ varies with τ^2.

Lemma C.1. *Let $\tau_x^2 := (\frac{3}{\sqrt{2}} - 2)\bar{B}^2$ and $\tau_y^2 := \frac{1}{2}\bar{B}^2$. Then, $\underline{\Sigma}$ is*
(i) strictly increasing in $\tau^2 \in (0, \tau_x^2)$, and $\underline{\Sigma} \to 0$ as $\tau^2 \to 0$;
(ii) strictly decreasing in $\tau^2 \in (\tau_x^2, \tau_y^2)$, and for $\tau^2 \in [\tau_y^2, \infty)$, $\underline{\Sigma} = 0$.

Proof. Let $g(\tau^2) := \frac{1}{2}\sqrt{\tau^4 + 4\bar{B}^2\tau^2} - 3\tau^2$ and $\underline{\Sigma} = \max\{0, g(\tau^2)\}$ as in (4). The first derivative of $g(\tau^2)$ with respect to τ^2 is

$$\frac{1}{2}\left(\frac{4\bar{B}^2 + 2\tau^2}{2\sqrt{4\bar{B}^2\tau^2 + \tau^4}} - 3\right),$$

which is negative (positive) if and only if $\tau^2 > (<)(\frac{3}{\sqrt{2}} - 2)\bar{B}^2 =: \tau_x^2$. First, as $\tau^2 \to 0$, $g(\tau^2) \to 0$ from above, hence $\underline{\Sigma} \to 0$. Moreover, the positive derivative of g implies that $\underline{\Sigma}$ strictly increases in $\tau^2 \in [0, \tau_x^2)$. Second, g is strictly positive over $[\tau_x^2, \tau_y^2)$ and strictly decreasing for $\tau^2 > \tau_x^2$. Hence, $\underline{\Sigma}$ strictly decreases for $\tau^2 \in (\tau_x^2, \tau_y^2)$. For $\tau^2 = \tau_y^2$, $\underline{\Sigma} = 0$ because $g(\tau_y^2) = 0$. Therefore, because $g(\tau_y^2) \leqslant 0$ for $\tau^2 \in [\tau_y^2, \infty)$, $\underline{\Sigma} = 0$. ■

If $\bar{B} = 0$, then $\underline{\Sigma} = 0$ for any τ^2. This implies any citizen in any minipublic is active. Hence, $\mathbf{m}^* \in \mathcal{M}_n^f$ for any τ^2, so $\underline{\tau}^2 = \bar{\tau}^2$. If $\bar{B} \neq 0$, let $\bar{\tau}^2 = \tau_y^2$ as in lemma C.1. By lemma C.1(ii), for any $\tau^2 \geqslant \bar{\tau}^2$, $\underline{\Sigma} = 0$ so any citizen is active in any minipublic. Therefore, any $\mathbf{m} \in \mathcal{M}_n^f$ is feasible, and hence, optimal.

Pick any $\mathbf{m}_n^f \in \mathcal{M}_n^f$, and let $i_k^f \in \arg\max_{i \in \mathbf{m}_n^f} M_i(\mathbf{m}_n^f)$ be among the citizens with the highest marginal informativeness. If i_k^f is active in $\mathbf{m}_n^f$ then $\mathbf{m}_n^f$ is feasible. By Lemma C.1(i), for any $\Sigma(\mathbf{m}_n^f \setminus i_1^f) > 0$, there exists $\underline{\tau}^2$ sufficiently small so that $0 < \underline{\Sigma} < \Sigma(\mathbf{m}_n^f \setminus i_k^f)$ for all $\tau^2 \leqslant \underline{\tau}^2$. Thus, for τ^2 sufficiently small, $\mathbf{m}_n^f$ is feasible and hence, optimal. ■

Proposition C.1. *Fix $\tau, \bar{B}, \ell$ and consider the Ornstein-Uhlenbeck correlation structure as in Section 4.2.2. There exist unique $n_\emptyset, n_f \in \mathbb{N} \cup \{0, +\infty\}$ such that (i) $\mathbf{m}^* = \mathbf{m}_n^f$ for $n \geqslant n_f$, (ii) $\mathbf{m}^* = \emptyset$ for $n \leqslant n_\emptyset$, (iii) $\mathbf{m}^* \neq \{\emptyset, \mathbf{m}_n^f\}$ for $n \in [n_\emptyset + 1, n_f - 1]$, and (iv) m^* is Δ-equidistant for $n \in [n_\emptyset + 2, n_f - 1]$.*

Proof of Proposition C.1. We prove this in three steps.

Lemma C.2. *Suppose the Ornstein-Uhlenbeck structure in Section 4.2.2. If $\mathbf{m}_n^f$ is active for some $n \in \mathbb{N}$, then $\mathbf{m}_{n'}^f$ is active for all $n' > n$ as well.*

Proof. First, it is immediate that if $\mathbf{m}_1^f = \{1/2\}$ is active, then any $\mathbf{m}_n^f$ for $n > 1$ is active as well. Fix $n \geqslant 2$. Suppose $\mathbf{m}_n^f$ for some $n \geqslant 1$ is active. For any $n' > n$, $i_1^f(n') < i_1^f(n)$ and $d(n') < d(n)$. This implies that $M_1(\mathbf{m}_{n'}^f) < M_1(\mathbf{m}_n^f)$ and $M_2(\mathbf{m}_{n'}^f) < M_2(\mathbf{m}_n^f)$. But $\Sigma(\mathbf{m}_{n'}^f) > \Sigma(\mathbf{m}_n^f)$. Hence, the active informativeness is strictly higher, and the marginal informativeness for $i_1^f(n')$ and $i_2^f(n')$ are strictly lower in the larger minipublic $\mathbf{m}_{n'}^f$; this implies that their passive informativeness are strictly higher in $\mathbf{m}_{n'}^f$ than in $\mathbf{m}_n^f$. Hence, if $i_1^f(n)$ and $i_2^f(n)$ are active in $\mathbf{m}_n^f$, then $i_1^f(n')$ and $i_2^f(n')$ must be active in $\mathbf{m}_{n'}^f$ as well. By Lemma 4.2, (i) if $i_f^1(n')$ is active, then $i_{n'}^f(n')$ is active as well, (ii) if $i_2^f(n')$ is active, then all inner citizens in $\mathbf{m}_{n'}^f$ are active as well. Hence $\mathbf{m}_{n'}^f$ is active. ■

Lemma C.3. *Suppose the correlation structure of $\beta(\cdot)$ is as in Section 2. If $\mathbf{m}_n^* = \emptyset$, then $\mathbf{m}_{n'}^* = \emptyset$ for all $n' \leqslant n$.*

Proof. By contradiction, assume that there exists $n' < n$ such that $\mathbf{m}_{n'}^* \neq \emptyset$. Then, the minipublic $\mathbf{m}_{n'}^*$ is also feasible with a capacity of n and gives strictly higher payoff to the policymaker than $\emptyset$, contradicting the optimality of $\mathbf{m}_n^* = \emptyset$. ■

Lemma C.4. *Suppose the Ornstein-Uhlenbeck structure in Section 4.2.2. There is at most one $n \in \mathbb{N}$ such that m^* is the (δ, Δ)-alternating minipublic.*

Proof. Let n be the lowest capacity at which an optimal (δ, Δ)-alternating minipublic $\mathbf{m}^*(n)$ arises. By Lemma D.3, n is even, and $\mathbf{m}^*(n+1)$ cannot be (δ, Δ)-alternating because $n+1$ is odd. We show that for all $\tilde{n} \geqslant n+2$, the optimal minipublic cannot be of the (δ, Δ)-alternating type. By the proof of Lemma 3.2, $\mathbf{m}^*(n+1)$ is either a first-best minipublic $\mathbf{m}^f_{n+1}$ or a Δ-equidistant one $\mathbf{m}^*(n+1)$ with generic citizen $i_j(n+1)$. If it is $\mathbf{m}^f_{n+1}$, the result is immediate by Lemma C.2. If it is $\mathbf{m}^*(n+1)$, we first show that for any $\tilde{n} \geqslant n+2$, the following Δ-equidistant minipublic is feasible: it has the same two left-most citizens ($i_1(\tilde{n}) = i_1(n+1)$ and $i_2(\tilde{n}) = i_2(n+1)$) and right-most citizens ($i_{\tilde{n}-1}(\tilde{n}) = i_n(n+1)$ and $i_{\tilde{n}}(\tilde{n}) = i_{n+1}(n+1)$), and all other citizens are equidistantly allocated in the interior. Then, $\Sigma(\mathbf{m}^*(\tilde{n})) > \Sigma(\mathbf{m}^*(n+1))$, and $M_1(\mathbf{m}^*(\tilde{n})) = M_{\tilde{n}}(\mathbf{m}^*(\tilde{n})) = M_1(\mathbf{m}^*(n+1))$ and $M_j(\mathbf{m}^*(\tilde{n})) < M_j(\mathbf{m}^*(n+1))$ for all other $j \in \mathbf{m}^*(\tilde{n})$. Hence, all citizens in $\mathbf{m}^*(\tilde{n})$ are active. Finally, by Lemma D.2, the optimal minipublic cannot be (δ, Δ)-alternating for any $\tilde{n}$ because there exists a feasible equidistant one. ■

■

Proposition C.2. *Let $n < n'$ and $\mathbf{m}^*(n)$ and $\mathbf{m}^*(n')$ be both Δ-equidistant minipublics in the Ornstein-Uhlenbeck correlation structure as in Section 4.2.2. Then, $\Delta(\mathbf{m}^*(n)) > \Delta(\mathbf{m}^*(n'))$.*

Proof of Proposition C.2. Let $i_j(n)$ denote a generic citizen in $\mathbf{m}^*(n)$. Consider the following minipublic $\tilde{\mathbf{m}}$ with n' citizens as constructed in the proof of Lemma C.4: $\tilde{i}_1 = i_1(n)$, $\tilde{i}_2 = i_2(n)$, $\tilde{i}_{n'-1} = i_{n-1}(n)$ and $\tilde{i}_{n'} = i_n(n)$, and all other $n'-4$ citizens are equidistantly allocated in the interior. Then, $\Sigma(\tilde{\mathbf{m}}) > \Sigma(\mathbf{m}^*(n))$, $M_1(\tilde{\mathbf{m}}) = M_{n'}(\tilde{\mathbf{m}}) = M_1(\mathbf{m}^*(n))$ and $M_j(\tilde{\mathbf{m}}) < M_j(\mathbf{m}^*(n+1))$ for all other $j \in \tilde{\mathbf{m}}$. Hence, all citizens in $\tilde{\mathbf{m}}$ are active. First, let $i_2(n) > i_2^f(n')$. But then, since $\tilde{\mathbf{m}}$ is feasible, so is $\mathbf{m}^f_{n'}$. This is because $\Sigma(\tilde{\mathbf{m}}) < \Sigma(\mathbf{m}^f_{n'})$, $M_1(\tilde{\mathbf{m}}) > M_1(\mathbf{m}^f_{n'}) > M_2(\mathbf{m}^f_{n'})$, so all citizens are active in $\mathbf{m}^f_{n'}$ because citizen 1 is active in $\tilde{\mathbf{m}}$. Second, let $i_2(n) < i_2^f(n')$. Note that $i_1(\tilde{\mathbf{m}})$ is slack in the feasible minipublic $\tilde{\mathbf{m}}$. Hence, the optimal minipublic $\mathbf{m}(n')$ must have smaller distance between inner citizens than in the feasible minipublic $\tilde{\mathbf{m}}$ for the (ED) of citizen 1 to bind and to achieve a higher informativeness than $\tilde{\mathbf{m}}$. Finally, let $i_2(n) = i_2^f(n')$. Then, $\tilde{\mathbf{m}} = \mathbf{m}^f_{n'}$, so $\mathbf{m}^*(n')$ cannot be a distorted Δ-equidistant minipublic. ■

Proposition C.3 (Distortions arise under strong policy sentiment)**.** *Fix capacity n. There exist unique cutoffs $0 < \underline{b} \leqslant \bar{b} < \infty$ such that:*

(i) the optimal minipublic is a first-best one, $\mathbf{m}^* \in \mathcal{M}^f_n$, if and only if $|\bar{B}| \leqslant \underline{b}$;

(ii) the optimal minipublic consists of n citizens but is distinct from the first-best minipublics, $\mathbf{m}^* \notin \mathcal{M}^f_n$, if and only if $|\bar{B}| \in (\underline{b}, \bar{b}]$;

(iii) the optimal minipublic is empty if and only if $|\bar{B}| > \bar{b}$.

Proof of Proposition C.3. The following lemma will be invoked in the proof.

Lemma C.5 (Single crossing in $|\bar{B}|$)**.** *For any given $0 \leqslant \underset{\sim}{\Sigma} < \tilde{\Sigma}$, there exists a unique cutoff $b > 0$ such that $V_C(\tilde{\Sigma}) \geqslant V_C(\underset{\sim}{\Sigma})$ if and only if $|\bar{B}| \leqslant b$.*

Proof. Without loss, let $\bar{B} \geqslant 0$. Consider the function $D(\bar{B}) := V_C(\tilde{\Sigma}) - V_C(\underset{\sim}{\Sigma})$, which is continuously differentiable in $\bar{B}$. We claim that D crosses zero exactly once from above.

The payoff-minimizing informativeness $\underline{\Sigma}$ in (4) is nondecreasing in $\bar{B}$. Fix $0 \leqslant \underset{\sim}{\Sigma} < \tilde{\Sigma}$, and define $\underline{b} := \{\bar{B} : \underline{\Sigma} = \underset{\sim}{\Sigma}\}$, and $\bar{b} := \{\bar{B} : \underline{\Sigma} = \tilde{\Sigma}\}$. From equation (4), it immediately follows that $\underline{b} \geqslant 0$ and $\bar{b} > 0$.

By Lemma 3.1, for any $0 \leqslant \bar{B} \leqslant \underline{b}$, the payoff-minimizing $\underline{\Sigma}$ is weakly lower than $\underset{\sim}{\Sigma}$. Hence, a higher informativeness yields a higher expected payoff, so $D(\bar{B}) > 0$. Similarly, for any $\bar{B} \geqslant \bar{b}$, $\underline{\Sigma}$ is weakly to the right of both $\underset{\sim}{\Sigma}$ and $\tilde{\Sigma}$, and hence, $D(\bar{B}) < 0$. This implies that the function D crosses zero k times in the interval $(\underline{b}, \bar{b})$, where $k \geqslant 1$ and k odd.

We claim that $k = 1$. By contradiction, suppose that $k > 1$. By the continuous differentiability of D, the derivative D' must be switching sign at least three times, so there exist at least two different values of $\bar{B} \in (\underline{b}, \bar{b})$ at which $D'(\bar{B}) = 0$. We next show that at most one such value can exist, which generates the desired contradiction. The first derivative of $D(\bar{B})$ is

$$D'(\bar{B}) = h(\bar{B}; \tilde{\Sigma}) - h(\bar{B}; \underset{\sim}{\Sigma})$$

where $h(\bar{B}; \Sigma) := \Phi(\frac{\bar{B}}{\sqrt{\Sigma+\tau^2}}) + \phi(\frac{\bar{B}}{\sqrt{\Sigma+\tau^2}})\frac{\bar{B}\tau^2}{\sqrt{(\Sigma+\tau^2)^3}}$. The partial derivative of h with respect to $\bar{B}$ is

$$\begin{aligned}\frac{\partial h(\bar{B}; \Sigma)}{\partial \bar{B}} &= \phi(\frac{\bar{B}}{\sqrt{\Sigma+\tau^2}})\left[\frac{1}{\sqrt{\Sigma+\tau^2}} + \frac{\tau^2}{\sqrt{(\Sigma+\tau^2)^3}} - \frac{\bar{B}^2\tau^2}{\sqrt{(\Sigma+\tau^2)^5}}\right] \\ &= \phi(\frac{\bar{B}}{\sqrt{\Sigma+\tau^2}})\left[\frac{\Sigma^2 - \tau^2(\bar{B}^2 - 3\Sigma) + 2\tau^4}{\sqrt{(\Sigma+\tau^2)^5}}\right].\end{aligned}$$

From (4), V_C increases in Σ if and only if $\Sigma \geqslant \underline{\Sigma}$, or equivalently if $\Sigma^2 - (\bar{B}^2 - 3\Sigma)\tau^2 + 2\tau^4 \geqslant 0$. As $\underset{\sim}{\Sigma} < \underline{\Sigma} < \tilde{\Sigma}$ for every $\bar{B} \in (\underline{b}, \bar{b})$, it holds that $\underset{\sim}{\Sigma}^2 - (\bar{B}^2 - 3\underset{\sim}{\Sigma})\tau^2 + 2\tau^4 < 0$ and $\tilde{\Sigma}^2 - (\bar{B}^2 - 3\tilde{\Sigma})\tau^2 + 2\tau^4 \geqslant 0$. Hence, $\frac{\partial h(\bar{B};\tilde{\Sigma})}{\partial \bar{B}} \geqslant 0$ and $\frac{\partial h(\bar{B};\underset{\sim}{\Sigma})}{\partial \bar{B}} < 0$.

To sum up, on the entire domain $\bar{B} \in (\underline{b}, \bar{b})$, $h(\bar{B}; \tilde{\Sigma})$ is increasing in $\bar{B}$ and $h(\bar{B}; \underset{\sim}{\Sigma})$ is strictly decreasing in it. Hence, there is at most one $\bar{B}'$ that satisfies $D'(\bar{B}') = 0$. We have reached a contradiction, so $k = 1$. ∎

(i) A first-best minipublic $\mathbf{m}_n^f \in \mathcal{M}_n^f$ is optimal if and only if each $i \in \mathbf{m}_n^f$ is active, i.e., $V_C(\Sigma(\mathbf{m}_n^f)) \geqslant V_C(\Sigma(\mathbf{m}_n^f \setminus i))$. By Lemma C.5 and the fact that $\Sigma(\mathbf{m}_n^f \setminus i_k^f) < \Sigma(\mathbf{m}_n^f)$ for any $k \in \{1, \ldots, n\}$, there exists a threshold $b_k > 0$ such that i_k^f is active if and only if $|\bar{B}| \leqslant b_k$. Define $\underline{b}$ to be the lowest among all such b_k for $k \in \{1, \ldots, n\}$. By construction, each $i_k^f \in \mathbf{m}_n^f$ is active if $|\bar{B}| \leqslant \underline{b}$. On the other hand, if $|\bar{B}| > \underline{b}$, there exists at least one citizen in $\mathbf{m}_n^f$ who prefers to be passive.

(ii) The optimal minipublic is empty if and only if no minipublic $\mathbf{m} \in \mathcal{M}_n$ is active. First, we establish the sufficiency of $|\bar{B}| \geqslant \bar{b}$ for the optimal minipublic to be empty, then its necessity.

As $|\bar{B}| \to +\infty$, the limit payoff V_C is strictly decreasing over the relevant domain $[0, \Sigma(\mathbf{m}_n^f)]$ because $\underline{\Sigma} \to +\infty$. That is, for $|\bar{B}|$ sufficiently large, for all $\mathbf{m} \in \mathcal{M}_n$ each $i \in \mathbf{m}$ is passive. Therefore, there exists a cutoff $\bar{b} < +\infty$ such that the optimal minipublic is empty if $|\bar{B}| \geqslant \bar{b}$.

Suppose there exist $b < \tilde{b} < \bar{b}$ such that (i) if $|\bar{B}| = b$ the optimal minipublic is empty, and (ii) if $|\bar{B}| = \tilde{b}$ the optimal minipublic, denoted by $\tilde{\mathbf{m}}$, is nonempty. Then, each $i \in \tilde{\mathbf{m}}$ is active, which means that $D(\tilde{b}) > 0$, and hence D is strictly decreasing at $|\bar{B}| = \tilde{b}$. Because $b < \tilde{b}$, it must be that $D(b) > D(\tilde{b}) > 0$, hence $\tilde{\mathbf{m}}$ is active when $|\bar{B}| = b$ as well. This contradicts the empty optimal minipublic for $|\bar{B}| = b$. Hence, the optimal minipublic is empty only if $|\bar{B}| \geqslant \bar{b}$. ∎

Proposition C.4. *Consider the Ornstein-Uhlenbeck structure of Section 4.2.2. For any two optimal minipublics of the Δ-equidistant pattern corresponding to $|\bar{B}|, |\bar{B}'| \in (\underline{b}, \bar{b})$ such that $|\bar{B}| < |\bar{B}'|$, where $\underline{b}, \bar{b}$ are as defined in Proposition C.3, the distance between inner citizens increases in policy sentiment, i.e., $\Delta^*(\bar{B}) \leqslant \Delta^*(\bar{B}')$.*

Proof of Proposition C.4. Let $\mathbf{m}^*(\bar{B})$ and $\mathbf{m}^*(\bar{B}')$ denote the two optimal minipublics of the Δ-equidistant pattern, with corresponding distance between inner citizens $\Delta^*(\bar{B})$ and $\Delta^*(\bar{B}')$. By Lemma C.5, any minipublic that is feasible for $\bar{B}'$ is also feasible for $\bar{B}$. Therefore $\Sigma(\mathbf{m}^*(\bar{B})) \geqslant \Sigma(\mathbf{m}^*(\bar{B}'))$. But the informativeness of a Δ-equidistant minipublic that is more spread out than the first-best minipublic $\mathbf{m}_n^f$ strictly decreases in Δ. Hence, it must be that $\Delta^*(\bar{B}) \leqslant \Delta^*(\bar{B}')$. ∎

Proposition C.5. *Consider the Ornstein-Uhlenbeck structure of Section 4.2.2, and suppose* $0 < \underline{\Sigma} < 1$. *There exist* $\underline{\ell}$ *and* $\bar{\ell}$ *with* $0 < \underline{\ell} \leqslant \bar{\ell} < \infty$ *such that (i) for* $\ell \leqslant \underline{\ell}$, $\mathbf{m}^* = \emptyset$, *(ii) for* $\ell \in (\underline{\ell}, \bar{\ell})$, $\mathbf{m}^* \notin \{\emptyset, \mathbf{m}_n^f\}$ *is distorted in composition, and (iii) for* $\ell \geqslant \bar{\ell}$, $\mathbf{m}^* = \mathbf{m}_n^f$.

Proof of Proposition C.5. The following lemma is useful for the argument.

Lemma C.6. *For any* $\mathbf{m} \in \mathcal{M}$, $\Sigma(\mathbf{m})$ *strictly increases in* ℓ. *Moreover,* $\Sigma(\mathbf{m}) \to 0$ *as* $\ell \to 0^+$ *and* $\Sigma(\mathbf{m}) \to 1$ *as* $\ell \to +\infty$.

Proof. Consider $\Sigma(\{i\}) = \ell(2 - e^{-i/\ell} - e^{-(1-i)/\ell})$ for $i \in [0, 1]$. Differentiating with respect to ℓ,

$$\frac{\partial \Sigma(\{i\})}{\partial \ell} = \frac{2\ell - e^{-i/\ell}(i + \ell) - e^{-(1-i)/\ell}(1 - i + \ell)}{\ell}.$$

From the power series of the exponential function $e^{-x} < 1-x$, hence $e^{-i/\ell}(i+\ell) < \left(1 - \frac{i}{\ell}\right)(i+\ell) = \ell - i^2/\ell < \ell$. By a similar reasoning, $e^{-(1-i)/\ell}(1 - i + \ell) < \ell$ as well. Hence this derivative is strictly positive. Next, we show that γ_j for each $j = 1, \ldots, n$ is strictly increasing in ℓ, where γ_j are as derived in Lemma B.1. Observe that we can break $\gamma_1(\mathbf{m})$ down into

$$\frac{\partial \gamma_1(\mathbf{m})}{\partial \ell} = \frac{\partial(\ell(1 - e^{-i_1/\ell}))}{\partial \ell} + \frac{\partial\left(\ell(\tanh\left(\frac{i_2 - i_1}{2\ell}\right))\right)}{\partial \ell} = \left(1 - \frac{e^{-\frac{i_1}{\ell}}(\ell + i_1)}{\ell}\right) + \left(\frac{i_1 - i_2 - \ell\sinh((i_1 - i_2)/\ell)}{\ell + \ell\cosh((i_1 - i_2)/\ell)}\right)$$

The first term in the RHS is strictly positive by the reasoning above. The second term in the RHS is strictly positive because $\sinh(x) > x$ for any $x > 0$. As established above, $e^{-i_1/\ell}(\ell + i_1) < \ell$. The function $h(x) := e^x \mathrm{sech}(x/2)^2$ is strictly increasing in x, and $h(0) = 1$. Hence $\ell e^{(i_2 - i_1)/\ell}\mathrm{sech}((i_2 - i_1)/2\ell))^2 > \ell$. For $j = 2, \ldots, n-1$:

$$\frac{\partial \gamma_j(\mathbf{m})}{\partial \ell} = \frac{2\ell\left(\tanh\left(\frac{i_j - i_{j-1}}{2\ell}\right) + \tanh\left(\frac{i_{j+1} - i_j}{2\ell}\right)\right) - (i_j - i_{j-1})\mathrm{sech}\left(\frac{i_j - i_{j-1}}{2\ell}\right)^2 - (i_{j+1} - i_j)\mathrm{sech}\left(\frac{i_{j+1} - i_j}{2\ell}\right)^2}{2\ell}.$$

The function $g(x) := \tanh(x) - x\mathrm{sech}(x)^2$ is strictly increasing for $x > 0$ and $g(0) = 0$. Hence, the derivative above is strictly positive for $i_{j-1} < i_j < i_{j+1}$. By the characterization of Σ in Lemma B.1, if $\Sigma(\{i\})$ increasing in ℓ for any i and $\gamma_j(\mathbf{m})$ increasing in ℓ for any j and $\mathbf{m}$, then $\Sigma(\mathbf{m})$ is increasing in ℓ for any $\mathbf{m}$.

Fix $\mathbf{m}$. As $\ell \to 0^+$, $\Sigma(\{i_k\}) \to 0$ for any $i_k \in [0, 1]$ and $\gamma_k(\mathbf{m}) \to 0$ for any $i_k \in \mathbf{m}$. Therefore by Lemma B.1, $\Sigma(\mathbf{m}) \to 0$ as $\ell \to 0$. As $\ell \to +\infty$, using L'Hôpital's rule, $\Sigma(\{i_k\}) \to 1$ for any $i_k \in \mathbf{m}$. Furthermore, $\ell\tanh(\frac{d}{2\ell}) \to \frac{d}{2}$ as $\ell \to \infty$ for any distance $d > 0$. Using this observation and L'Hôpital's rule, the limit of γ_k as given by (9) is

$$\lim_{\ell \to +\infty} \gamma_k(\mathbf{m}) = \begin{cases} \dfrac{i_1}{2} + \dfrac{i_2}{2} & \text{if } k = 1, \\ \dfrac{i_{k+1}}{2} - \dfrac{i_{k-1}}{2} & \text{if } k = 2, ..., n-1, \\ 1 - \dfrac{i_{n-1}}{2} - \dfrac{i_n}{2} & \text{if } k = n. \end{cases} \tag{10}$$

Thus, the limit of informativeness of any minipublic with $n \geqslant 1$ is

$$\lim_{\ell \to +\infty} \Sigma(\mathbf{m}) = \lim_{\ell \to +\infty} \sum_k \gamma_k(\mathbf{m})\Sigma(\{i_k\}) = 1.$$

∎

Because $0 < \underline{\Sigma}$ and $\Sigma(\mathbf{m}) \to 0$ as $\ell \to 0^+$ for any $\mathbf{m} \in \mathcal{M}_n$, there exists ℓ sufficiently small such that for any $\mathbf{m} \in \mathcal{M}_n$, $\Sigma(\mathbf{m}) < \underline{\Sigma}$. Hence, the set of feasible minipublics is empty and $\mathbf{m}^* = \emptyset$. But if $\mathbf{m}^* = \emptyset$ for some $\ell > 0$, then for any $\ell' < \ell$, any $\mathbf{m} \in \mathcal{M}_n$, and any $i \in \mathbf{m}$, it must be that $\Sigma(\mathbf{m}; \ell') < \Sigma(\mathbf{m}; \ell)$ and $\Sigma(\mathbf{m} \setminus \{i\}; \ell') < \Sigma(\mathbf{m} \setminus \{i\}; \ell)$, so $\mathbf{m}$ is not feasible for ℓ' either. Hence, $\mathbf{m}^* = \emptyset$ for $\ell' < \ell$ as well.

Moreover, by Lemma C.6 above, both $\Sigma(\mathbf{m}_n^f \setminus i_k^f)$ for any $i_k^f \in \mathbf{m}_n^f$ and $\Sigma(\mathbf{m}_n^f)$ converge to 1 as $\ell \to +\infty$. Hence, for ℓ sufficiently high, $\underline{\Sigma} < \Sigma(\mathbf{m}_n^f \setminus i_k^f) < \Sigma(\mathbf{m}_n^f)$ because $\underline{\Sigma} < 1$ by the premise. Therefore, there exists $\ell > 0$ for which $\mathbf{m}^* = \mathbf{m}_n^f$ is optimal. But then for any $\ell' > \ell$, it must be that $\Sigma(\mathbf{m}_n^f; \ell') > \Sigma(\mathbf{m}_n^f; \ell)$ and $\Sigma(\mathbf{m}_n^f \setminus \{i_j^f\}; \ell') > \Sigma(\mathbf{m}_n^f \setminus \{i_j^f\}; \ell)$ for any $i_j^f \in \mathbf{m}_n^f$. Therefore $\mathbf{m}_n^f$ is feasible, and hence optimal, for any $\ell' > \ell$ as well. ■

Proposition C.6. *Consider the Ornstein-Uhlenbeck structure of Section 4.2.2. For any two optimal minipublics of the Δ-equidistant pattern corresponding to $\ell, \ell' \in (\underline{\ell}, \bar{\ell})$ such that $\ell' > \ell$, where $\underline{\ell}, \bar{\ell}$ are as in Proposition C.5, the distance between inner citizens decreases in the homogeneity of the citizenry, i.e., $\Delta^*(\ell) \geqslant \Delta^*(\ell')$.*

Proof of Proposition C.6. Let $\mathbf{m}^*(\ell)$ and $\mathbf{m}^*(\ell')$ be the optimal minipublics for ℓ and ℓ', respectively. By contradiction, suppose $\Delta^*(\ell) < \Delta^*(\ell')$, hence under any $\ell'' > 0$, $\Sigma(\mathbf{m}^*(\ell'); \ell'') < \Sigma(\mathbf{m}^*(\ell); \ell'')$. By Lemma C.6, it must be that $\mathbf{m}^*(\ell)$ is also feasible under ℓ', because for every $i \in \mathbf{m}^*(\ell)$, $\Sigma(\mathbf{m}^*(\ell); \ell') > \Sigma(\mathbf{m}^*(\ell); \ell)$ and $\Sigma(\mathbf{m}^*(\ell) \setminus \{i\}; \ell') > \Sigma(\mathbf{m}^*(\ell) \setminus \{i\}; \ell)$. Hence, $\mathbf{m}^*(\ell')$ is suboptimal under ℓ'. ■

D For Online Publication

D.1 Axiomatization of the Ornstein-Uhlenbeck structure

The Ornstein-Uhlenbeck process introduced in Assumption 2 uniquely satisfies the following set of natural axioms on the outcome mapping β.

A.1 *(Principle of maximal ignorance)* For any group of citizens $\{i_1, \ldots, i_n\}$, outcomes $\{\beta(i_1), \ldots, \beta(i_n)\}$ follow a multivariate Gaussian distribution.

A.2 *(Similar citizens, similar outcomes)* $\beta(\cdot)$ is almost surely continuous.

A.3 *(Identical outcome uncertainty)* For each $i \in [0,1]$, $\beta(i) - \bar{B} \sim \mathcal{N}(0,1)$.

A.4 *(Distance-based correlation)* For any two $i_1, i_2 \in [0,1]$, the correlation between $\beta(i_1)$ and $\beta(i_2)$ depends only on the distance $|i_1 - i_2|$.

A.5 *(Look to your left, look to your right)* For any $i_1 < \ldots < i_k < \ldots i_n$, the distribution of $\beta(i_k)$ depends on the outcomes of other citizens in the set only through $\beta(i_{k-1})$ and $\beta(i_{k+1})$.

Axiom A.1 imposes a general Gaussian structure, whereas Axioms A.2-A.5 specify additional properties. A.1 can also be interpreted as a maximal-ignorance desideratum. The Gaussian distribution maximizes entropy among all unbounded distributions of a fixed mean and variance, therefore the Gaussian structure allows one to draw the weakest conclusions possible from a set of outcomes. A.2 requires that for any two citizens that are arbitrarily close to each other, their realized outcomes are also close. A.3 requires that all citizens face the same uncertainty about their outcomes. In understanding how informative a citizen's outcome is for the rest of the citizenry, this axiom allows us to isolate the role of the citizen's position in $[0,1]$ from the role of the outcome uncertainty that he faces. Axioms A.4 and A.5 specify how a citizen's position determines his correlation to other citizens. Correlation between any two citizens' outcomes depends only on how far the two citizens are from each other (A.4). Moreover, given a set of citizens the outcomes of which are observed, the best conjecture for the outcome of any citizen outside this set depends only on the outcomes of his closest neighbors in this set (A.5).

Corollary D.1, which follows from Theorem 1.1 of Doob (1942), establishes that not only does the Ornstein-Uhlenbeck process satisfy this set of natural axioms A.1-A.5, but it is the *only* stochastic process that does so.

Corollary D.1 (Doob (1942)). *The Ornstein-Uhlenbeck process on domain* $[0,1]$ *uniquely satisfies assumptions A.1 - A.5.*

D.2 General distributions

Let F denote the distribution of the policymaker's threshold of adoption over $(-\infty, \infty)$ with continuously differentiable density f. The citizen's interim payoff for a realized post-minipublic value $\tilde{B} \in \mathbb{R}$ is

$$v(\tilde{B}) := \tilde{B} \Pr(c \leqslant \tilde{B}) = \tilde{B} F(\tilde{B}).$$

Note that $v(0) = 0$, $v'(\tilde{B}) > 0$ for $\tilde{B} > 0$, $\lim_{\tilde{B} \to +\infty} v(\tilde{B}) = +\infty$, and $\lim_{\tilde{B} \to -\infty} v(\tilde{B}) = 0$ from below. Moreover, $v'(\tilde{B}) < 0$ for $\tilde{B} \ll 0$. The following lemma identifies a sufficient condition for v to be U-shaped. We say that a function $h(x)$ is concave-convex-concave in x if there exists $x_1, x_2 \in \mathbb{R} \cup \{-\infty, +\infty\}$ such that $h(x)$ is concave for $x \leqslant x_1$ and $x \geqslant x_2$, and convex for $x \in (x_1, x_2)$.

Lemma D.1. *Let f be log-concave. Then $v(\tilde{B})$ is (i) U-shaped in $\tilde{B}$ and (ii) concave-convex-concave in $\tilde{B}$.*

Proof. (i) The interim payoff v is first decreasing and then increasing if its derivative $v'(\tilde{B}) := \tilde{B}f(\tilde{B})+F(\tilde{B})$ is single-crossing in $\tilde{B}$, in the sense that if $v'(\tilde{B}) > 0$, then $v'(\tilde{B}') > 0$ for any $\tilde{B}' > \tilde{B}$. First, note that $v'(\tilde{B}) > 0$ for any $\tilde{B} \geqslant 0$. Consider $\tilde{B} < \tilde{B}' < 0$. Because f is log-concave, F is also log-concave and the ratio f/F is nonincreasing.[33] Hence, if $v'(\tilde{B}) > 0$ then

$$\tilde{B}'\frac{f(\tilde{B}')}{F(\tilde{B}')} > \tilde{B}\frac{f(\tilde{B}')}{F(\tilde{B}')} \geqslant \tilde{B}\frac{f(\tilde{B})}{F(\tilde{B})} > -1$$

which implies that $v'(\tilde{B}) > 0$ as well. This, together with the fact that $v'(\tilde{B}) < 0$ for $\tilde{B} \ll 0$, implies that v' is single-crossing in $\tilde{B}$ from below.

(ii) We need to inspect the sign of $v''(\tilde{B}) = 2f(\tilde{B}) + \tilde{B}f'(\tilde{B}) \Rightarrow v''(\tilde{B})/f(\tilde{B}) = 2 + \tilde{B}f'(\tilde{B})/f(\tilde{B})$. By the log-concavity of f, the ratio $f'(\tilde{B})/f(\tilde{B})$ is decreasing in $\tilde{B}$. The log-concavity of f implies that f is unimodal, so f' changes sign only once from above—suppose without loss that the mode is at $\tilde{B}_0 > 0$. Consider first $\tilde{B} < 0$. Then $\tilde{B}f'(\tilde{B})/f(\tilde{B})$ is increasing in $\tilde{B} < 0$. But $v''(0) > 0$, so v'' changes sign at most once over $\tilde{B} \in (-\infty, 0)$. For $\tilde{B} \in (0, \tilde{B}_0)$, $\tilde{B}f'(\tilde{B})/f(\tilde{B}) > 0 > -2$, so $v''(\tilde{B}) > 0$. For $\tilde{B} \geqslant \tilde{B}_0$, $\tilde{B}f'(\tilde{B})/f(\tilde{B}) < 0$ and decreasing, so v'' changes sign at most once over $(\tilde{B}_0, \infty)$. If $\lim_{\tilde{B}\to-\infty} \tilde{B}f'(\tilde{B}) < -2$ ($\lim_{\tilde{B}\to+\infty} \tilde{B}f'(\tilde{B}) < -2$) then v is strictly concave for $\tilde{B}$ sufficiently negative (positive). ■

Some log-concave distributions that are widely used in economic applications are the Laplace distribution, the extreme value distribution, the exponential distribution, and the Gamma distribution. For more examples, see Bagnoli and Bergstrom (2005).

Consider a family of distributions over post-minipublic values $\{G_b(\tilde{B})\}_{b\in[0,\infty)}$ such that each G has a binary support over $\{\bar{B} - \underline{b}, \bar{B} + \bar{b}\}$, where $\underline{b}, \bar{b} > 0$, with probabilities p and $1-p$, respectively. For Bayes rule to hold, it must be that $\bar{b} = \underline{b}p/(1-p)$. The support expands, in the sense that both post-minipublic values are further away from $\bar{B}$, as $\underline{b}$ increases. Hence, $\underline{b}$ is a proxy for spread. The expected payoff of the citizen is

$$\tilde{V}_C(\underline{b}) = p(\bar{B} - \underline{b})F(\bar{B} - \underline{b}) + (1-p)(\bar{B} + \bar{b})F(\bar{B} + \bar{b}).$$

Analogously to our baseline analysis, we seek to understand the monotonicity of $\tilde{V}_C$ in the spread $\underline{b}$ in this setting with a log-concave threshold distribution and binary distribution over post-minipublic values. The shape of the citizen's expected payoff is qualitatively the same as in our baseline Gaussian model for $\underline{b}$ sufficiently close to zero and sufficiently far from zero. We first show that for $\underline{b}$ sufficiently large, the citizen's expected payoff increases in $\underline{b}$ and the citizens prefer the lottery over post-minipublic values $\{\bar{B} - \underline{b}, \bar{B} + \bar{b}\}$ to no lottery.

Proposition D.1. *Let f be log-concave. There exists $\overline{\beta} > 0$ such that for all $\underline{b} > \overline{\beta}$, $\tilde{V}_C(0) < \tilde{V}_C(\underline{b})$ and $\partial\tilde{V}_C(\underline{b})/\partial\underline{b} > 0$.*

Proof. Because $\lim\limits_{B\to-\infty} v(B) = 0$ and $\lim\limits_{B\to+\infty} v(B) = \infty$, it holds that $\lim\limits_{\underline{b}\to\infty} (1-p)v(\bar{B}+\underline{b}p/(1-p))+pv(\bar{B}-\underline{b}) \to +\infty$ for any $p \in (0,1)$. Hence, for any $\bar{B}$ and any p, there exists $\overline{\beta}$ such that (i) $(1-p)v(\bar{B} + \overline{\beta}p/(1-p)) + pv(\bar{B} - \overline{\beta}) > \bar{B}$, (ii) $v(\bar{B} + \overline{\beta}p/(1-p)) > 0$, and (iii) $v(\bar{B} - \overline{\beta}) < x_1$. This implies that for all $\underline{b} > \overline{\beta}$, $v(\bar{B} - \underline{b})$ and $v(\bar{B} + \bar{b}p(1-p))$ are both increasing in $\underline{b}$. Hence, $\tilde{V}_C$ is increasing in $\underline{b}$ for any $\underline{b} > \overline{\beta}$. ■

[33] For standard properties of log-concave densities, see Bagnoli, Mark, and Ted Bergstrom (2005) "Log-concave probability and its applications." *Economic Theory,* 26: 445-469.

By the same effect which led to the curse of too little information in the baseline model, here, a small amount of information (via a small mean preserving spread) can strictly harm the citizens if the prior value $\bar{B}$ corresponds to low expected misalignment.

Proposition D.2. *Let f be log-concave and $\bar{B}$ lie in a concave region of v, i.e., $\bar{B} < x_1$ or $\bar{B} > x_2$. Then, there exist $\underline{\beta} > 0$ such that $\partial \tilde{V}_C(\underline{b})/\partial \underline{b} < 0$ for all $\underline{b} < \underline{\beta}$.*

Proof. By the premise, because $\bar{B}$ lies strictly in the concave region, there exists $\underline{\beta}$ sufficiently small such that for all $\underline{b} < \underline{\beta}$, $\bar{B} - \underline{b}$ and $\bar{B} + \underline{b}p/(1-p)$ lie both in the same concave region around $\bar{B}$. The result follows because a higher $\underline{b}$ corresponds to a mean preserving spread along a concave interim payoff, which reduces the expected payoff $\tilde{V}_C$. ■

When is $\tilde{V}_C$ quasiconvex on the entire domain? Beyond our Gaussian baseline model, this remains an open question for a general framework, even with a log-concave threshold density f. The following example points out one instance in which, among two available experiments π_1 and π_2 such that π_2 is a mean-preserving spread of π_1, the citizen strictly prefers π_1 to both the uninformative experiment $\{\bar{B}\}$ and π_2; hence $\tilde{V}_C$ is not quasiconvex in this example.

Example 1 (Single-peaked payoff over ordered experiments)**.** Suppose the policymaker has a deterministic threshold $\bar{c} = 5$ and the prior value is $\bar{B} = 8$. Let π_0 denote the uninformative experiment with degenerate distribution at $\{\bar{B}\}$. We consider two experiments π_1 and π_2 that induce the following distributions over post-minipublic values $\tilde{B}$:

$$\pi_1 : \begin{cases} -2 & \text{w.p.} \quad 1/3 \\ 13 & \text{w.p.} \quad 2/3 \end{cases}, \qquad \pi_2 : \begin{cases} -12 & \text{w.p.} \quad 1/9 \\ 3 & \text{w.p.} \quad 4/9 \\ 18 & \text{w.p.} \quad 4/9 \end{cases}.$$

It is straightforward to verify that the distribution corresponding to π_2 is a MPS of that corresponding to π_1. Then, $\tilde{V}_C(\pi_1) = 1/3 \cdot 0 + 2/3 \cdot 13 = 26/3 > 8$, so the citizen prefers π_1 to no information. However, $\tilde{V}_C(\pi_2) = 4/9 \cdot 18 = 8 = \tilde{V}_C(\pi_0)$. Therefore, the citizen strictly prefers π_1 to both π_0 and π_2, so $\tilde{V}_C$ is no longer quasiconvex over a sequence of ordered experiments $\{\pi_0, \pi_1, \pi_2\}$.

D.3 Additional results for Section 4.2

D.3.1 General characterization

Lemma D.2. *If $\mathbf{m}^*$ has the (δ, Δ)-alternating pattern, then no Δ-equidistant minipublic is feasible.*

Proof of Lemma D.2. We prove the contrapositive. Suppose the set of feasible Δ-equidistant minipublics is nonempty, and let Δ' be the smallest distance across all minipublics in this set, corresponding to $\mathbf{m}' = \{i'_1, i'_2, ..., i'_n\}$. First, consider a (δ, Δ)-alternating minipublic with $i''_2 \leqslant i'_2$ and $i''_{n-1} = 1 - i''_2 \geqslant i'_{n-1} = 1 - i'_2$. Such a minipublic has strictly lower informativeness than the Δ''-equidistant minipublic with the same i''_2 and i''_{n-1}. In turn, this Δ''-equidistant minipublic is less informative than the $\Delta'-$equidistant minipublic because $\Delta'' \geqslant \Delta'$. Hence, any (δ, Δ)-alternating minipublic with $i''_2 \leqslant i'_2$ is suboptimal. Second, consider a (δ, Δ)-alternating minipublic with $i''_2 > i'_2$ and $i''_{n-1} = 1 - i''_2 < i'_{n-1} = 1 - i'_2$. The passive informativeness of i''_1 in this minipublic is strictly lower than the passive informativeness of the leftmost citizen in the $\Delta''-$ equidistant minipublic with the same i''_2 and i''_{n-1}. But the leftmost citizen is passive in the Δ''-equidistant minipublic because $\Delta'' < \Delta'$. Hence, i''_1 must be passive in the (δ, Δ)-alternating minipublic as well. Therefore, (δ, Δ)-alternating minipublic with $i''_2 > i'_2$ is not feasible. ■

Lemma D.3. *Let $n \geqslant 5$ odd and $\mathbf{m}^* \neq \mathbf{m}_n^f$. The optimal minipublic is either of the Δ-equidistant pattern or empty. Moreover, if the (ED) constraints of all citizens are violated in $\mathbf{m}_n^f$, then $\mathbf{m}^* = \emptyset$.*

Proof. By Proposition 4.3, any optimal (δ^*, Δ^*)-alternating minipublic has $i_3^* - i_2^* = i_{n-1}^* - i_{n-2}^* = \Delta^*$. For n odd, this is impossible since there is an even number of alternating distances between i_2^* and i_{n-1}^*. Hence, if $\mathbf{m}^* \neq \emptyset$ then $\mathbf{m}^*$ is Δ-equidistant with $\Delta > \Delta^f$. This implies that $M_3(\mathbf{m}^*) > M_3(\mathbf{m}_n^f)$. But i_3^f is passive in $\mathbf{m}_n^f$, so i_3^* is passive in $\mathbf{m}^*$ as well. ■

D.3.2 Formal results for "Demographic diversity and representativeness"

Lemma D.4. *For any $j = 1, \dots, n$, $i_j^f < j/(n+1)$ for $i_j^f < 1/2$ and $i_k^f > k/(n+1)$ for $i_k^f > 1/2$.*

Proof of Lemma D.4. In order to show that $i_1^f < 1/(n+1)$, we invoke the first-order condition of Σ with respect to i_1^f. The function

$$g(i_1) := 1 - e^{-i_1/\ell} + \tanh\left(\frac{1-2i_1}{2\ell(n-1)}\right)$$

is strictly increasing in i_1. Moreover, $g(1/(n+1)) > 0$. Because $g(i_1^f) = 0$ by FOC, then $i_1^f < 1/(n+1)$. By a similar argument, $i_n^f > n/(n+1)$. The rest of the claim follows because both $\mathbf{m}_n^f$ and $\{1/(n+1), \dots, n/(n+1)\}$ are symmetric about $1/2$ and $i_n^f - i_1^f > (n-1)/(n+1)$. ■

Lemma D.5. *Let $\mathbf{m} = \{i_1, \dots, i_n\}$. Then, Ψ is given by*

$$\Psi(\mathbf{m}) = \frac{1}{2}\ell\left(1 - e^{-2i_1/\ell}\right) + \frac{1}{2}\ell\left(1 - e^{-2(1-i_n)/\ell}\right) + \sum_{j=2}^{n} \ell + (i_j - i_{j-1})\left(1 - \coth\left(\frac{i_j - i_{j-1}}{\ell}\right)\right).$$

Proof of Lemma D.5. For each $i \in [0,1]$, the distribution of $\beta(i)$ conditional on $\beta(\mathbf{m})$ is Gaussian and it depends only on i's closest neighbors in $\mathbf{m}$. By Gaussian updating, the conditional variance of $\beta(i)$ given $\beta(\mathbf{m})$ is $e^{-(i_1-i)/\ell}$ for $i \in [0, i_1]$, $e^{-(i-i_n)/\ell}$ for $i \in [i_n, 1]$, and

$$\operatorname{csch}\left(\frac{i_j - i_{j-1}}{\ell}\right)\left(\sinh\left(\frac{i_j - i}{\ell}\right)e^{-(i-i_{j-1})/\ell} + \sinh\left(\frac{i - i_{j-1}}{\ell}\right)e^{-(i_j-i)/\ell}\right)$$

for $i \in [i_{j-1}, i_j]$. Integrating over each interval $[0, i_1], [i_1, i_2], \dots, [i_n, 1]$ and adding up these terms gives the desired expression. ■

Example 2 ($\mathbf{m}_4^f$ more Ψ-representative than $\mathbf{m}^*$)**.** Fix $\ell = 3$ and $n = 4$. Figure 8a plots the first-best minipublic, the Ψ-maximal minipublic, and the optimal minipublic for $\tau = 1/2$ and $\bar{B} = 2.5182$. Using the characterization in Lemma D.5, it is straightforward to compute $\Psi(\mathbf{m}_4^f) = 0.968946$ and $\Psi(\mathbf{m}^*) = 0.968806$. Therefore, the first-best minipublic is more representative than the optimal minipublic with respect to Ψ. This is because in the optimal minipublic, the citizens i_2^* and i_3^* are shifted outwards towards the periphery by a large margin relative to the respective second and third citizen in the Ψ-maximal minipublic.

Example 3 ($\mathbf{m}^*$ more Ψ-representative than $\mathbf{m}_4^f$)**.** Following up on Example 2, we keep all parameters the same except for $\bar{B} = 2.517$. The first-best minipublic and the Ψ-maximal minipublic continue to be the same as before, because they depend only on ℓ. The optimal minipublic is distorted in such a way that each citizen in the optimal minipublic is between their counterpart in the first-best minipublic and their counterpart in the Ψ-maximal minipublic (Figure 8b). By a similar calculation, $\Psi(\mathbf{m}^*) = 0.969053 > 0.968946 = \Psi(\mathbf{m}_4^f)$. This is an instance in which the optimal minipublic is more representative than the first-best one with respect to the measure Ψ.

D.4 Formal results for Section 6.2

D.4.1 Private evidence discovery

We consider an alternative game of private evidence discovery in which the timing is as follows: (i) the policymaker chooses $\mathbf{m} \in \mathcal{M}_n$, (ii) each citizen $i \in \mathbf{m}$ decides whether to discover $\beta(i)$, which is observed by the rest of $\mathbf{m}$ but not the policymaker, (iii) a citizen j is drawn randomly with uniform probability from $\mathbf{m}$, (iv) citizen j sends a message $x \in \mathbb{R}$ about the post-minipublic value $\tilde{B} \in \mathbb{R}$ to the policymaker, and (v) the policymaker makes an adoption decision based on her belief $\mathbb{E}[B \mid x]$. A communication strategy for citizen j in (iv) is a distribution $\alpha(\cdot \mid \tilde{B})$ over $x \in \mathbb{R}$. Without loss, each equilibrium message $\tilde{x}$ can be relabelled so that $\tilde{x} = \mathbb{E}[B \mid \tilde{x}]$. An equilibrium is *informative* if there exists at least two equilibrium messages $\tilde{x}_0 \neq \tilde{x}_1$.

Proposition D.3. *In the private evidence discovery game described above: (i) the optimal minipublic is $\mathbf{m}^* = \mathbf{m}_n^f$; (ii) there exists an informative equilibrium in $\mathbf{m}_n^f$; (iii) in any informative equilibrium in $\mathbf{m}_n^f$, each citizen $i_j^f \in \mathbf{m}_n^f$ is active, each citizen follows the same communication strategy α^*, and there exist on-path messages x_0^*, x_1^* such that $\alpha^*(x_0^* \mid B_{\mathbf{m}_n^f}) = 1$ for $B_{\mathbf{m}_n^f} < 0$ and $\alpha^*(x_1^* \mid B_{\mathbf{m}_n^f}) = 1$ for $B_{\mathbf{m}_n^f} > 0$.*

Proof. Fix an arbitrary minipublic $\mathbf{m} \in \mathcal{M}_n$ and let $\hat{\mathbf{m}} \subseteq \mathbf{m}$ be the active minipublic with post-minipublic value $B_{\hat{\mathbf{m}}}$. Consider the following communication strategy: $\alpha(x_0 \mid B_{\hat{\mathbf{m}}}) = 1$ for $B_{\hat{\mathbf{m}}} < 0$ and $x_0 = \mathbb{E}[B \mid B_{\hat{\mathbf{m}}} < 0]$, and $\alpha(x_1 \mid B_{\hat{\mathbf{m}}}) = 1$ for $B_{\hat{\mathbf{m}}} \geqslant 0$ and $x_1 = \mathbb{E}[B \mid B_{\hat{\mathbf{m}}} \geqslant 0]$. Then $x_1 > 0 > x_0$. Also, suppose the policymaker assigns off-path belief $\mathbb{E}[B \mid B_{\hat{\mathbf{m}}} = 0] = 0$ to any other message $x \neq x_0, x_1$. It is straightforward that this strategy is a best response for any randomly drawn citizen $i \in \mathbf{m}$. Therefore, an informative equilibrium exists for any $\mathbf{m}, \hat{\mathbf{m}}$, and $i \in \mathbf{m}$. Now, given $\mathbf{m}, \hat{\mathbf{m}}$, and $i \in \mathbf{m}$, consider an arbitrary informative equilibrium α^* that assigns nonzero probability to messages $\mathcal{X}^* := \{x_0, x_1, \ldots, x_N\}$. Without loss, we can relabel these messages so that $\mathbb{E}[B \mid x_0] < \mathbb{E}[B \mid x_1] < \ldots < \mathbb{E}[B \mid x_N]$, or equivalently, $x_0 < x_1 < \ldots < x_N$. If $\alpha^*(x_k \mid B_{\hat{\mathbf{m}}}) > 0$ for $B_{\hat{\mathbf{m}}} < 0$, then it must be that $x_k \in \arg\min_{x \in \mathcal{X}^*} \mathbb{E}[B \mid x]$ because the probability of adoption $\Pr(c \leqslant x_k)$ is increasing in x_k. This implies that $x_k = x_0$. Hence, $\alpha^*(x_0 \mid B_{\hat{\mathbf{m}}}) = 1$ for any $B_{\hat{\mathbf{m}}} < 0$. By a similar argument, $\alpha^*(x_N \mid B_{\hat{\mathbf{m}}}) = 1$ for any $B_{\hat{\mathbf{m}}} > 0$. Hence the policymaker learns the sign of $B_{\hat{\mathbf{m}}}$. For $B_{\hat{\mathbf{m}}} = 0$, which is realized with zero probability, the citizens are indifferent across all messages. Therefore, in any informative equilibrium, any randomly drawn citizen generically (i.e., up to the message for $B_{\hat{\mathbf{m}}} = 0$) sends at most two messages: $x_0 = \mathbb{E}[B \mid B_{\hat{\mathbf{m}}} < 0]$ for $B_{\hat{\mathbf{m}}} < 0$ and $x_1 = \mathbb{E}[B \mid B_{\hat{\mathbf{m}}} > 0]$ for $B_{\hat{\mathbf{m}}} > 0$.

Next, we establish that in any $\mathbf{m}$ and for any informative equilibrium in the continuation game, every citizen $i \in \mathbf{m}$ is active with probability one. First, for any $\hat{\mathbf{m}} \subseteq \mathbf{m}$, the distribution of $B_{\hat{\mathbf{m}} \cup i}$ is a mean-preserving spread of $B_{\hat{\mathbf{m}}}$. Second, the interim payoff is $B_{\hat{\mathbf{m}}} \Pr(c \leqslant \mathbb{E}[B \mid B_{\hat{\mathbf{m}}} > 0])$ if $B_{\hat{\mathbf{m}}} > 0$ and $B_{\hat{\mathbf{m}}} \Pr(c \leqslant \mathbb{E}[B \mid B_{\hat{\mathbf{m}}} < 0])$ if $B_{\hat{\mathbf{m}}} < 0$. Because this is a piecewise linear function with a lower slope for $B_{\hat{\mathbf{m}}} < 0$, the interim payoff is convex. Hence any citizen $i \in \mathbf{m}$ prefers to be active for any active subset $\hat{\mathbf{m}} \subseteq \mathbf{m}$. Therefore, any $\mathbf{m} \in \mathcal{M}_n$ is active for any informative equilibrium in the continuation game.

Finally, we show that $\mathbf{m}^* = \mathbf{m}_n^f$ for some $\mathbf{m}_n^f \in \mathcal{M}_n^f$. For any $\mathbf{m} \in \mathcal{M}_n$ and $\mathbf{m}_n^f \in \mathcal{M}_n^f$, the distribution of $B_{\mathbf{m}_n^f}$ is a mean-preserving spread of $B_{\mathbf{m}}$. Correspondingly, the distribution that assigns probability 1/2 to two posterior values $\left\{\mathbb{E}[B \mid B_{\mathbf{m}_n^f} < 0], \mathbb{E}[B \mid B_{\mathbf{m}_n^f} > 0]\right\}$ is a mean-preserving spread of the distribution that assigns probability 1/2 to two posterior values $\{\mathbb{E}[B \mid B_{\mathbf{m}} < 0], \mathbb{E}[B \mid B_{\mathbf{m}} > 0]\}$. Therefore, the policymaker strictly prefers the distribution with support $\left\{\mathbb{E}[B \mid B_{\mathbf{m}_n^f} < 0], \mathbb{E}[B \mid B_{\mathbf{m}_n^f} > 0]\right\}$. Hence, $\mathbf{m}^* = \mathbf{m}_n^f$.

■

D.4.2 Biased policymaker and uncertain thresholds for citizens

We enrich the baseline model in two ways. First we let the policymaker's threshold be drawn from $c \sim \mathcal{N}(\bar{c}, \tau^2)$, where $\bar{c} \in \mathbb{R}$ is the ex ante bias of the policymaker. Second, we let citizen i's threshold be drawn from $c_i \sim \mathcal{N}(0, \tau_i^2)$, where $\tau_i \geqslant 0$ is arbitrary across i and c_i is independent from c. We derive the players' payoffs in this general environment and argue that the dependence of the payoffs on Σ continues to be qualitatively the same as in Lemma 3.1 in the baseline model.

Proposition D.4 (Dependence of payoffs on informativeness)**.**

(i) The expected payoff of the policymaker is strictly increasing in Σ.

(ii) The expected payoff of any citizen i *does not depend on* τ_i *and it is strictly quasiconvex in* Σ*, with a minimum at*

$$\underline{\Sigma} = \max\left\{0, \frac{1}{2}\left((\bar{B}-\bar{c})\bar{c} - 3\tau^2 + \sqrt{(\bar{B}-\bar{c})^2\bar{c}^2 + 2(2\bar{B}-3\bar{c})(\bar{B}-\bar{c})\tau^2 + \tau^4}\right)\right\}.$$

Proof of Proposition D.4. (i) Following steps similar to the proof of Lemma A.1, we observe that

$$\Pr\left[B_{\hat{\mathbf{m}}} - c > 0\right] = \Phi\left(\frac{\bar{B}-\bar{c}}{\sqrt{\tau^2 + \Sigma(\hat{\mathbf{m}})}}\right), \quad \mathbb{E}[B_{\hat{\mathbf{m}}} - c | B_{\hat{\mathbf{m}}} - c > 0] = \bar{B} - \bar{c} + \sqrt{\tau^2 + \Sigma(\hat{\mathbf{m}})}\lambda\left(\frac{\bar{c}-\bar{B}}{\sqrt{\tau^2 + \Sigma(\hat{\mathbf{m}})}}\right)$$

where λ is the inverse Mills ratio. Therefore, taking the product of the two expressions, the expected payoff of the policymaker is (suppressing the dependence on $\hat{\mathbf{m}}$)

$$V_P(\Sigma) = \left(\bar{B}-\bar{c}\right)\Phi\left(\frac{\bar{B}-\bar{c}}{\sqrt{\Sigma+\tau^2}}\right) + \sqrt{\Sigma+\tau^2}\phi\left(\frac{\bar{B}-\bar{c}}{\sqrt{\Sigma+\tau^2}}\right).$$

Differentiating V_P with respect to Σ gives

$$\frac{\partial V_P(\Sigma)}{\partial \Sigma} = \frac{\phi\left(\frac{\bar{B}-\bar{c}}{\sqrt{\tau^2+\Sigma}}\right)}{2\sqrt{\Sigma+\tau^2}} > 0.$$

(ii) Citizen i's expected payoff is

$$\begin{aligned}
V_i(\Sigma(\hat{\mathbf{m}})) &:= \int_{-\infty}^{\infty}\int_{-\infty}^{+\infty} \Pr\left[B_{\hat{\mathbf{m}}} - c \geqslant 0\right]\mathbb{E}\left[B_{\hat{\mathbf{m}}} - c_i | B_{\hat{\mathbf{m}}} - c \geqslant 0\right] \mathrm{d}\Phi\left(\frac{c-\bar{c}}{\tau}\right)\mathrm{d}\Phi\left(\frac{c_i}{\tau_i}\right) \\
&= \bar{V}_C(\Sigma(\hat{\mathbf{m}})) - \left(\int_{-\infty}^{\infty}\Pr\left[B_{\hat{\mathbf{m}}} \geqslant c\right]\mathrm{d}\Phi\left(\frac{c-\bar{c}}{\tau}\right)\right)\int_{-\infty}^{\infty} c_i \,\mathrm{d}\Phi\left(\frac{c_i}{\tau_i}\right) \\
&= \bar{V}_C(\Sigma(\hat{\mathbf{m}})) \\
&= \bar{B}\Phi\left(\frac{\bar{B}-\bar{c}}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\right) + \frac{\Sigma(\hat{\mathbf{m}})}{\sqrt{\Sigma(\hat{\mathbf{m}})+\tau^2}}\phi\left(\frac{\bar{B}-\bar{c}}{\sqrt{\Sigma(\hat{\mathbf{m}})+\tau^2}}\right)
\end{aligned}$$

where $\bar{V}_C$ is the expected payoff of citizen i if all citizens' thresholds are deterministically zero, i.e., $\tau_i = 0$ for all $i \in [0,1]$, and hence it is the same for all citizens. The second equality follows from $\mathbb{E}_{B_{\hat{\mathbf{m}}}}[c_i \mid B_{\hat{\mathbf{m}}} - c \geqslant 0] = c_i$ and the third equality uses $\mathbb{E}[c_i] = 0$. Therefore, the expected payoff of citizen i does not depend on τ_i. The expression for $\bar{V}_C$ follows from a similar reasoning to part (i), using the fact that the probability of adoption is the same but the conditional expectation of $B_{\hat{\mathbf{m}}}$ is

$$\mathbb{E}[B_{\hat{\mathbf{m}}} | B_{\hat{\mathbf{m}}} - c > 0] = \bar{B} + \frac{\Sigma(\hat{\mathbf{m}})}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\lambda\left(\frac{\bar{c}-\bar{B}}{\sqrt{\tau^2+\Sigma(\hat{\mathbf{m}})}}\right).$$

Taking the derivative of $\bar{V}_C(\Sigma)$ with respect to Σ gives

$$\frac{\partial \bar{V}_C(\Sigma)}{\partial \Sigma} = \frac{\phi\left(\frac{\bar{B}}{\sqrt{\tau^2+\Sigma}}\right)}{2\left(\tau^2+\Sigma\right)^{5/2}} \left(\Sigma^2 + 2\tau^4 + 3\tau^2\Sigma + (\bar{c}-\bar{B})(\Sigma\bar{c}+\tau^2\bar{B})\right). \tag{11}$$

Then, $\bar{V}_C$ strictly increases in Σ if and only if $\Sigma^2 + 2\tau^4 + 3\tau^2\Sigma + (\bar{c}-\bar{B})(\Sigma\bar{c}+\tau^2\bar{B}) > 0$. Because $\Sigma \geqslant 0$, the only admissible root of $\Sigma^2 + 2\tau^4 + 3\tau^2\Sigma + (\bar{c}-\bar{B})(\Sigma\bar{c}+\tau^2\bar{B}) = 0$ is

$$\Sigma_0 := \frac{1}{2}\left((\bar{B}-\bar{c})\bar{c} - 3\tau^2 + \sqrt{(\bar{B}-\bar{c})^2\bar{c}^2 + 2(2\bar{B}-3\bar{c})(\bar{B}-\bar{c})\tau^2 + \tau^4}\right),$$

so $\underline{\Sigma} = \max\{0, \Sigma_0\}$. Therefore, the citizen's expected payoff is strictly decreasing at $\Sigma \in [0, \underline{\Sigma})$ and strictly increasing at $\Sigma \in (\underline{\Sigma}, \infty)$. ■

The following corollary establishes that if the policymaker's bias is such that she takes a different decision from what citizens prefer ex ante if no evidence is discovered, then any citizen in any minipublic prefers to be active in order to overturn the policymaker's default decision. Therefore, a necessary condition for a distorted optimal minipublic to arise is for the policymaker and the citizens to prefer the same decision ex ante, i.e., $\bar{B} \leqslant \min\{0, \bar{c}\}$ or $\bar{B} \geqslant \max\{0, \bar{c}\}$.

Corollary D.2. *Fix $\bar{c} \in \mathbb{R}$.*

(i) If the citizens and the policymaker prefer different decisions ex ante, i.e., $\bar{c} < \bar{B} < 0$ or $0 < \bar{B} < \bar{c}$, then $\mathbf{m}^* \in \mathcal{M}_n^f$.

(ii) There exists $\bar{b} > |\bar{c}|$ such that if $|\bar{B}| > \bar{b}$ and $sgn(\bar{B}) = sgn(\bar{c})$, then $\mathbf{m}^* = \emptyset$.

Proof of Corollary D.2. (i) If $\bar{c} < \bar{B} < 0$ or if $0 < \bar{B} < \bar{c}$, then $(\bar{c}-\bar{B})(\Sigma\bar{c}+\tau^2\bar{B}) > 0$. Because also $\Sigma^2 + 2\tau^4 + 3\tau^2\Sigma \geqslant 0$, we have that $\partial V_i(\Sigma)/\partial\Sigma > 0$ in equation (11). Hence V_i strictly increases in Σ for any i. This means that in any $\mathbf{m}$, each citizen $i \in \mathbf{m}$ strictly prefer being active to being passive. Therefore, any $\mathbf{m}_n^f \in \mathcal{M}_n^f$ is feasible so $\mathbf{m}^* \in \mathcal{M}_n^f$.
(ii) Without loss, let $\bar{B} > 0$ and $\bar{c} > 0$. Then, for $\bar{B}$ sufficiently high, $\partial V_i(\Sigma)/\partial\Sigma < 0$ in equation (11) for any $\Sigma \in [0, \sigma^2]$. Since citizens' expected payoff is strictly decreasing in informativeness, no minipublic can be incentivized to be active. ■

Suppose $\tau = 0$ and $\bar{c} > 0$, so there is no political uncertainty and the policymaker follows a more demanding threshold on the adoption decision. The citizen's expected payoff is strictly decreasing for low levels of informativeness if and only if $\underline{\Sigma} = \bar{c}(\bar{B}-\bar{c}) > 0$, i.e., if and only if the players are in ex ante agreement about their preferred adoption decision and the citizens lean more strongly toward it. If $\bar{B} \gg \bar{c} > 0$ or $\bar{B} \ll \bar{c} < 0$, then $\underline{\Sigma}$ is sufficiently high and the curse of too little information arises even in the absence of any political uncertainty.

D.4.3 Private interest

This appendix considers a variation of the model in Section 4.2.2 in which citizen i obtains $\beta(i)$ if the policy is adopted (instead of the policy value B) and 0 otherwise. The rest of the structure is the same as in the model of Section 4.2.2. Proposition D.5 shows that a citizen's expected payoff from a minipublic depends on two sufficient statistics: (i) its minipublic informativeness, and (ii) the covariance induced between the citizen's local evidence and the post-minipublic value.

Proposition D.5. *Consider an active minipublic* $\mathbf{m} = \{i_1, \ldots, i_n\} \in \mathcal{M}_n$*. The expected payoff of any citizen* $i \in [0,1]$ *from minipublic* $\mathbf{m}$ *is*

$$V_i(\mathbf{m}) = \bar{B}\Phi\left(\frac{\bar{B}}{\sqrt{\tau^2 + \Sigma(\mathbf{m})}}\right) + \frac{\sigma(i,\mathbf{m})}{\sqrt{\tau^2 + \Sigma(\mathbf{m})}}\phi\left(\frac{\bar{B}}{\sqrt{\tau^2 + \Sigma(\mathbf{m})}}\right) =: \tilde{V}_C(\sigma(i,\mathbf{m}), \Sigma(\mathbf{m})),$$

where $\Sigma(\mathbf{m})$ *is the minipublic informativeness of* $\mathbf{m}$ *as derived in Lemma B.1 and*

$$\sigma(i,\mathbf{m}) := cov(\beta(i), B_{\mathbf{m}}) = \begin{cases} \sqrt{\Sigma(i)} & \text{if} \quad i \in \mathbf{m} \\ \sum_{j=1}^n \gamma_j(\mathbf{m}) e^{-|i-i_j|/\ell} & \text{if} \quad i \notin \mathbf{m}. \end{cases}$$

Proof of Proposition D.5. Fix a post-minipublic value $B_{\mathbf{m}}$. Observing that the joint distribution of $\beta(i)$ and $B_{\mathbf{m}}$ is Gaussian, the interim payoff of citizen i is

$$\begin{aligned} v_i(B_{\mathbf{m}}) &= \mathbb{E}[\beta(i) \mid B_{\mathbf{m}}] \Pr(c \leqslant B_{\mathbf{m}}) \\ &= \left(\bar{B} + \frac{\sigma(i,\mathbf{m})}{\Sigma(\mathbf{m})}(B_{\mathbf{m}} - \bar{B})\right)\Phi\left(\frac{B_{\mathbf{m}}}{\tau}\right) \\ &= \frac{\Sigma(\mathbf{m}) - \sigma(i,\mathbf{m})}{\Sigma(\mathbf{m})}\bar{B}\Phi\left(\frac{B_{\mathbf{m}}}{\tau}\right) + \frac{\sigma(i,\mathbf{m})}{\Sigma(\mathbf{m})}B_{\mathbf{m}}\Phi\left(\frac{B_{\mathbf{m}}}{\tau}\right) \end{aligned}$$

Integrating with respect to the distribution of $B_{\mathbf{m}} \sim \mathcal{N}(\bar{B}, \Sigma(\mathbf{m}))$, we obtain the expected payoff

$$\begin{aligned} V_i(\mathbf{m}) &= \frac{\Sigma(\mathbf{m}) - \sigma(i,\mathbf{m})}{\Sigma(\mathbf{m})}\bar{B}\int_{-\infty}^{\infty}\Phi\left(\frac{B_{\mathbf{m}}}{\tau}\right)\frac{1}{\sqrt{\Sigma(\mathbf{m})}}\phi\left(\frac{B_{\mathbf{m}} - \bar{B}}{\sqrt{\Sigma(\mathbf{m})}}\right)\mathrm{d}B_{\mathbf{m}} + \frac{\sigma(i,\mathbf{m})}{\Sigma(\mathbf{m})}V_C(\Sigma(\mathbf{m})) \\ &= \frac{\Sigma(\mathbf{m}) - \sigma(i,\mathbf{m})}{\Sigma(\mathbf{m})}\bar{B}\Phi\left(\frac{\bar{B}}{\sqrt{\tau^2 + \Sigma(\mathbf{m})}}\right) + \frac{\sigma(i,\mathbf{m})}{\Sigma(\mathbf{m})}V_C(\Sigma(\mathbf{m})) \\ &= \bar{B}\Phi\left(\frac{\bar{B}}{\sqrt{\tau^2 + \Sigma(\mathbf{m})}}\right) + \frac{\sigma(i,\mathbf{m})}{\sqrt{\tau^2 + \Sigma(\mathbf{m})}}\phi\left(\frac{\bar{B}}{\sqrt{\tau^2 + \Sigma(\mathbf{m})}}\right), \end{aligned}$$

where V_C is the citizen's expected payoff from our baseline model of common interest. The first line uses the fact that $V_C(\Sigma(\mathbf{m})) = \mathbb{E}_{B_{\mathbf{m}}}[B_{\mathbf{m}}\Phi(B_{\mathbf{m}}/\tau)]$, the second line follows from identity $(10,010,8)$ in Owen (1981), and the third line uses the expression for $V_C(\Sigma(\mathbf{m}))$. Because $\mathbf{m}$ enters $V_i(\mathbf{m})$ through two sufficient statistics—namely, $\sigma(i,\mathbf{m})$ and $\Sigma(\mathbf{m})$—we can express it as $\tilde{V}_C(\sigma(i,\mathbf{m}), \Sigma(\mathbf{m}))$. Next, if $i \in \mathbf{m}$, then supposing that he is the j^{th} citizen in it, we have

$$\sigma(i,\mathbf{m}) = \mathrm{cov}\left(\beta(i_j), \sum_{k=1}^n \gamma_k(\mathbf{m})\beta(i_k)\right) = \gamma_j(\mathbf{m}) + \sum_{k \neq j}\gamma_k(\mathbf{m})e^{-|i_j - i_k|/\ell} = \sqrt{\Sigma(i_j)}$$

where the last equality follows from calculations in the proof of Lemma B.1. By a similar calculation, if $i \notin \mathbf{m}$, then

$$\sigma(i,\mathbf{m}) = \mathrm{cov}\left(\beta(i), \sum_{k=1}^n \gamma_k(\mathbf{m})\beta(i_k)\right) = \sum_{k=1}^n \gamma_k(\mathbf{m})e^{-|i-i_k|/\ell}.$$

■

Note that $\tilde{V}_C(\Sigma, \Sigma) = V_C(\Sigma)$. In terms of monotonicity, it is immediate that $\tilde{V}_C$ is strictly increasing in its first argument and, similarly to our baseline analysis, quasiconvex in the second argument. We can now rewrite the (ED) constraints for a citizen $i_j \in \mathbf{m}$ based on the payoff characterization of Proposition D.5:

$$\tilde{V}_C\left(\sqrt{\Sigma(i_j)}, \Sigma(\mathbf{m})\right) \geqslant \tilde{V}_C\left(\sigma(i_j, \mathbf{m} \setminus i_j), \Sigma(\mathbf{m} \setminus i_j)\right). \tag{ED}$$

There is a substantial increase in dimensionality of this problem relative to our baseline analysis. The set of (ED) constraints for a minipublic of size n depends on the minipublic through $(3n+1)$ variables (rather than $n+1$ variables under common interest): the active informativeness $\Sigma(\mathbf{m})$, n terms of passive informativeness $\{\Sigma(\mathbf{m} \setminus i_1), \ldots, \Sigma(\mathbf{m} \setminus i_n)\}$, n terms of singleton informativeness $\{\Sigma(i_1), \ldots, \Sigma(i_n)\}$, as well as n covariance terms $\{\sigma(i_1, \mathbf{m} \setminus i_1), \ldots, \sigma(i_n, \mathbf{m} \setminus i_n)\}$.

For a singleton minipublic $\mathbf{m} = \{i\}$, $\sigma(i, \mathbf{m}) = \sqrt{\Sigma(i)}$ and $\sigma(i, \emptyset) = 0$. The (ED) constraint simplifies to $\tilde{V}_C\left(\sqrt{\Sigma(i)}, \Sigma(i)\right) \geqslant \tilde{V}_C(0,0) = V_C(0)$. Because $\Sigma(1/2) > \Sigma(i)$ for any $i \neq 1/2$, the incentives to discover evidence are strongest for this median citizen. Hence, if $n = 1$, the optimal minipublic is either $\mathbf{m}^* = \{1/2\}$ or empty.

For a two-citizen minipublic $\mathbf{m} = \{i_1, i_2\}$, the (ED) constraints for i_1 and i_2 are

$$\tilde{V}_C\left(\sqrt{\Sigma(i_1)}, \Sigma(\mathbf{m})\right) \geqslant \tilde{V}_C\left(\sqrt{\Sigma(i_2)}e^{-(i_2-i_1)/\ell}, \Sigma(i_2)\right),$$

$$\tilde{V}_C\left(\sqrt{\Sigma(i_2)}, \Sigma(\mathbf{m})\right) \geqslant \tilde{V}_C\left(\sqrt{\Sigma(i_1)}e^{-(i_2-i_1)/\ell}, \Sigma(i_1)\right),$$

respectively, whereas the (ED) constraints from our common interest model can be rewritten as

$$\tilde{V}_C(\Sigma(\mathbf{m}), \Sigma(\mathbf{m})) \geqslant \tilde{V}_C(\Sigma(i_2), \Sigma(i_2)), \quad \tilde{V}_C(\Sigma(\mathbf{m}), \Sigma(\mathbf{m})) \geqslant \tilde{V}_C(\Sigma(i_1), \Sigma(i_1)).$$

Example 4. This is a numerical example in which the optimal minipublic is the first-best one under private interest but it is a distorted minipublic under common interest. Let $n = 2$, $\ell = 1/2$, $\tau = 1$, and $\bar{B} = 1.861$. The first-best minipublic is given by $\mathbf{m}_2^f = \{i_1^f, i_2^f\} = (0.274589, 0.725411)$. This first-best minipublic satisfies the (ED) constraints under private interest, hence the optimal minipublic is exactly $\mathbf{m}_{PI}^* = \mathbf{m}_2^f$. However, it violates the (ED) constraints under common interest. The optimal minipublic under common interest is the distorted minipublic $\mathbf{m}^* = \{0.2778, 0.7222\}$.

Example 5. This is a numerical example in which the optimal minipublic is distorted under private interest but it is the empty minipublic under common interest. Let $n = 2$, $\ell = 1/2$, $\tau = 1$, as in Example 4, but now $\bar{B} = 3.02$. The first-best minipublic is not feasible under either private or common interest. Moreover, the prior value $\bar{B}$ is so extreme that the optimal minipublic is $\mathbf{m}^* = \emptyset$ under common interest. However, the optimal minipublic under private interest is $\mathbf{m}_{PI}^* = \{0.285883, 0.714117\}$.

D.4.4 Delegation of decisional authority

We consider an alternative *delegation game*, that varies from our baseline model in who has decisional authority: at the minipublic choice stage, the policymaker also decides whether to delegate ($d = 1$) decisional authority to the minipublic or retain it ($d = 0$). If $d = 0$, the continuation game coincides with our baseline model. If $d = 1$, then at the adoption stage, a randomly drawn citizen (as opposed to the policymaker) in the minipublic decides whether to adopt the policy.[34] We denote the optimal strategy of the policymaker at the minipublic choice stage as d^* and $\mathbf{m}_{del}^*$.

Proposition D.6. *Let $\mathbf{m}^* = \emptyset$ in the baseline model, and $\mathbf{m}_n^f \in \mathcal{M}_n^f$. Then, in the delegation game,*

[34] All citizens are perfectly aligned on which adoption decision they prefer for any post-minipublic value. The assumption of a randomly citizen having decisional authority is for concreteness.

1. *if* $\tau^2 < \Sigma(\mathbf{m}_n^f)$, *then* $d^* = 1$ *and* $\mathbf{m}^*_{del} = \mathbf{m}_n^f$. *The policymaker is strictly better off than in the baseline model.*

2. *if* $\tau^2 > \Sigma(\mathbf{m}_n^f)$, *then* $d^* = 0$ *and* $\mathbf{m}^*_{del} = \emptyset$. *The policymaker has the same payoff as in the baseline model.*

Proof. By the premise, $\mathbf{m}^* = \emptyset$ in the baseline model and $\Sigma(\emptyset) = 0$. Hence, the policymaker's payoff if the decision is not delegated is $V_P(0) = \Pr[c < \bar{B}]\mathbb{E}\left[\bar{B} - c | c < \bar{B}\right] = \bar{B}\Phi\left(\bar{B}/\tau\right) + \tau\phi\left(\bar{B}/\tau\right)$. If the policymaker delegates the decision to a minipublic $\mathbf{m}$, then all citizens in $\mathbf{m}$ are active. Then, the policy gets adopted if and only if $B_{\mathbf{m}} \geqslant 0$, so the policymaker's payoff is

$$V_P^{del}(\Sigma(\mathbf{m})) = \Pr\left[B_{\mathbf{m}} \geqslant 0\right]\mathbb{E}\left[B_{\mathbf{m}} - c | B_{\mathbf{m}} \geqslant 0\right] = \bar{B}\Phi\left(\frac{\bar{B}}{\sqrt{\Sigma(\mathbf{m})}}\right) + \sqrt{\Sigma(\mathbf{m})}\phi\left(\frac{\bar{B}}{\sqrt{\Sigma(\mathbf{m})}}\right).$$

By the same argument as in Section D.4.2, the policymaker's payoff does not depend on τ since $\mathbb{E}[c \mid B_{\mathbf{m}} \geqslant 0] = 0$. The policymaker's payoff V_P^{del} is strictly increasing in $\Sigma(\mathbf{m})$. Therefore, if $d^* = 1$, then $\mathbf{m}^*_{del} \in \mathcal{M}_n^f$. Finally, we observe that $V_P(0) > V_P^{del}(\mathbf{m}_n^f)$ if and only if $\tau^2 > \Sigma(\mathbf{m}_n^f)$. ∎

D.4.5 No commitment in evidence disclosure

The game of Section 2, which the discussion below refers to as the *commitment game*, assumes commitment in evidence disclosure: the outcome of each active citizen is disclosed publicly regardless of its realization. The citizen cannot withhold unfavorable outcome realizations. We examine here the robustness of our analysis to this commitment assumption. To do so, we consider the following *no-commitment game* which differs from the commitment game only at the evidence discovery stage: (i) each minipublic citizen simultaneously decides whether to discover evidence,[35] (ii) each citizen who discovers evidence observes his outcome privately, and (iii) citizens decide simultaneously whether to disclose or conceal their privately observed outcomes. That is, citizens' evidence is verifiable (e.g., as in Milgrom and Roberts (1986)).

Proposition D.7 establishes that for any feasible minipublic in the commitment game, there exists an equilibrium in the no-commitment game in which the policymaker perfectly infers all minipublic outcomes. In particular, this equilibrium guarantees that in the no-commitment game the policymaker can attain at least the same level of informativeness as that of the optimal minipublic in the commitment game.

Assumption 3. *For any* $\mathbf{m}$ *and* $i \in \mathbf{m}$, *the post-minipublic value* $B_{\mathbf{m}}$ *is strictly increasing in* $\beta(i)$.

Proposition D.7. *Suppose that Assumption 3 holds. Let* $\mathbf{m}$ *be any feasible minipublic in the commitment game. Then, in the no-commitment game, there exists an equilibrium for minipublic* $\mathbf{m}$ *in which (i) all citizens in* $\mathbf{m}$ *discover evidence, and (ii) the policymaker infers all outcomes* $\beta(\mathbf{m})$ *perfectly.*

Proof of Proposition D.7. We prove that the following constitutes an equilibrium: (i) each citizen $i \in \mathbf{m}$ discovers evidence, (ii) each citizen $i \in \mathbf{m}$ discloses $\beta(i) \neq x_i$ and conceals $\beta(i) = x_i$, where x_i uniquely solves $\mathbb{E}[B \mid \beta(i) = x_i] = 0$, and (iii) the policymaker adopts the policy if and only if her post-minipublic value is higher than her realized threshold of adoption c.

First, (iii) is a best response for the policymaker. Because there is a single outcome realization $\beta(i) = x_i$ which citizen $i \in \mathbf{m}$ conceals and both disclosure and no disclosure are on the equilibrium path, the

[35] We assume that discovery decisions are observable to the policymaker: she can distinguish between a citizen with no evidence and one who conceals evidence. Yet this assumption is without loss for proposition D.7. If the decision were instead unobservable, it would be weakly dominant for each $i \in \mathbf{m}$ to discover evidence.

policymaker perfectly infers $\beta(\mathbf{m})$ and the post-minipublic value $B_{\mathbf{m}} = \mathbb{E}[B \mid \beta(i), \beta(\mathbf{m} \setminus i)]$. Therefore, she best responds as in the commitment game.

Second, we show that it is a best response for citizen i to disclose $\beta(i)$ if $\beta(i) \neq x_i$ conditional on i having discovered $\beta(i)$ and all other citizens following strategy (ii). Consider first $\beta(i) \neq x_i$. For simplicity of notation, let $\mu := \mathbb{E}[B|\beta(i)]$. The distribution of the post-minipublic value from the perspective of citizen i with evidence $\beta(i)$ is denoted by $B_{\mathbf{m}}|\beta(i)$. Using the law of iterated expectations, we have $\mathbb{E}[B_{\mathbf{m}}|\beta(i)] = \mathbb{E}[\mathbb{E}[B|\beta(\mathbf{m}\backslash i), \beta(i)]|\beta(i)] = \mathbb{E}[B|\beta(i)] = \mu$. Let $\tilde{\Sigma}$ be the variance of $B_{\mathbf{m}}|\beta(i)$, which does not depend on the realization of $\beta(i)$.[36] The random variable $B_{\mathbf{m}}|\beta(i)$ is distributed according to $B_{\mathbf{m}}|\beta(i) \sim \mathcal{N}(\mu, \tilde{\Sigma})$. If citizen i discloses $\beta(i)$, the policymaker's post-minipublic value is $B_{\mathbf{m}}$. By standard Gaussian updating, the post-minipublic value is linear in local evidence. Hence, if i conceals $\beta(i)$, the policymaker's post-minipublic value is $\hat{B}_{\mathbf{m}} = B_{\mathbf{m}} - \lambda$ for some $\lambda \in \mathbb{R}$. That is, concealing $\beta(i)$ shifts the policymaker's post-minipublic value either up or down by $|\lambda|$. By similar calculations as in the proof of Lemma A.1, we calculate the expected payoff of citizen i if he discloses or conceals $\beta(i)$. If he discloses $\beta(i)$, he obtains

$$V_C(\beta(i)) := \mathbb{E}[B_{\mathbf{m}}|B_{\mathbf{m}} \geqslant c, \beta(i)] \Pr[B_{\mathbf{m}} \geqslant c|\beta(i)] = \mu\Phi\left(\frac{\mu}{\sqrt{\tau^2 + \tilde{\Sigma}}}\right) + \frac{\tilde{\Sigma}}{\sqrt{\tau^2 + \tilde{\Sigma}}}\phi\left(\frac{\mu}{\sqrt{\tau^2 + \tilde{\Sigma}}}\right)$$

Similarly, if he conceals $\beta(i) \neq x_i$, he obtains

$$\tilde{V}_C(\beta(i)) := \mathbb{E}[B_{\mathbf{m}}|\hat{B}_{\mathbf{m}} \geqslant c, \beta(i)] \Pr\left[\hat{B}_{\mathbf{m}} \geqslant c|\beta(i)\right] = \mu\Phi\left(\frac{\mu - \lambda}{\sqrt{\tau^2 + \tilde{\Sigma}}}\right) + \frac{\tilde{\Sigma}}{\sqrt{\tau^2 + \tilde{\Sigma}}}\phi\left(\frac{\mu - \lambda}{\sqrt{\tau^2 + \tilde{\Sigma}}}\right)$$

The function $f(a) := \mu\Phi(\frac{a}{\sqrt{\tau^2+\tilde{\Sigma}}}) + \frac{\tilde{\Sigma}}{\sqrt{\tau^2+\tilde{\Sigma}}}\phi(\frac{a}{\sqrt{\tau^2+\tilde{\Sigma}}})$ varies in a depending on the sign of μ and the relation between μ and a:

$$\frac{\partial f(a)}{\partial a} = \phi\left(\frac{a}{\sqrt{\tau^2 + \tilde{\Sigma}}}\right)\frac{\mu(\tau^2 + \tilde{\Sigma}) - a\tilde{\Sigma}}{(\tau^2 + \tilde{\Sigma})^{\frac{3}{2}}}\begin{cases} > 0 \text{ if } \mu > 0 \text{ and } a < \mu, \\ < 0 \text{ if } \mu < 0 \text{ and } a > \mu. \end{cases}$$

Next, we show that $V_C(\beta(i)) > \tilde{V}_C(\beta(i))$ for every $\beta(i) \neq x_i$. Let $\beta(i) > x_i$. Then, by the definition of x_i and Assumption 3, $\mu > 0$ and $\lambda > 0$. This means that disclosing evidence in favor of the policy yields a higher payoff than concealing it, as $f(a)$ is increasing in a for these parameters and $\mu - \lambda < \mu$. Similarly, let $\beta(i) < x_i$. In this case, $\mu < 0$ and $\lambda < 0$. Disclosing evidence in favor of the status quo yields a higher payoff than concealing it. If $\beta(i) = x_i$, then $\lambda = 0$. Then, concealing is a weak best response because $V_C(\beta(i)) = \tilde{V}_C(\beta(i))$.

Finally, we show that (i) holds: it is a best response for citizen i to (privately) discover $\beta(i)$ if all other citizens in $\mathbf{m}$ discover their respective outcomes. Because in the continuation equilibrium (ii) and (iii) all minipublic outcomes $\beta(\mathbf{m})$ are perfectly inferred by the policymaker, citizen i discovers $\beta(i)$ if and only if his (ED) in the commitment game holds. By the premise, every $i \in \mathbf{m}$ in the commitment game is active, hence citizen i prefers to discover $\beta(i)$ in the no-commitment game as well. ■

In this equilibrium, each minipublic citizen $i \in \mathbf{m}$ discloses all but a single outcome realization $\beta(i) = x_i$, which is pinned down by $\mathbb{E}[B \mid \beta(i) = x_i] = 0$. This is the unique realization that leaves him indifferent between the policy and the status quo. To see that this is indeed an equilibrium, consider a minipublic of two citizens $\{i, j\}$. If citizen i conceals evidence in favor of the policy $\beta(i) > x_i$, this encourages the policymaker

[36] The variance $\tilde{\Sigma}$ is independent of $\beta(i)$ because the joint distribution of B and $\beta(i)$ is Gaussian. The functional form of $\tilde{\Sigma}$ is inconsequential for this proof and therefore omitted.

to be more demanding on $\beta(j)$ for adoption because she incorrectly believes that $\beta(i) = x_i$. This has two opposing effects on i's payoff: the expected value of the policy conditional on its being adopted increases, but the probability of such an adoption decreases. The latter effect dominates. Some policies that are preferable to the status quo, given i's favorable evidence, are forgone. Because citizen i's preference is aligned with the policymaker's ex ante, he does not benefit from inducing false pessimism by concealing favorable evidence about the policy. The reasoning is analogous if citizen i holds unfavorable evidence $\beta(i) < x_i$ instead. False optimism from concealing $\beta(i)$ would lead to policy adoption with too high of a probability.

Thus, for any minipublic that is feasible in the commitment game, the policymaker is not worse off if citizens lack commitment in disclosure. However, there might exist minipublics which are not feasible in the commitment game but are informative in the no-commitment game. Therefore, the policymaker attains weakly higher informativeness in the no-commitment game.