Wisdom of the Crowd? Information Aggregation in Representative Democracy

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Abstract

In representative democracy, voters elect candidates who strategically propose policies. In a common value environment with imperfectly informed voters and candidates, we establish that intermediation by candidates can render information aggregation unfeasible even when a large electorate presented with exogenous options would almost always select the correct policy. In fact, the possibility of information aggregation encourages candidates' conformism and stifles the competition among ideas. Neither liberalizing access to candidacy nor introducing additional frictions in voters information guarantees feasible information aggregation. Thus, the political failure we uncover is due to the intermediation by candidates—that is, the nature of representative democracy.

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1 Introduction

Democracy is commonly defended on the ground that elections tend to successfully aggregate dispersed information, thereby protecting societies from policy mistakes (Condorcet, 1785). In modern democracies, however, citizens do not directly vote on policy. Rather, they elect representatives who strategically take policy positions. This paper studies, in the context of a common value environment, whether the desirable properties of direct democracy carry over to representative democracy.

We establish that in a large representative democracy policy mistakes can happen with positive probability, even though the same electorate presented with exogenous options would almost surely select the correct policy. The wisdom of crowd—the possibility of information aggregation—encourages candidates to converge to the ex-ante welfare-maximizing option for electoral reasons. Candidates' strategic conformism then impedes the competition among ideas and renders information aggregation unfeasible: with strictly positive probability, the policy will not be socially optimal. We further show that liberalizing access to candidacy can engender serious coordination failures among potential candidates, which (paradoxically) reduces the degree of electoral competition and exacerbates the risk of policy mistake. The novel political failure we uncover is due to intermediation by candidates, and is thus inherent to representative democracy.

Formally, this paper introduces electoral competition within the set-up of Feddersen and Pesendorfer (1996), a canonical model of information aggregation in elections. There are two possible policy options and an ex-ante unknown state of the world which can take one of two values. All voters prefer the policy to match the realization of the state of the world. Voters can be informed (in which case they learn the realization of the state) or not (in which case they can only rely on their prior). Two candidates competing for office also receive either a perfectly informative signal about the state or no information at all.[1]

If voters were presented with two distinct policy options, as Feddersen and Pesendorfer establish, information aggregation would always be guaranteed: the correct policy would be implemented with probability approaching 1 as the electorate grows large. Our set-up, however, is one of representative democracy where the alternatives offered to the electorate depend on the strategic choices of candidates who value both implementing the correct policy and holding office.

[1] The assumption that candidates' signal fully reveals the state guarantees that the implementation of the wrong policy is not the result of candidates' 'honest mistakes.'

When candidates propose distinct policy options, for all informed voters, it is individually rational to cast a ballot for the candidate offering the correct policy. When candidates converge, in turn, we assume that voters are swayed by a random symmetric valence shock (i.e., toss a fair coin). Given voters' behavior, we first establish that in a large electorate there is no equilibrium in which candidates propose divergent policies. An informed candidate who promises the wrong policy would rather offer the correct option for electoral reasons (he is almost certain to lose the election otherwise) as well as policy reasons (he suffers a cost when he wins). This failure to sustain divergence is not necessarily bad for voters: convergence can result from both candidates observing the state and committing to the optimal policy. But candidates are not always informed, and their behavior when uninformed is critical for the feasibility of information aggregation.

Information aggregation requires candidates to propose divergent policies when uninformed about the realized state of the world. But is it in the interest of an uninformed candidates to behave this way? The answer depends on the balance between electoral incentives and the payoff loss associated with implementing the wrong policy. If one policy option is ex-ante more likely to be correct (henceforth, the 'ex-ante popular policy'), the candidate proposing the unpopular option can improve his electoral chances by switching policy. This deviation, however, comes at a cost: the possibility of a policy mistake when both candidates are uninformed *and* the ex-ante less likely state of the world is realized. If electoral incentives are strong enough, uninformed candidates nevertheless converge to the ex-ante popular policy, thereby rendering information aggregation unfeasible. *In any equilibrium* (in particular, whether or not voters play a symmetric voting strategy conditional on divergence), the probability that the correct policy is implemented is bounded away from one regardless of the electorate's size.

Our theoretical results uncover a novel form of political failure. The possibility of information aggregation can paradoxically stifle competition among ideas by encouraging excessive conformism among candidates. As some policy options are no longer proposed, information aggregation becomes unfeasible in equilibrium. In two extensions of our baseline setting, we ask whether facilitating access to candidacy or reducing voter information can restore the role of elections as a "marketplace of ideas."

In our first extension, we show that removing restrictions on candidacy does not guarantee that the correct policy is always offered to the electorate. Far from it. The presence of electoral institutions (such as parties or primaries) limiting access to candidacy can benefit voters. By providing benefits from office, parties can avoid the "volunteer dilemma," whereby all citizens want the correct policy to be implemented, but everyone would like someone else to run for office and bear the associated cost. But even when citizens enjoy a net benefit from holding office, parties can be helpful in coordinating entry and increasing the chances that informed citizens run on the correct policy. Finally, we show that the possibility of third candidate entry in the presence of two established parties can also impede information aggregation by reducing the cost of policy mistake, and thus increasing the relative benefit of conformism. Our paper thus uncovers a novel normative argument for delegating candidate selection to strong parties.

In our second extension, we consider voters who imperfectly observe not only the state of the world, but also candidates' platforms (consistent with evidence in, e.g., Campbell et al., 1980; Delli Carpini and Keeter, 1996). Restricting attention to voter symmetric strategies, we establish that our results continue to hold as long as a voter cannot fully infer candidates' platforms from her knowledge of the state (e.g., candidates make mistakes with arbitrarily small probability). As in Feddersen and Pesendorfer (1996), voters who do not observe the state abstain in order to minimize the risk of a policy mistake and let well-informed voters decide the outcome of the election. But so do voters who observe the state realization but not the platforms. Rather than being afraid of picking the wrong policy, they fear voting for the wrong candidate (i.e., whose policy does not match the state). As a result, only voters who observe the state and (at least) one platform cast a vote, and candidates' electoral incentives remain unchanged compared to the baseline model.[2]

Our two extensions combined stress that the unfeasibility of information aggregation is due to the nature of representative democracy (intermediation by candidates), rather than errors on the part of the electorate.

Our work builds upon and is connected to a large body of work on electoral institutions. Starting with Austen-Smith and Banks (1996), an important game-theoretic literature has examined whether information can be aggregated in large electorates. Several scholars consider private value environments in which voters have divergent policy preferences (e.g., Castanheira, 2003a,b; Gül and Pesendorfer, 2009; Meirowitz and Shotts, 2009; Myatt, 2016; Acharya, 2016). In these papers, the main question is of full information equivalence: is *the majority's* decision the same with perfect and imperfect information? Due to the conflict of interests between voters, infor-

[2]Given our equilibrium restriction to symmetric voting strategies, this result, however, should be seen as a lower bound suggesting that reducing voter information is, at worst, inconsequential.

mation equivalence is not guaranteed, especially when voters' evaluation of a policy is different conditional on receiving the same information (Bhattacharya, 2013a,b; Ali et al., 2017).

This paper, instead, considers a common value environment: all voters agree ex-post on the correct policy. Several important contributions have shown that a large electorate almost always selects the right policy when faced with exogenous options (e.g., Feddersen and Pesendorfer, 1997; Wit, 1998; Myerson, 1998; McMurray, 2012) and no second-order uncertainty (Mandler, 2012). In particular, a sufficient condition, satisfied in our setting, is that the signal and policy spaces have the same cardinality (Barelli et al., 2017).[3]

A few papers incorporate strategic politicians in common value environments. Razin (2003) and McMurray (2017b) show that when candidates can adjust their policies after observing vote tallies, information aggregation is feasible only if politicians share voters' preferences.[4] Battaglini (2017) shows that this problem is especially acute when the decision-maker cannot commit to a decision-rule and voter information is noisy. Our set-up is immune to these issues, since candidates' policy preferences coincide with voters' and informed voters can perfectly observe the state.

An important feature of our model is that candidates strategically propose their platforms ex-ante, rather than adjusting their policy as a function of the electoral results. With a single strategic proposer, Bond and Eraslan (2010) show that by inducing more moderation, unanimity can be more beneficial for voters than majority rule. In a setting with electoral competition, Martinelli (2001) and Laslier and Van der Straeten (2004) highlight how voter information can discipline politicians with distinct preferences than the electorate's.[5] In contrast, Kartik et al. (2015) shows that office-motivated candidates tend to posture and over-react to their information when voters can only rely on their prior. Our results, instead, establish that candidates with the same policy preferences as voters' become too conformist because of the possibility of information aggregation.

[3] With exogenous options, as Piketty (2000) establishes, information aggregation may nonetheless fail whenever the electorate must vote in multiple elections as voters use the first election to coordinate electoral decisions in the second election. Lohmann (1994), however, shows that costly political actions can serve as a coordination device then.

[4] In a similar vein, Shotts (2006) highlights that when there are multiple elections, voters can induce candidates' moderation in the second election by choosing the appropriate voting strategy (including abstention) in the first election. Aytimur and Bruns (2015) show that a large electorate is able to aggregate information to encourage more effort from an incumbent in a principal-agent setting.

[5] Gül and Pesendorfer (2009) shows that the electorate may not be able to discipline politicians when voters do not always learn candidates' platforms. However, only one candidate is strategic in their setting.

Closest to our approach are Gratton (2014) and McMurray (2017a). Both find that electoral competition benefits an imperfectly informed electorate. Gratton (2014) establishes that well-informed candidates provide higher welfare relative to direct democracy, owing to politicians' ability to pick the right policy among many alternatives. McMurray (2017a) finds that poorly informed candidates always provide voters with a meaningful choice among a continuum of policy options when states of the world are symmetrically distributed. Because our interest lies in information aggregation (which is less easily defined in settings with a continuum of policy options), we restrict our analysis to a binary policy space and show that the positive effects of electoral competition that these authors document are not robust to imperfectly informed candidates and asymmetrically distributed states of the world.[6]

The paper proceeds as follows. The next Section describes the model. Section 3 contains our main results on information aggregation when candidates have the same policy preferences as voters', but also care about holding office. Section 4 discusses our extensions on access to candidacy and voter information. Section 5 concludes. Proofs for Section 3 are in the Appendix. All remaining proofs and additional extensions are collected in an Online Appendix.[7]

2 Model

The game features an electorate composed of $2n + 1$ citizens and two candidates (A and B) competing for an elected office. Candidate $J \in \{A, B\}$ chooses a platform $x_J \in \{0, 1\}$. Each citizen $i \in N$ has a chance to make an electoral decision $a_i \in \{\phi, A, B\}$, where ϕ denotes abstention and $J \in \{A, B\}$ a vote for J. The impact of platform x_J depends on the realization of an underlying state of the world $z \in \{0, 1\}$, picked by Nature at the beginning of the game. We assume that policy 0 is ex-ante unpopular and 1 ex-ante popular: the common knowledge prior satisfies $Pr(z = 0) = \alpha < 1/2$.

We suppose that all citizens share the same policy preference (i.e., we focus on a common value environment when it comes to the electorate): all want the policy choice to match the realization

[6]Information aggregation is always feasible in our baseline setting when politicians are always informed or the states are symmetrically distributed, in line with Gratton's and McMurray's results. We expect our logic to hold in their set-ups provided the notion of information aggregation can be extended to a continuum of policy options. More generally, a version of our results hold for any finite set of policy options. We focus on binary alternative to simplify the analysis and the comparison with direct democracy.

[7]Available at the following link: `goo.gl/UAhGbF`

of the state. Citizen i's preferences can then be represented by the following utility function:

$$U(x,z) = \begin{cases} 0 & \text{if } x = z \\ -1 & \text{if } x \neq z \end{cases} \tag{1}$$

As in Feddersen and Pesendorfer (1996), we assume that citizen i is selected by Nature to vote with probability $1 - p_\phi$ (p_ϕ corresponds, e.g., to the probability of being sick on the day of the vote). Henceforth, we refer to selected citizens as voters. This assumption guarantees that a voter is always pivotal with strictly positive probability for any finite n.

Candidates share voters' policy preferences, but also value holding office. Formally, candidate J' utility function assumes the following form:

$$U_J(x,z,e) = \begin{cases} \omega + (1-\omega)U(z,x) & \text{if } e = J \\ (1-\omega)U(z,x) & \text{otherwise} \end{cases}, \tag{2}$$

where e denotes the identity of the elected candidate and $\omega \in [0,1]$ captures the extent of candidates' office motivation relative to their policy payoff.

After the realization of the state of the world z, citizens and candidates receive a signal of z. Before choosing his platform x_J, candidate $J \in \{A, B\}$ observes a message $m_J \in M := \{\emptyset, 0, 1\}$. Similarly, citizen i receives a message $m_i \in M$ before being selected by Nature and eventually making her electoral decision. Message $m \in \{0,1\}$ fully reveals the realized state of the world—$Pr(z = y|m = y) = 1,\ y \in \{0,1\}$—, whereas message $m = \emptyset$ is completely uninformative—$Pr(z = 0|m = \emptyset) = \alpha$. All messages are independently drawn conditional on the realized state of the world. It is common knowledge that candidate J is informed with probability $\pi \in (0,1)$—$Pr(m_J = \emptyset) = 1 - \pi$—and citizen i is informed with probability $q \in (0,1)$—$Pr(m_i = \emptyset) = 1 - q$.

To summarize the timing of the game is:

1. Nature draws $z \in \{0,1\}$;
2. Candidate $J \in \{A, B\}$ privately observes his signal $m_J \in M$. He then chooses $x_J \in \{0,1\}$;
3. Citizen $i \in N$ observes $m_i \in M$, and $(x_A, x_B) \in \{0,1\}^2$. She is then selected to vote with probability $1 - p_\phi$, and if so makes her electoral decision $a_i \in \{\phi, A, B\}$. Otherwise, she does not vote;

4. The candidate who receives the most votes is elected (with ties decided by a fair coin toss) and implements his platform;
5. The game ends and payoffs are realized.

The equilibrium concept is Perfect Bayesian Nash Equilibrium (PBE). We impose two additional refinements. First, we assume that voters receive a negligible (and unmodeled) symmetric valence shock determining their electoral decision when indifferent. This assumption is equivalent to voters randomizing uniformly between candidates when the latter converge to the same policy.[8]

Second, we assume that both candidates face an arbitrarily small probability of mistake $\delta > 0$ (i.e., with probability δ, J proposes $y \in \{0, 1\}$ when his strategy prescribes $x \neq y$). This refinement is close in spirit to trembling hands with an important caveat: we do not take the limit of δ to 0.[9] This restriction implies that, whatever their prescribed strategies, candidates' platforms never fully reveal the state and thus leave a role for information aggregation by the electorate. It also guarantees that an equilibrium exists for all parameter values even after restricting voters' strategy. Importantly, the possibility of mistake plays no role in establishing the unfeasibility of information aggregation with strategic candidates.

In what follows, the term 'equilibrium' refers to PBE satisfying these two additional requirements. Unlike the rest of the literature, we generally dispense with the assumption of symmetric voting strategies (conditional on information and candidates' divergence) and only impose this restriction for some auxiliary results, in which case we explicitly refer to *voter-symmetric* equilibria.

Throughout the paper, we make use of the following notation. In a size $2n + 1$ electorate, for each candidate J, a pure strategy is a mapping $x_J^n : M \to \{0, 1\}$. A mixed strategy is denoted by $\gamma_J^n : \{0, 1\} \times M \to \Delta[\{0, 1\}]$. For each voter i, a pure strategy is a mapping $a_i^n : M \times \{0, 1\}^2 \to \{\phi, A, B\}$ and a mixed strategy is denoted by $\tau_i^n : \{\phi, A, B\} \times M \times \{0, 1\}^2 \to \Delta[\{\emptyset, A, B\}]$. A tuple of strategies takes the form $\gamma^n := (\gamma_A^n, \gamma_B^n)$ for candidates and $\tau^n = \{\tau_i^n\}_{i=1}^{2n+1}$ for voters. In what follows, we say that a candidate *follows his signal* if $x_J^n(m) = m \in \{0, 1\}$, $J \in \{A, B\}$ and

[8] This assumption guarantees that voters are unable to coordinate conditional on convergence. Our main conclusion no longer holds when voters can play coordinated strategies (see Online Appendix B.2). As extensively discussed in Online Appendix B.3, coordinated voters' behavior requires perfect indifference, whereas our results continue to hold substantively if voting behavior is affected by any kind of additional non-policy considerations.

[9] Matějka and Tabellini (2016) also assume that candidates make mistakes to generate rational inattention in probabilistic voting models. Alternatively, we could have assumed that voters face a small probability of misperceiving candidates' platforms. In our extensions, however, we choose another approach to introduce frictions in voter information about candidates' actions.

an informed voter *follows her signal* if she votes for the candidate proposing the correct policy conditional on divergence (the definition is vacuous when candidates' platforms converge).

We now introduce our notion of information aggregation by adapting Battaglini's (2017) definition to our setting. Let $Pr(x, z; \gamma^n, \tau^n, \delta)$ be the probability that policy $x \in \{0, 1\}$ is implemented in state $z \in \{0, 1\}$ when candidates play strategy profile γ^n, voters play strategy profile τ^n in an electorate of size $2n + 1$, and the probability of mistake is δ. The probability that the correct policy is implemented is then:

$$Q(\gamma^n, \tau^n, \delta) = \alpha Pr(0, 0; \gamma^n, \tau^n, \delta) + (1 - \alpha)Pr(1, 1; \gamma^n, \tau^n, \delta).$$

Definition 1. *Information aggregation is feasible if and only if for all $\epsilon > 0$, there exists $\delta(\epsilon) > 0$ and a sequence of equilibria $\{\gamma^n, \tau^n\}_{n=0}^{\infty}$ such that $\lim_{n\to\infty} Q(\gamma^n, \tau^n, \delta(\epsilon)) > 1 - \epsilon$.*

Notice that Definition 1 only requires the existence of a sequence of equilibria in which the probability that the policy outcome matches the state-contingent optimum converges to 1. We naturally extend the definition by stating that information aggregation is feasible for the sequence of equilibria $\{\tilde{\gamma}^n, \tilde{\tau}^n\}_{n=0}^{\infty}$ if and only if all $\epsilon > 0$, there exists $\delta(\epsilon) > 0$ such that $\lim_{n\to\infty} Q(\tilde{\gamma}^n, \tilde{\tau}^n, \delta(\epsilon)) > 1-\epsilon$.

Before proceeding to the analysis, two remarks are in order. First, our approach can be understood as introducing representative democracy into Feddersen and Pesendorfer's (1996) framework (with no partisan voters): policy options are endogenous to candidates' choices.[10] This provides a clear baseline and a clean interpretation for our findings. As Feddersen and Pesendorfer (1996) establish, when voters are presented with two exogenous and distinct alternatives, information aggregation is feasible. Departures from this result can only be attributed to the intermediation by candidates. In addition, the assumption that informed candidates perfectly learn the state of the world stacks the model against finding that information aggregation is unfeasible, relative to a setting with noisy information.[11]

Second, the model allows candidates to have access to better information than the average citizen (i.e., we can have $\pi > q$). This assumption captures a variety of political institutions (e.g.,

[10]Partisan voters can only impede information aggregation, and so their presence could only reinforce our main result.

[11]If candidates received a noisy signal of the realization of the state of the world, there would be a risk of candidates' honest mistakes: both candidates propose the same mistaken platform while following their signal (details available upon request). Not so much in our set-up: as long as at least one candidate is informed and follows his signal, information aggregation is guaranteed.

parties, primaries) that, in practice, are responsible for supporting and screening candidates. We discuss the role of these institutions in greater detail in Section 4.

3 Electoral incentives and information aggregation

As noted above, if voters are presented with distinct alternatives, information aggregation is feasible. We therefore first ask whether candidates have electoral incentives to propose divergent platforms (i.e., $x_A(m_A) \neq x_B(m_B)$ for all $(m_A, m_B) \in M^2$) thereby decentralizing information aggregation to the electorate. Our first result establishes that if information aggregation is feasible, it must be that informed candidates must follow their signals.

Proposition 1. *In any sequence of equilibria for which information aggregation is feasible, there exists $\overline{n}^{inf}$ such that for all $n \geq \overline{n}^{inf}$, the platform choice of a candidate $J \in \{A, B\}$ satisfies: $x_J(m) = m$ for $m \in \{0, 1\}$.*

To understand this result, suppose that A receives message $m = 1$. Candidate A prefers $x = 1$ to $x = 0$ for electoral and policy reasons. From an electoral perspective, in a large electorate his winning probability when proposing $x_A = 1$ is at least $1/2$ (strictly higher whenever B proposes 0 with positive probability, since the electorate aggregates information), whereas it is *at most* $1/2$ when proposing $x_A = 0$ (strictly lower if B proposes 1 with positive probability). From a policy perspective, in a large electorate, the probability of a policy mistake is almost zero when proposing $x_A = 1$ (due to the feasibility of information aggregation), whereas A would suffer a policy loss whenever he wins the election after proposing $x_A = 0$.

A direct consequence of Proposition 1 is that in a large electorate divergent platforms cannot be part of an equilibrium whenever information aggregation is feasible. Equilibria with strategic candidates are thus qualitatively distinct from the ones arising in set-ups with exogenous policy options.

Corollary 1. *In any sequence of equilibria for which information aggregation is feasible, there exists $\overline{n}^{inf}$ such that for all $n \geq \overline{n}^{inf}$ in equilibrium candidates do not propose divergent platforms.*

Corollary 1 indicates that intermediation by candidates reduces the competition among ideas in elections. However, this is not necessarily detrimental for the electorate. In fact, fully divergent platforms are not incentive compatible because informed candidates have too much incentive to act on their knowledge of the realized state of the world. This tends to benefit voters: with probability at least $\pi^2(1-\delta)^2$, both candidates offer the correct policy. To understand whether information aggregation is feasible, we need to consider *all candidates' strategy profiles*; some of them could be better for the electorate than divergent platforms.

Our next result establishes that even after considering all candidates' strategy profiles and voters' electoral decisions conditional on divergence, full information aggregation is not always feasible.

Proposition 2. *Information aggregation is feasible if and only if*

$$\frac{\omega}{1-\omega} < \frac{2\alpha}{1-2\alpha}(1-\pi). \tag{3}$$

Information aggregation is feasible only if uninformed candidates offer divergent platforms with probability one (otherwise, there is a strictly positive probability that they converge to the wrong policy, which leads to a violation of Definition 1). Proposition 2 establishes that this behavior is not always incentive compatible in a large electorate.

To make sense of Equation 3, suppose without loss of generality that for n large enough, $x^n_A(\emptyset) = 0$ and $x^n_B(\emptyset) = 1$ (recall that by Proposition 1, $x^n_J(m) = m,\ J \in \{A, B\},\ m \in \{0, 1\}$). By choosing $x_A = 0$, as n goes to infinity, an uniformed A has a chance of winning only if $z = 0$: with probability 1 when candidate B offers platform $x_B = 1$ (probability $\alpha(1-\pi)$) and with probability 1/2 when B learns the state and also chooses platform $x_B = 0$ (probability $\alpha\pi$). This results in an overall expected winning probability of $\alpha[(1-\pi)+\pi/2]$. When he deviates to $x_A = 1$, an uninformed A wins with probability 1/2 only when B also chooses $x_B = 1$, which occurs when either the state is $z = 1$ (probability $1-\alpha$) or when the state is $z = 0$ but B is uninformed (probability $\alpha(1-\pi)$). This results in a higher expected winning probability: $(1-\alpha)/2+\alpha(1-\pi)/2$. The electoral benefit of deviating to $x_A = 1$ is thus $\left(\frac{1}{2}-\alpha\right)\omega$.

However, this deviation also carries a risk of having the wrong policy implemented, which occurs when the state is $z = 0$ and B is uninformed (probability $\alpha(1-\pi)$). The expected policy loss is then $\alpha(1-\pi)(1-\omega)$. Combining the two, we obtain that information aggregation is feasible if and only if the cost of policy mistake dominates the electoral benefit of proposing $x_A = 1$: $\left(\frac{1}{2}-\alpha\right)\omega < \alpha(1-\pi)(1-\omega)$. Simple rearranging then yields the condition in Proposition 2. When

Equation 3 does not hold, uninformed candidates have too much incentives to be conformist and propose the ex-ante popular policy $x = 1$.[12]

A direct implication of Proposition 2 is that information aggregation is never feasible with purely office-motivated candidates ($\omega = 1$). Electoral incentives work through office-motivation. When candidates only care about winning, the best way to achieve their objective is to be conformist and propose the ex-ante popular alternative. As in a Downsian framework with uncertainty over voters' preferences (Bernhardt et al., 2009), candidates' policy motivation is critical for the well-functioning of representative democracy.

Corollary 2. *When $\omega = 1$, information aggregation is never feasible.*

We next consider equilibria when information aggregation is unfeasible (i.e., Equation 3 does not hold). As in Feddersen and Pesendorfer (1996), we restrict attention to symmetric voting strategies. Observe that voters can never infer the state from proposed platforms, since candidates make mistakes with small but positive probability. Uninformed voters always face the risk of making an electoral mistake after conditioning on the event that they are pivotal. To avoid this, they abstain and delegate electoral decision-making to the informed voters in a large electorate: abstention by uninformed—commonly referred to as the swing voter's curse (Feddersen and Pesendorfer, 1996)—holds in our setting (see Lemma 1 in the Appendix for a formal statement and proof). Consequently, the probability that the correct policy is chosen goes to 1 *conditional on divergence*.

Anticipating voters' behaviors and its consequences, uninformed candidates have too much incentive to behave with conformity in a large electorate. As a result, for high enough n the unique voter-symmetric equilibrium features uninformed candidates proposing the ex-ante popular policy $x = 1$ (i.e., $x^n_A(\emptyset) = x^n_B(\emptyset) = 1$), whereas informed candidates follow their signal (i.e., $x^n_J(m) = m$, $J \in \{A, B\}$ $m \in \{0, 1\}$).[13] Our analysis thus establishes a lower bound on the quality of information aggregation. While not always guaranteed, in the limit the correct policy is implemented whenever

[12]Observe that when the state is distributed uniformly ($\alpha = 1/2$), full information aggregation is always feasible as in McMurray (2017a).

[13]The assumption that candidates make mistakes with probability δ is essential for the existence of a voter-symmetric equilibrium for sufficiently large n. Absent mistake, in the strategy profile described in the text, platform $x = 0$ fully reveals the state is $z = 0$. In this case, uninformed voters have a dominant strategy to vote for the candidate proposing $x = 0$, which in turns creates an incentive for uninformed candidates to deviate from their prescribed strategies and choose $x = 0$ (if $q < 1 - q$, a candidate proposing $x = 0$ against an opponent proposing $x = 1$ is certain to win the election as $n \to \infty$ regardless of the state). Equilibrium existence then is not guaranteed for all parameter values. Introducing mistakes eliminates this problem for large enough electorates. An equilibrium may not exist only for relatively small n. In that case, we can assume that the electorate is sufficiently large to begin with to reestablish the result. Since we are concerned with information aggregation or lack thereof in the limit, this is with little loss of generality.

at least one candidate is informed. As a result, the quality of equilibrium electoral decision-making is strictly increasing with π.

Corollary 3. *If $\frac{\omega}{1-\omega} < \frac{2\alpha}{1-2\alpha}(1-\pi)$, in the unique voter-symmetric sequence of equilibria, the limit probability that the correct policy is implemented is strictly increasing with π.*

Combining Proposition 2 and Corollary 3, our analysis highlights that a large probability that candidates are informed (π) is a mixed blessing for the electorate (see Figure 1 for an illustration). On the one hand, fixing candidates' equilibrium behaviors, the probability that the correct policy is implemented increases with π (since informed candidates propose the correct policy in equilibrium). On the other hand, a high π reduces the policy loss associated with deviation and thus encourages conformism by uninformed candidates (the condition for information aggregation to be feasible becomes tighter).[14] Due to this second effect, an increase in π can lead to a significant decrease in voters' expected utility, an affine transformation of the probability of policy mistake. For example, in Figure 1, the probability that the correct policy is implemented in the limit of a voter-symmetric sequence of equilibria is 99% when π tends to 0 and approximately 92% when $\pi = 0.5$, a drop of around 6.5%.

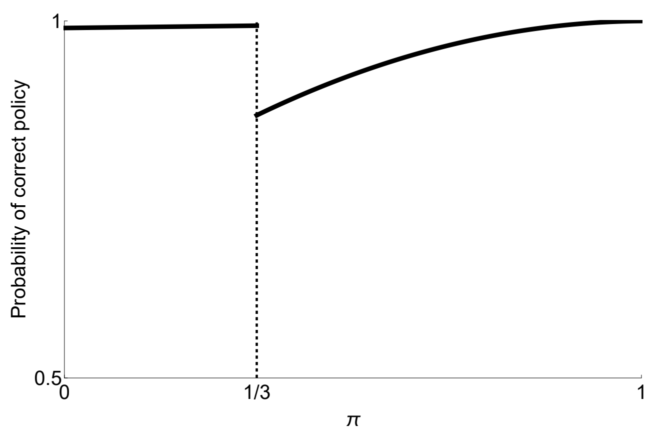

Figure 1: Probability the correct policy is implemented in the limit

The figure represents probability the correct policy is implemented ($Q(\gamma^n, \tau^n, \delta)$) as n goes to infinity in voter-symmetric equilibria. Parameter values $\alpha = 0.3$, $\omega = 0.5$, $\delta = 0.01$.

[14]Using the proof of Corollary 3, it can further be checked that information aggregation is feasible when candidates are always informed ($\pi = 1$) in line with results in Gratton (2014).

4 Access to candidacy and voter information

The previous section establishes that in representative democracy, electoral incentives encourage candidates' conformism, which can stifle competition among ideas and render information aggregation unfeasible. Our baseline model, however, essentially assumes a duopoly (i.e., two parties) in the supply of candidates. Party control over access to candidacy, we assumed, can improve choice over an individual citizen's wisdom (if $\pi > q$), but does not fully eliminate the need for elections ($\pi < 1$). In our first extension, we study whether liberalizing access to candidacy can restore the competition among ideas and thus information aggregation. In a second, extension we consider whether reducing voters' information can reduce candidates' incentive to be conformist. Online Appendix A contains the formal analysis of both extensions and all proofs.

Access to candidacy

Our baseline framework presupposes the presence of political institutions that perform two roles: they restrict entry to two candidates, and they (possibly) provide benefits from office. In this subsection, we discuss whether the political failure we uncover in Proposition 2 is resolved when we liberalize access to candidacy.

Consider first a setting in which candidacy is fully decentralized. Building on citizen-candidate models (Osborne and Slivinski, 1996; Besley and Coate, 1997), we assume that each citizen simultaneously decides whether to run at cost $c \in (0, 1)$ after observing her message $m \in M$. While citizens in traditional citizen-candidate approaches are ideologically differentiated, in this model, all citizens agree ex-post on the correct policy (see Equation 1). As a consequence, the entry game resembles a volunteer's dilemma: each voter wants the correct policy to be implemented, but would prefer somebody else to run. Volunteer games have well-known properties. In any sequence of symmetric equilibria, the probability at least one citizen runs is strictly decreasing with the size of the electorate (even after restricting entry to informed citizens). Far from encouraging competition, liberalizing entry may deplete the marketplace of ideas.

We further show that focusing on asymmetric equilibria—in which a few citizens are "designated" to run—cannot fully resolve the issue. Indeed, unlike a classical volunteer's dilemma where one volunteer suffices, information aggregation is feasible only if two citizens enter. But the citizen assigned to propose the ex-ante unpopular policy has little incentive to do so if uninformed since he always pays the cost $c > 0$, but is pivotal for information aggregation only if the state is $z = 0$; that is, only with probability $\alpha < 1/2$.

The analysis thus reveals that the benefit of holding office—at the core of the political failure we identify (Corollary 2)—is also key to encourage entry and permit information aggregation. An intrinsically valuable office, however, is not sufficient. There is no sequence of equilibria in which all informed voters run with probability one as the electorate grows large. An informed citizen always pays the cost of entry, but his probability of winning the valuable office tends to zero as n approaches infinity (in addition, the cost of not running in term of policy mistakes also tends to zero). In any symmetric equilibrium, informed voters must thus randomize between entering and staying out. But an informed citizen is then willing to enter only if the risk of policy mistake is non null. Hence, the existence of any symmetric equilibrium with positive probability of entry *requires* information aggregation to be unfeasible. In turn, benefits from office facilitate (in the sense of set inclusions), but do not guarantee information aggregation when a subset of citizens are designated to be candidates. In particular, these benefits must not be too high, or they risk encouraging too many entrants and generating the same coordination problem as in symmetric equilibria.

By offering rents from office and favoring coordination, political institutions that restrict entry (e.g., parties' monopoly on candidates' supply) may benefit rather than hurt the electorate. But should entry be limited to two candidates? Or would it be beneficial to allow for third candidate entry (a best case scenario by the reasoning above)? In a third extension, we show that partially liberalized access to candidacy—a possibly informed politician C chooses whether to run (at a cost c) after A and B commit to their platforms—has ambivalent effect on information aggregation. When the cost of entry is very low, C always enters and information aggregation is always feasible. When it is intermediate, C's presence can actually render information aggregation *harder* to achieve (i.e., the condition for feasible information aggregation is more stringent than Equation 3), by reducing the likelihood of a policy mistake when A and B converge to the ex-ante popular policy.

In summary, liberalizing access to candidacy is not a panacea to restore competition among ideas. While directly responsible for the political failure we uncover, political institutions that provide a benefit from office and restrict entry to two candidates may nonetheless improve the performance of elections as a marketplace of ideas. They serve to facilitate coordination on designated candidates and to guarantee that some candidates may actually run. Our paper thus provides a novel normative rationale for delegating candidate selection to strong parties.

Imperfectly observed platforms

In this subsection, we investigate whether additional imperfections in voter information can reduce (uninformed) candidates' incentives to play conformist strategies. We assume that voters do not necessarily observe what policy candidates stand for, in line with decades of survey evidence (e.g., Campbell et al., 1980; Delli Carpini and Keeter, 1996).

Formally, we assume that before making her electoral decision, each voter observes two messages: (i) $m \in M$ and (ii) $r \in \{(\emptyset, \emptyset), (\emptyset, x_B), (x_A, \emptyset), (x_A, x_B)\}$. The first message m reveals the state z if $m \neq \emptyset$ and has similar properties as in the baseline set-up. The second message $r = (r_A, r_B)$ fully reveals the platform of candidate $J \in \{A, B\}$ if and only if $r_J \neq \emptyset$. We assume that platform learning is i.i.d. across voters and satisfies: $Pr(r_J = x_J) = p \in (0, 1)$, $J \in \{A, B\}$ (the baseline model has $p = 1$).

Even when a voter does not observe x_J, she updates about candidates' behavior from her knowledge of the state. As such, partially informed voters who observe $m = z$, but not (x_A, x_B) may have an incentive to vote for the candidates more likely to propose $x = z$. This, in turn, can encourage uninformed candidates to propose divergent platforms. The candidate proposing the ex-ante unpopular policy would have less to gain from offering the more likely option as he would never be able to earn the votes of partially informed voters in the likely state $z = 1$.

Alas, when voters play a symmetric voting strategy the profile discussed above does not arise in equilibrium in a large electorate. The reason is that all partially informed voters abstain. Due to the probability of mistakes $\delta > 0$, for any candidates' strategy profile, voters who observe the state but not platforms do not know which candidate promises the right policy. They thus fear choosing the wrong candidate and prefer to delegate electoral decision-making to more informed voters (who both observe the state and at least one platform), much like those voters who observe platforms but not the state.[15]

As the election is decided by voters who observe the state and what candidates stand for, candidates face the exact same incentives as in the baseline model. As a result, uninformed candidates prefer conformity whenever the electoral benefit of proposing the ex-ante popular policy dominates its potential policy cost.

[15]We show in the proof of Lemma A.5 in Online Appendix A that abstention is the unique voter-symmetric equilibrium strategy for n large enough.

Proposition 3. *There exists a sequence of voter-symmetric equilibria for which information aggregation is feasible if and only if Equation 3 holds.*

Observe that in this section, we only establish our unfeasibility result for the most-studied—and arguably more natural—case of voter-symmetric strategies. We cannot exclude that (relatively complex) asymmetric voting strategies may improve the feasibility of information aggregation. In addition, the possibility of candidates' mistakes plays a key role. It implies that voters who only observe $m = z$ have a dominant strategy to abstain. However, it also indicates that non-abstention by these voters is fragile; it requires that voters are absolutely certain of what candidates propose, even without observing their platforms—arguably, a strong assumption. Nonetheless, in light of these two caveats, Proposition 3 should be interpreted as a lower bound on the unfeasibility of information aggregation in electoral setting with strategic candidates and low voter information.[16] Worsening voters' ability to observe candidates' platforms cannot exacerbate the political failure that this paper identifies. The unfeasibility of information aggregation is due to candidates' behaviors, not voters' political knowledge.

5 Conclusion

This paper uncovers a novel political failure of representative democracy. In an environment in which elections would aggregate dispersed information if the electorate were presented with exogenous policy options, we show that the risk of policy mistake can be bounded away from zero when candidates strategically choose their policy commitments. When candidates' office-motivation is large relative to the policy cost of implementing the wrong policy, the wisdom of the crowd—the possibility of information aggregation—encourages uninformed candidates to converge to the ex-ante popular policy. Candidates' excessive conformism then impedes the competition among ideas and renders information aggregation unfeasible.

In extensions, we establish that liberalizing access to candidacy or reducing voter information cannot generally restore competition among ideas. When it comes to information aggregation, the fundamental issue of representative democracy is not that entry is restricted to two candidates—if anything, this may benefit the electorate—or that voters are poorly informed. The fundamental

[16] We expect that our main conclusion continues to hold when voters receive noisy signals or need to pay a cost to acquire information. As others have shown (see Martinelli, 2006; Szentes and Koriyama, 2009), these assumptions are of no or only limited consequences for information aggregation whenever the electorate is presented with two distinct exogenous options.

issue is that the set of policy options available to the electorate depends on candidates' strategic decisions (be it, platform or entry choices). The political failure we uncover is due to the intermediation by candidates; that is, the nature of representative democracy itself.

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Appendix: Proofs for Section 3

Recall that for each candidate J, a pure strategy is a mapping $x_j^n : M \to \{0, 1\}$ (with $M = \{\emptyset, 0, 1\}$) and a mixed strategy is denoted by $\gamma_J^n : \{0, 1\} \times M \to \Delta[\{0, 1\}]$. For each voter $i \in N$, a pure strategy is a mapping $a_i^n : M \times \{0, 1\}^2 \to \{\phi, A, B\}$ and a mixed strategy is denoted by $\tau_i^n : \{\phi, A, B\} \times M \times \{0, 1\}^2 \to \Delta[\{\emptyset, A, B\}]$.

Throughout, denote $\Pi_J^n(z; x_A, x_B)$ the ex-ante probability that in an electorate of size $2n + 1$, candidate $J \in \{A, B\}$ wins in state $z \in \{0, 1\}$ when candidates propose platforms $(x_A, x_B) \in \{0, 1\}^2$. Under the assumption, $\Pi_J^n(z; x_A, x_B) = \frac{1}{2}$ whenever $x_A = x_B$. In what follows, in line with the idea of trembling hand refinements, candidates only consider their opponent's probability of mistakes (and not their own since $\delta < 1/2$) when making their platform choice.

Proof of Proposition 1

Let $\Gamma_J^n(x; z) := \pi\big((1 - \delta)\gamma_J^n(x; z) + \delta\gamma_J^n(\neg x, z)\big) + (1 - \pi)\big((1 - \delta)\gamma_J^n(x; \emptyset) + \delta\gamma_J^n(\neg x, \emptyset)\big)$ denote the ex-ante probability that $J \in \{A, B\}$ proposes x in state z. A's expected payoff from following his signal $m = z$ and doing the opposite are, respectively

$$\omega\left(\Pi_A^n(z; z, \neg z)\Gamma_B^n(\neg z; z) + \Gamma_B^n(z; z)\frac{1}{2}\right) - (1 - \omega)\left(1 - \Pi_A^n(z; z, \neg z)\right)\Gamma_B^n(\neg z; z),$$

$$\omega\left(\Gamma_B^n(\neg z; z)\frac{1}{2} + \Pi_A^n(z; \neg z, z)\Gamma_B^n(z; z)\right) - (1 - \omega)\Big(\Gamma_B^n(\neg z; z) + \Pi_A^n(z; \neg z, z)\Gamma_B^n(z; z)\Big)$$

Whenever information aggregation is feasible, $\lim_{n\to\infty} \Pi_A^n(z; z, \neg z) = 1$ and $\lim_{n\to\infty} \Pi_A^n(z; \neg z, z) = 0$. So for n large enough, $\Pi_A^n(z; z, \neg z) \geq 1/2 \geq \Pi_A^n(z; \neg z, z)$ and A prefers to follow his signal. By symmetry, the claim follows for B. $\square$

Proof of Corollary 1

Follows directly from Proposition 1 as divergence requires $x_A(m) = 0$ or $x_A(m) = 1$ for $m \in M$. $\square$

Proof of Proposition 2

We restrict attention to voters' strategies such that $\lim_{n\to\infty} \Pi_A^n(z; z, \neg z) = 1$ and $\lim_{n\to\infty} \Pi_A^n(z; \neg z, z) = 0$. Observe that this is without loss of generality (wlog) since information aggregation would not be feasible otherwise (in that case, either voters make mistakes conditional on divergence, or candidates always converge when uninformed). From Proposition 1, an informed candidate J must then always follow his signal for n large enough.

Step 1. We first show that information aggregation is feasible if and only if there exists a sequence of equilibria in which candidates' strategies satisfy $\gamma_J^n(0;\emptyset) = \gamma_{-J}^n(1;\emptyset) = 1$ for some $J \in \{A, B\}$ and n large enough.

Necessity. Suppose that $\gamma_J^n(0;\emptyset) \in (0,1)$. In the limit, given the voter's strategy, the probability that the correct policy is chosen (where we simply highlight dependence on n and denote $\lim\limits_{n\to\infty} \gamma_J^n :=$ γ_J for ease of exposition) is then:

$$\begin{aligned}
\lim_{n\to\infty} Q(n;\gamma) =& 1 - \delta^2 \begin{pmatrix} \pi^2 + \pi(1-\pi)\big(\alpha(\gamma_A(0;\emptyset) + \gamma_B(0;\emptyset)) + (1-\alpha)(\gamma_A(1;\emptyset) + \gamma_B(1;\emptyset))\big) \\ +(1-\pi)^2\big(\alpha\gamma_A(0;\emptyset)\gamma_B(0;\emptyset) + (1-\alpha)\gamma_A(1;\emptyset)\gamma_B(1;\emptyset)\big) \end{pmatrix} \\
&- \delta(1-\delta) \begin{pmatrix} (1-\pi)^2\big(\gamma_A(1;\emptyset)\gamma_B(0;\emptyset) + \gamma_A(0;\emptyset)\gamma_B(1;\emptyset)\big) \\ +\pi(1-\pi)\big(\alpha(\gamma_A(1;\emptyset) + \gamma_B(1;\emptyset)) + (1-\alpha)(\gamma_A(0;\emptyset) + \gamma_B(0;\emptyset))\big) \end{pmatrix} \\
&- (1-\delta)^2\big(\alpha\gamma_A(1;\emptyset)\gamma_B(1;\emptyset) + (1-\alpha)\gamma_A(0;\emptyset)\gamma_B(0;\emptyset)\big)
\end{aligned}$$

Unless $\alpha\gamma_A(1;\emptyset)\gamma_B(1;\emptyset)+(1-\alpha)\gamma_A(0;\emptyset)\gamma_B(0;\emptyset) = 0$, there exists $\epsilon > 0$ such that $\lim_{n\to\infty} Q(n;\gamma) < 1-\epsilon$ for all $\delta > 0$. Hence, information aggregation requires: (i) $\gamma_A(0;\emptyset)\gamma_B(0;\emptyset) = 0$ and (ii) $\gamma_A(1;\emptyset)\gamma_B(1;\emptyset) = (1-\gamma_A(0;\emptyset))(1-\gamma_B(0;\emptyset)) = 0$. The two conditions are satisfied simultaneously only if $\gamma_J(0;\emptyset) = \gamma_{-J}(1;\emptyset) = 1$ for some $J \in \{A, B\}$.

Sufficiency. Consider candidates' strategy profile $(x_A(m), x_B(m)) = (\mathbb{I}_{\{m=1\}}, \mathbb{I}_{\{m\neq 0\}})$. In this case, $\lim\limits_{n\to\infty} Q(n;\gamma) = 1 - \pi\delta^2 - (1-\pi)\delta(1-\delta)$. Observe that $\pi\delta^2 + (1-\pi)\delta(1-\delta)$ is strictly increasing with δ (since $\delta < 1/2$). Hence, for all $\epsilon > 0$, there exists a unique $\overline{\delta}(\epsilon) > 0$ such that for all $\delta \in (0, \overline{\delta}(\epsilon))$, $\lim\limits_{n\to\infty} Q(n;\gamma) > 1-\epsilon$. Hence, information aggregation is feasible.

Step 2. As a second step, we establish that there exists a sequence of equilibria in which candidates' strategy $\gamma_J^n(0;\emptyset) = \gamma_{-J}^n(1;\emptyset) = 1$ for some $J \in \{A, B\}$ is individually rational for all $\delta \in (0, \delta^0)$ for some $\delta^0 > 0$ and n large enough if and only if Equation 3 holds. Wlog, assume that $x_A^n(\emptyset) = 0$. Recall that $\Gamma_J^n(x;z)$ is the ex-ante probability that $J \in \{A, B\}$ chooses x in state z.

Candidate A's (IC) when uninformed is:

$$\alpha\left\{\begin{array}{c}\Gamma_B^n(0;0)\Pi_A^n(0;0,0)\omega+\Gamma_B^n(1;0)\Pi_A^n(0;0,1)\omega\\-\Gamma_B^n(1;0)(1-\Pi_A^n(0;0,1))(1-\omega)\end{array}\right\}+(1-\alpha)\left\{\begin{array}{c}\Gamma_B^n(0;1)\big(\Pi_A^n(1;0,0)\omega-(1-\omega)\big)\\+\Gamma_B^n(1;1)\Pi_A^n(1;0,1)(2\omega-1)\end{array}\right\}$$
$$\geq\alpha\left\{\begin{array}{c}\Gamma_B^n(0;0)\Pi_A^n(0;1,0)(2\omega-1)\\+\Gamma_B^n(1;0)\big(\Pi_A^n(0;1,1)\omega-(1-\omega)\big)\end{array}\right\}+(1-\alpha)\left\{\begin{array}{c}\Gamma_B^n(0;1)\big(\Pi_A^n(1;1,0)-(1-\omega)\big)\\+\Gamma_B^n(1;1)\Pi_A^n(1;1,1)\omega\end{array}\right\}\quad(4)$$

Under our assumption, $\Pi_A^n(z;x,x)=1/2$. Further, our restriction on voters' strategy implies $\lim_{n\to\infty}\Pi_A^n(z;z,\neg z)=1$ and $\lim_{n\to\infty}\Pi_A^n(z;\neg z,z)=0$ for $z\in\{0,1\}$ as $n\to\infty$. Denote $\lim_{n\to\infty}\Gamma_J^n:=\Gamma_J$, Equation 4 becomes:

$$\alpha\omega\left(1-\frac{\Gamma_B(0;0)}{2}\right)+(1-\alpha)(1-\Gamma_B(1;1))\left(\frac{\omega}{2}-(1-\omega)\right)$$
$$\geq\alpha(1-\Gamma_B(0;0))\left(\frac{\omega}{2}-(1-\omega)\right)+(1-\alpha)\omega\left(1-\frac{\Gamma_B(1;1)}{2}\right)$$

Given B's strategy, $\Gamma_B(1;1)=1-\delta$ and $\Gamma_B(0;0)=\pi+(1-2\pi)\delta$ so the (IC) can be rewritten as:

$$\omega\left(\frac{1}{2}-\alpha\right)\leq(1-\omega)\alpha(1-\pi)+\delta\left(\frac{\omega}{2}(1-\alpha)-(1-\omega)\big(\alpha(1-2\pi)+(1-\alpha)\big)\right)\quad(5)$$

Notice that if Equation 5 holds, it can be checked that a candidate B has no incentive to deviate after $m_B=\emptyset$ since he proposes the ex-ante more likely policy.

We now show that Equation 3 implies that Equation 5 holds for small enough δ. We need to consider two cases. First, suppose that $\frac{\omega}{2}(1-\alpha)-(1-\omega)\big(\alpha(1-2\pi)+(1-\alpha)\big)\geq 0$. Hence, if Equation 3 holds, Equation 5 is satisfied for all $\delta>0$. Second, suppose that $\frac{\omega}{2}(1-\alpha)-(1-\omega)\big(\alpha(1-2\pi)+(1-\alpha)\big)<0$. Then Equation 3 implies that there exists $\delta^0>0$ such that for all $\delta\in(0,\delta^0]$, Equation 5 holds. □

Proof of Corollary 2

Direct from observation of the necessary and sufficient condition in the text of Proposition 2 given $\alpha<1/2$. □

To prove our next result, we focus on voter-symmetric voting strategies (and thus drop the subscript i from voters' strategies). Following Feddersen and Pesendorfer (1996), we denote by $\sigma_{z,x}^n(\tau)$ the probability that a randomly drawn voter votes for policy $x \in \{0,1\}$ in state $z \in \{0,1\}$ as a function of the uninformed voters' strategy τ. We further denote by $\sigma^n_J(z; x_A, x_B)$ the probability that a randomly drawn voter votes for $J \in \{A, B\}$ in state z as a function of candidates' platforms $(x_A, x_B) \in \{0,1\}^2$. We also denote $\beta(m, x_A, x_B) \in (0,1)$ the posterior that the state is $z = 0$ after observing message $m \in M$ and platforms $(x_A, x_B) \in \{0,1\}^2$. Finally, let $\Pi^n := \frac{(1-(1-p_\phi)q)^{2n+1}}{2}$. A preliminary Lemma states that the swing voter's curse holds in this setting. In a voter-symmetric equilibrium, uninformed voters abstain for n large enough.

Lemma 1. *Suppose $x_A \neq x_B$. For all $\beta(\emptyset, (x_A, x_B)) \in (0,1)$, there exists $\overline{n}^\phi(\beta)$ such that for all $n > \overline{n}^\phi(\beta)$, the unique voter-symmetric equilibrium features uninformed voters abstaining.*

Proof. The proof follows closely the proofs of Proposition 1, Lemma 1.A and Proposition 3.(iii) in Feddersen and Pesendorfer (1996, p. 421-22). Without loss of generality, suppose $x_A = 0$ and $x_B = 1$. The probabilities that a citizen makes a correct decision in states $z = 0$ and $z = 1$ are, respectively:

$$\begin{aligned}
\sigma^n_{0,0}(\tau) =& \sigma^n_A(0; 0, 1) = (1 - p_\phi)(q + (1 - q)\tau^n(A; \emptyset, 0, 1)) \\
\sigma^n_{1,1}(\tau) =& \sigma^n_B(1; 0, 1) = (1 - p_\phi)(q + (1 - q)\tau^n(B; \emptyset, 0, 1))
\end{aligned}$$

In turn, the probabilities of an incorrect vote in states $z = 0$ and $z = 1$ are, respectively:

$$\begin{aligned}
\sigma^n_{0,1}(\tau) =& \sigma^n_B(0; 0, 1) = (1 - p_\phi)(1 - q)\tau^n(B; \emptyset, 0, 1) \\
\sigma^n_{1,0}(\tau) =& \sigma^n_A(1; 0, 1) = (1 - p_\phi)(1 - q)\tau^n(A; \emptyset, 0, 1)
\end{aligned}$$

As in Feddersen and Pesendorfer (1996), $\sigma^n_{x,x}(\tau) = \sigma^n_{\neg x,x}(\tau) + q(1 - p_\phi)$. Let $Eu(x|m; x_A, x_B, \tau^n)$ be the expected utility associated with voting for the candidate committing to $x \in (x_A, x_B)$ or abstaining, in which case $x = \phi$, conditional on (i) message m, (ii) candidates' platforms (x_A, x_B), and (iii) uninformed citizens' strategy profile τ^n.

We can thus use the proof of Feddersen and Pesendorfer's Proposition 1 in Fey and Kim (2002) (simply replacing α with the posterior $\beta(\emptyset, (x_A, x_B))$) to establish that $Eu(0|\emptyset; 0, 1, \tau^n) = Eu(1|\emptyset; 0, 1, \tau^n)$ $\Rightarrow Eu(\phi|\emptyset; 0, 1, \tau^n) > Eu(0|\emptyset; 0, 1, \tau^n)$. Further, if there exists $\varepsilon > 0$ such that $\sigma^n_{\neg x,x}(\tau) - \sigma^n_{x,\neg x}(\tau) > \varepsilon$, then there exists $\overline{n}^\emptyset(\beta)$ such that for all $n \geq \overline{n}^\emptyset(\beta)$ $Eu(\neg x|\emptyset; 0, 1, \tau^n) > Eu(\phi|\emptyset; 0, 1, \tau^n) > Eu(x|\emptyset; 0, 1, \tau^n)$ (Feddersen and Pesendorfer's Lemma 1.A). Finally, using a similar logic as in the proof of Feddersen and Pesendorfer's Proposition 3.(iii) for $n \geq \overline{n}^{\emptyset}(\beta)$ we obtain that abstention is a dominant strategy so $\tau^n(\phi; \emptyset, 0, 1) = 1$. $\square$

Proof of Corollary 3

Observe that due to probability δ of mistake, uninformed voters' belief satisfies $\beta(\emptyset; x_A, x_B) \in (0,1)$ for all x_A, x_B such that $x_A \neq x_B$ for all candidates' strategy. Hence, by Lemma 1, for all $n \geq \overline{n}^{\emptyset}(\beta)$, with $\overline{n}^{\emptyset}(\beta)$ finite, uninformed voters abstain. This implies that for n large enough, informed candidates follow their signal in any equilibrium (using a similar reasoning as in the proof of Proposition 1). We now show that for n large enough, under the condition of the corollary, uninformed candidates converge to 1. From the proof of Proposition 2, for n large enough, it is individually rational for uninformed A to propose $x_A^n(\emptyset) = 1$ even if B's choice when uninformed satisfies $x_B^n(\emptyset) = 1$ with probability one (if $\gamma_B^n(1; \emptyset) < 1$, the electoral benefit of proposing 1 is higher and the policy cost lower for A). By symmetry, it is individually rational for B to propose $x_B^n(\emptyset) = 1$ even if $\gamma_A^n(1; \emptyset) = 1$.
Hence, there exists a unique sequence of equilibria in which the equilibrium probability that the policy implemented matches the state satisfies:

$$\begin{aligned}
\lim_{n \to \infty} Q(n) =& \pi^2(1-\delta^2) + 2\pi(1-\pi)\big(\alpha(1-\delta(1-\delta)) + (1-\alpha)(1-\delta^2)\big) \\
&+ (1-\pi)^2\big(\alpha(1-(1-\delta)^2) + (1-\alpha)(1-\delta^2)\big) \\
=& 1 - \delta^2((1-\alpha) + \pi^2\alpha) - 2\delta(1-\delta)\pi(1-\pi)\alpha - (1-\delta)^2(1-\pi)^2\alpha
\end{aligned}$$

Denote $H(\pi) = (1-\pi)(1-\delta)^2 - \pi\delta^2 - (1-2\pi)\delta(1-\delta)$ and observe that $\lim_{n \to \infty} \partial Q(n)/\partial \pi$ has the same sign as $H(\pi)$. Notice that $H'(\pi) < 0$ and $H(1) = \delta(1-2\delta) > 0$ (since $\delta < 1/2$). Hence $\lim_{n \to \infty} \partial Q_S(n)/\partial \pi > 0$ as claimed. $\square$