Wisdom of the Crowd?
Information Aggregation and Electoral Incentives

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Abstract

Elections have long been understood as a mean to encourage candidates to act in voters' interest, as well as a way to aggregate dispersed information. This paper juxtaposes these two key features within a unified framework. Two candidates compete for an office by strategically proposing one of two possible policies. While one policy maximizes the electorate welfare, voters and candidates are not always informed about which one. We establish that whenever the electoral benefit of proposing the ex-ante more popular option is large enough compared to the payoff loss from a policy mistake, the probability that the correct policy is implemented is bounded away from one in equilibrium. Due to electoral incentives, information aggregation is unfeasible. We discuss the robustness of our finding to various changes to our baseline model, such as the possibility of entry by a third candidate or imperfectly observed policy proposals.

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1 Introduction

In a well-functioning democracy, electoral institutions perform at least two key roles. One the one hand, they help aligning politicians' actions with public opinion (an aspect extensively studied under the Downsian-Black approach), on the other, they provide a mechanism for aggregating dispersed information (a question at the heart of the well-known Condorcet Jury Theorem). These two aspects have been usually studied in isolation. They need not be. From President Obama retorting "I won" to Republicans' critiques of his economic plan (Wall Street Journal, 2009) to David Cameron claiming to have a mandate to renegotiate Britain's relationship with Europe (Reuters, 2015), newly elected officials often see their victory as a vindication of their campaign promises.

This paper studies whether electoral incentives are conductive to information aggregation. In our setting, voters agree that there exists a correct policy, but are not always informed about which policy is optimal. If citizens were to be presented exogenous policy options, the majority would select the correct option with probability approaching one as the electorate grows large: information would be fully aggregated. Instead, we suppose that voters cast a vote for one of two candidates who make binding policy promises. Information aggregation is thus contingent upon candidates' electoral incentives. We provide conditions under which electoral incentives and information aggregation are in conflict. As information is aggregated, candidates have incentives to propose the ex-ante more popular policy. Whenever the policy cost of implementing the wrong policy is relatively low, this incentive to pander leads to convergence to one policy option and impedes information aggregation.

Formally, this paper introduces strategic candidates within Feddersen and Pesendorfer's (1996) setting. There are two possible policy options and states of the world. All voters want the policy to match the state of the world. Voters can be informed (in which case they observe the state) or not (in which case they can only rely on their prior). Similarly, the competing candidates either receive perfect information about the state, or no information at all.[1] When candidates are partisan and care only about their preferred policy being implemented, the game is strategically equivalent to Feddersen and Pesendorfer's model. Voters are presented with two policy options and information

[1] The assumption that candidates' signal fully reveal the state guarantees that the wrong policy is not implemented because candidates make honest mistakes.

aggregation is always guaranteed. Things, however, become more involved when candidates are office and truth-motivated (i.e., care about implementing the right policy).

Whenever voters toss a coin when candidates propose the same policy (e.g., voters are swayed by a random valence shock), an equilibrium in which candidates always propose different policies never exists in a large electorate. An informed candidate who proposes the wrong policy has too strong incentive to deviate for electoral (he is almost certain to lose the election otherwise) and policy (he suffers a cost when he wins) reasons. This failure to sustain divergence is not necessarily bad for voters. Indeed, convergence may arise because both candidates observe the state, and both choose the optimal policy. But candidates are not always informed and their behavior when uninformed is critical for the feasibility of information aggregation.

Whenever uninformed candidates converge on a similar policy, the risk of a policy mistake is not null. Can we thus sustain divergent platforms by uninformed candidates? The answer depends critically on the balance between electoral incentives and the payoff loss of implementing the wrong policy. If one policy option is more likely to be correct, the candidate proposing the ex-ante less popular option would benefit electorally from offering the more popular policy. However, there is a probability that both candidates are uninformed and implement the wrong policy whenever the ex-ante less likely state is selected by Nature. If electoral incentives are strong enough, candidates' choices render info aggregation unfeasible. *In any equilibrium,* the probability that the correct policy is implemented is bounded away from 1 as the electorate grows large.

This result highlights the importance of considering electoral incentives in information aggregation settings. We next study the robustness of this insight under several modifications of the baseline setting. We first show that our conclusion holds whether candidates commit to their platform or not. Information aggregation is unfeasible because candidates converge to the same policy, which limits voters' ability to convey information with their vote.

The issue of convergence also means that one option is not proposed to the voter, which leaves room for a political entrepreneur to enter the race and propose the deserted policy. As our original candidates, a third candidate contemplating whether to pay a cost to contest in the election can be informed or uninformed. When the cost of entry is high, he will enter only if he is almost certain to win. That is, he must learn the right policy and observes incumbent candidates converging to the incorrect one. This reduces the electoral benefit of proposing the popular policy for uninformed candidates, but does not eliminate it, since a third candidate never enters when uninformed. As such, third candidates cannot guarantee information aggregation. Further, they can also make it more difficult: When the cost of entry is intermediary, an informed third candidate will enter and commit to the correct policy whenever candidates diverge. Electoral incentives to deviate then are the same as in the baseline model. In addition, an uninformed candidate's expected payoff loss from converging decreases, since a policy mistake occurs only if both his opponents (incumbent candidate and potential entrant) are not informed.

Turning our attention to the voters, we show that when they can coordinate on some electoral strategy, information aggregation becomes feasible. The strategy, however, requires voters to punish candidates differentially according to which policies they converge to. To highlight the fragility of this type of behavior, we show that when one candidate has a valence advantage and wins upon convergence, full information aggregation again is not guaranteed. For a large enough electorate, the advantaged candidate follows his signal when informed since he is likely to win anyway. An uninformed advantaged candidate, on the other hand, wants to match the policy of his opponent, whereas the latter wants to offer a different policy option. For sufficient large office motivation, the equilibrium is in mixed strategies and the probability of convergence on the wrong policies strictly positive.

Finally, following consistent findings that voters know little about politics and political parties (e.g., Campbell et al., 1980; Delli Carpini and Keeter, 1996), we consider the case when voters observe candidates' platforms only probabilistically. Under this assumption, there generally exists an equilibrium in which (i) full information aggregation occurs and (ii) voters are better off than with partisan candidates for finite electorate (even if voters toss a coin conditional on convergence). We construct an equilibrium in which candidates follow their signal when informed and diverge when uninformed so candidates' information complements the voters'. Uninformed candidates strategy is sustained by the behavior of voters who learn the state, but not the platforms. Anticipating candidates' strategies, these partially informed voters would vote for the candidate who is most likely to match the state. Candidates then each endogenously owns one policy and are thus rewarded differentially depending on the platform they propose, which by the reasoning above generates sufficient incentives for information aggregation. Poor voter information about candidates thus dominate full knowledge of platforms, and our paper establishes an additional channel through which transparency can hurt the electorate.

Our work builds upon and is connected to a large body of literature on electoral institutions. Starting with Austen-Smith and Banks (1996), a large game-theoretic literature has examined whether information can be aggregated in large electorate. Several scholars consider private value environments in which voters have divergent policy preferences (e.g., Castanheira, 2003b,a; Gül and Pesendorfer, 2009; Meirowitz and Shotts, 2009; Myatt, 2016). There, 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 interest between voters, information 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).

Instead, we consider a common value environment: all voters agree ex-post on the correct policy. Several important contributions in varied settings have shown that when faced with exogenous options, the electorate selects the right policy with probability approaching 1 as its size increases (e.g., Feddersen and Pesendorfer, 1997; Myerson, 1998; McMurray, 2012; Acharya and Meirowitz, 2017). In particular, a sufficient condition, satisfied in our setting, is that the signal space has same cardinality as the exogenous policy space (Barelli et al., 2017). 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.[2]

A few papers incorporate strategic politicians in common value environments. Razin (2003) considers a framework in which the elected candidate adjusts his policies after observing his vote share. When candidates' preferences are relatively similar to voters', information aggregation is obtained (McMurray 2017 establishes that this result in a rather general environment).[3] When candidates' preferences are distinct from the electorate's, information aggregation is no longer guaranteed as voters seek to limit the policy bias of a candidate by voting for his opponent. 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 are similar to voters', and informed voters can perfectly observe the state of the world.

[2] Lohmann (1994) shows that costly political actions can serve as a coordination device, Meirowitz (2005) attributes the same role to polls.

[3] 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.

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 strategic proposals, Bond and Eraslan (2010) show that unanimity can be more beneficial for voters than majority rule as it induces more moderation. They, however, consider only one proposer and thus cannot study the role of electoral incentives. Martinelli (2001) and Laslier and Straeten (2004) highlight how voter information can discipline politicians with distinct preferences from the voters'.[4] In turn, we show the reverse result: information aggregation can lead candidates with the same preferences as the voters' to pander to the electorate.

Closest to our approach are Gratton (2014) and McMurray (2016). Both find that strategic politicians offer platforms which render information aggregation possible. Gratton (2014), however, assumes that politicians are always informed; McMurray (2016) that the possible states of the world are uniformly distributed. This paper suggests important qualifications for their positive conclusions.[5] When both assumptions are relaxed, there is always a risk that full information aggregation becomes unfeasible due to candidates' electoral incentives.

The paper proceeds as follows: the next Section describes the model. Section 3 presents results from the benchmark case of partisan politicians. Section 4 contains our main results on information aggregation with independent candidates. Section. Section 5 concludes. Proofs for Section 4 are in the Appendix. All remaining proofs are collected in an Online Appendix.[6]

2 Model

The game features an electorate composed of a set of citizens with cardinality $2n+1$ and two candidates (A and B) competing for an elected office. Candidate $J \in \{A, B\}$ chooses a platform $x_J \in \{0, 1\}$, a citizen $i \in N$ makes an electoral decision $a_i \in \{\phi, A, B\}$, where ϕ denotes abstention and $J \in \{A, B\}$ a vote for candidate J. The impact of platform x_J depends on an underlying state of the world $z \in \{0, 1\}$ chosen by Nature at the beginning of the game. We assume that policy 0 is less likely to be correct; that is, the common knowledge prior satisfies $Pr(z = 0) = \alpha < 1/2$.

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

[5] In our setting, when politicians are always informed or the states are uniformly distributed, information aggregation is always feasible. However, our theoretical framework differs from Gratton's and McMurray's and so we cannot claim that their result is fragile. We, however, do expect our logic to hold in their set-ups.

[6] Available at `https://www.dropbox.com/s/vjbqujnk217bxxv/NVoters_SuppAppendix_July2017.pdf?dl=0`

We suppose that all citizens have similar policy preferences (i.e., we focus on a common value environment when it comes to the electorate). All want the policy choice to match the state. Hence, the utility of citizen i can be represented as

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

Following 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.

Each candidate, in turn, can be either partisan or independent: $\theta_J \in \{P, NP\}$. Type $\theta_A = P$ (resp. $\theta_B = P$), which occurs with probability ρ_A (resp. ρ_B), denotes a partisan candidate A (resp., B) who always proposes policy $x_A = 0$ (resp., $x_B = 1$).[7] A type $\theta_J = NP$ is an independent candidate $J \in \{A, B\}$ who has state-dependent policy payoff (i.e., truth motivation) as well as office motivation (e.g., ego rents). More formally, an independent candidate J's utility function assumes the following form:

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

with $\omega \in [0,1]$, $v(z,x) = 0$ if $x = z$ and $v(z,x) = -\Delta$ if $x \neq z$ for all $z \in \{0,1\}$. The parameter Δ measures the cost of a policy mistake from independent politicians' perspective.

Nature draws a candidates' types at the beginning of the game and to simplify the exposition, we assume that a candidate's type is his private information.[8] The role of partisan candidates is two-fold. First, it provides a useful benchmark to understand the role of electoral incentives (see Section 3). Second, their presence guarantees that an equilibrium always exists when we study the effect of these incentives (we return to this point in footnote 12).

[7] For example, a partisan candidate A's utility is $U_A(x,z,e) = \mathbb{I}_{\{x=0\}}$ and a partisan candidate B's utility is $U_B(x,z,e) = \mathbb{I}_{\{x=1\}}$, where $\mathbb{I}$ denotes the indicator function.

[8] This is without much loss of generality as types only affect payoffs through platform choice and there is thus no role for signaling. This assumption, however, guarantees that a candidate only conditions his platform choice on his own information and type.

While no player knows z at the beginning of the game, we assume that voters and candidates receive a signal of the state of the world. Before choosing his platform x_J, candidate $J \in \{A, B\}$ observes a message $m_J \in \{\emptyset, 0, 1\}$. Similarly, before making an electoral decision, voter i receives a message $m_i \in \{\emptyset, 0, 1\}$. Message $m \in \{0, 1\}$ fully reveals the 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 i.i.d. conditional on the 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 voter i is informed with probability $q \in (0, 1)$—-$Pr(m_i = \emptyset) = 1 - q$. In what follows, we say that a candidate *follows his signal* if $x_J = m_J \in \{0, 1\},\ J \in \{0, 1\}$ and a voter follows her signal if she votes for the candidate proposing the correct policy conditional on platform divergence.

To summarize the timing of the game is:

1. Nature draws $z \in \{0, 1\}$ and $\theta_A, \theta_B \in \{P, NP\}^2$;

2. Candidate $J \in \{A, B\}$ privately observes his type θ_J and signal $m_J \in \{\emptyset, 0, 1\}$. He then chooses $x_J \in \{0, 1\}$;

3. Citizen $i \in N$ is selected to vote with probability $1 - p_\phi$. If so, she observes $m_i \in \{\emptyset, 0, 1\}$, $x_A, x_B \in \{0, 1\}^2$, and makes her electoral decision $a_i \in \{\phi, A, B\}$. Otherwise, she abstains;

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. We further impose two additional restrictions. First, voters play a symmetric strategy conditional on their information. This restriction has little bearing on our main result, but simplifies the analysis of some of our extensions. Second, when candidates converge to the same policy ($x_A = x_B$), each selected voter randomizes uniformly between both candidates. This assumption is consistent with the presence of an unmodelled symmetrically distributed valence shock determining each voter's decision when indifferent. We consider alternative voter's behavior conditional on convergence in Section 5. In what follows, the term 'equilibrium' corresponds to this class of equilibria.

We now introduce some notation. For each candidate J, a pure strategy is a mapping $x_j : \{\emptyset, 0, 1\} \to \{0, 1\}$. A mixed strategy is denoted by $\gamma_j : \{0, 1\} \times \{\emptyset, 0, 1\} \to [0, 1]$. For each voter

$i \in N$, a pure strategy is a mapping $a_i : \{\emptyset, 0, 1\} \times \{x_A, x_B\} \rightarrow \{\phi, A, B\}$ and a mixed strategy is denoted by $\tau_i : \{\phi, A, B\} \times \{\emptyset, 0, 1\} \times \{x_A, x_B\} \rightarrow [0, 1]$. We denote the probability that the implemented policy matches the state in an electorate of size $2n+1$ by $Q(n) = \alpha Pr(0, 0; \gamma, \tau) + (1-\alpha)Pr(1, 1; \gamma, \tau)$, with $Pr(x, z; \gamma, \tau)$ the probability that policy $x \in \{0, 1\}$ is implemented in state z when candidates play strategy profile $\gamma = \{\gamma_A, \gamma_B\}$ and voters play the strategy τ. Following Battaglini (2017), we say that full information aggregation is feasible if there is a sequence of equilibria $\{\gamma^n, \tau^n\}_{n=0}^{\infty}$ for electorate of size $2n + 1$ such that $Q(n)$ converges to 1 as $n \rightarrow \infty$.

Before proceeding to the analysis, a last remark is in order. Notice that our approach builds on Feddersen and Pesendorfer's (1996) framework, with policy options endogenous to candidates' choice.[9] This implies that after receiving a message, candidates are perfectly informed about the state of the world. This goes against our main finding on the unfeasibility of information aggregation. Indeed, if candidates receive a noisy signal of the state of the world, there is a strictly positive probability that both candidates make a honest mistake (proposing the same mistaken platform while following their signal). Not so much in our set-up: as long as at least one candidate is informed and follows his signal, information aggregation is guaranteed.

3 Information aggregation with partisan candidates

As a benchmark, we consider the feasibility of information aggregation when candidates are always partisan ($\rho_A = \rho_B = 1$). In this case, the electorate is faced with two exogenous policy options: 0 and 1. The analysis in Feddersen and Pesendorfer (1996) then applies to our setting.[10] For n large enough, uninformed voters have a dominant strategy to abstain. Hence, the election is decided by informed voters. The wrong policy is implemented with probability 1/2 when no voter casts a vote (no voter is selected or informed), and with probability 0 otherwise. That is, we can express the probability that the implemented policy matches the state as $Q_P(n) = 1 - \frac{[1-(1-p_\phi)q]^{2n+1}}{2}$. We then obtain:

Proposition 1 (Feddersen and Pesendorfer (1996)). *When $\rho_A = \rho_B = 1$, there exists a sequence of equilibria such that $\lim_{n\rightarrow\infty} Q_P(n) = 1$.*

[9] We also assume that there is no partisan voters. Partisan voters can only impede information aggregation and so their presence could only reinforce our main result.

[10] After imposing no partisan voters, which corresponds to $p_1 = p_0 = 0$ using their notation.

Observe that when the electorate faces partisan candidates (and so exogenous options), the electorate cannot do better than $Q_P(n)$. In any other sequence of equilibria, uninformed voters must cast a vote (informed voters have a dominant strategy to follow their signal), which necessarily increases the probability of a policy mistake.

4 Information aggregation with independent candidates

We now examine whether information aggregation is feasible when candidates are independent. To simplify the description of the electoral incentives, we assume that the probability that each candidate is partisan is arbitrarily small (i.e., ρ_A and ρ_B are arbitrarily close to zero).

Solving the model by backward induction, we first consider the electoral decision of uninformed voters. In case of convergence ($x_A = x_B$), by assumption, uninformed voters randomize uniformly between both candidates. We thus consider their strategy conditional on platform divergence. Unlike the case of partisan candidates, candidates' platform choices can reveal some information about the state to the voters. Voter i thus forms a posterior—denoted $\beta(\emptyset; x_A, x_B)$—that the state is $z = 0$ after observing message $m_i = \emptyset$ and platforms $x_A, x_B \in \{0,1\}^2$. Since there is a (negligible, but strictly positive) probability that candidate J is partisan, platforms never fully reveal the state of the world: $\beta(\emptyset; x_A, x_B) \in (0,1),\ \forall x_A \neq x_B$. The next Lemma establishes that the swing voter's curse applies then. Uninformed voters prefer to 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 $n > \overline{n}^{\phi}(\beta)$, all uninformed voters abstain.*

The intuition mirrors the reasoning in Feddersen and Pesendorfer (1996). Uninformed voters condition their electoral decision on the event that they are pivotal. Since they are uncertain about the state of the world, they then take into account the probability of casting a wrong vote. Consequently, they delegate electoral decision-making to the informed voters.

For n large enough, conditional on divergent platform, informed and uninformed voters play the same strategy regardless of candidates' types (respectively, follow their signal and abstain). Can we then reproduce the partisan equilibrium in which candidates always propose divergent platforms? The next proposition offers a negative answer to this question.

Proposition 2. *For all $n \geq \overline{n}^{\emptyset}(\alpha)$, there is no equilibrium in which candidates always propose divergent platforms (i.e., $x_A(m_A) \neq x_B(m_B)$ for all $m_J \in \{\emptyset, 0, 1\}$).*

To understand this result, suppose, by way of contradiction, that there exists an equilibrium in which candidate A proposes $x_A = 0$ and candidate B $x_B = 1$. For such equilibrium to exist, it must be that A prefers policy 0 even after learning that the state is $z = 1$. But this is never the case when uninformed voters abstain because A suffers a double cost from proposing $x_A = 0$. First, there is an electoral cost: A wins with probability 1/2 when offering $x_A = 1$, whereas when choosing $x_A = 0$, he can only win when *no voter is informed* and the coin toss is favorable to her (probability $\frac{1}{2}(1-(1-p_\phi)q)^{2n+1}$). Second, there is a policy cost: conditional on winning, A is certain to implement the wrong policy.

Proposition 2 indicates that we cannot sustain a divergent equilibrium. However, it would be wrong to conclude from it that the electorate is always worse off (in term of information aggregation) with independent candidates. In fact, a divergent strategy is not incentive compatible because candidates have too much incentive to use their knowledge of the state of the world. But this tends to benefit voters since it implies that with independent candidates there is a probability of at least π^2 that both candidates offer the correct policy. To understand whether full information aggregation is feasible, we need to consider *all candidates' strategy profiles*, some of them could be better for the electorate than divergent platforms.

Denote $Q_{NP}(n)$ the highest equilibrium probability that the correct policy is chosen with independent candidates. Our next result establishes that even after considering all strategy profiles, full information aggregation is not always feasible with independent candidates.

Proposition 3. *There exists* $\epsilon > 0$ *such that* $\lim_{n\to\infty} Q_{NP}(n) < 1-\epsilon$ *if and only if*

$$(1-2\alpha)\frac{\omega}{2}R > \alpha(1-\pi)(1-\omega)\Delta$$

To guarantee full information aggregation, uninformed candidates must offer divergent platforms with probability 1. Suppose (without loss of generality) that $x_A(\emptyset) = 0$ and $x_B(\emptyset) = 1$. *Conditional on divergence*, as n goes to infinity, information is fully aggregated. When he proposes platform 0, A wins with strictly positive probability only if $z = 0$, with probability 1 when his opponent is uninformed and offers 1 (probability $\alpha(1-\pi)$) and 1/2 if when B learns the state (probability $\alpha\pi$). His ex-ante winning probability is thus $\alpha[\pi/2 + (1-\pi)]$. When deviating to platform $x_A = 1$, A wins with probability 1/2 whenever there is convergence, which occurs when the state is $z = 1$ (probability $1-\alpha$) as well as when the state is $z = 0$ and B does not learn the state (probability $\alpha(1-\pi)$). His ex-ante winning probability is then $(1-\alpha)/2 + \alpha(1-\pi)/2$. The electoral benefit of deviating to $x_A = 1$ is thus (in expectation) $(1-2\alpha)\frac{\omega}{2}R$. However, there is also a risk that the policy implemented is the wrong policy, which occurs when the state is $z = 0$ and B is uninformed (with probability $\alpha(1-\pi)$). Deviation to $x_A = 1$ thus entails an expected policy loss of $\alpha(1-\pi)(1-\omega)\Delta$. Combining the two, A has a profitable deviation whenever $(1-2\alpha)\frac{\omega}{2}R > \alpha(1-\omega)(1-\pi)\Delta$.[11]

Three important consequences stem from Proposition 3. First, the voter can be better off (in term of policy implementation) with partisan rather than independent candidates. Partisan candidates always offer a meaningful choice to voters and as such always guarantee information aggregation.

Corollary 1. *If $(1-2\alpha)\frac{\omega}{2}R > \alpha(1-\omega)(1-\pi)\Delta$, there exists $\overline{n}^{NP}$ such that for all $n \geq \overline{n}^{NP}$, $Q_P(n) > Q_{NP}(n)$.*

Second, full information aggregation is never feasible with office-motivated candidates, which corresponds to $\omega = 1$ in our setting.

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

Third, a large probability that candidates are informed (π) is a mixed blessing for the voter. On the one hand, a high π reduces the policy loss associated with deviation and thus encourages uninformed candidates to converge to the ex-ante popular policy in equilibrium (the condition sustaining full information aggregation becomes tighter). On the other hand, as the next corollary establishes, the probability that the correct policy is implemented increases with π (since informed candidates propose the correct policy in equilibrium).[12]

Corollary 3. *If $(1-2\alpha)\frac{\omega}{2}R > \alpha(1-\omega)(1-\pi)\Delta$, in equilibrium, $\lim_{n\to\infty} Q_{NP}(n) = 1 - \alpha(1-\pi)^2$.*

[11] Observe that the asymmetry between the two states is critical. When the state is distributed uniformly ($\alpha = 1/2$), full information aggregation is always feasible like in McMurray (2016).

[12] The positive probability that a candidate is partisan is essential for the existence of an equilibrium for sufficiently large n. The unique potentially incentive compatible candidate's strategy profile features informed candidates following their signal and uninformed ones proposing $x = 1$. Absent a (small) probability candidates are partisan, platform $x = 0$ fully reveals the state $z = 0$ (since candidates propose it only when informed). Uninformed voters then have a dominant strategy to vote for the candidate proposing $x = 0$. If voters are more likely than not to be informed, a candidate proposing 0 is certain to win the election as $n \to \infty$. This creates incentive for informed candidates to deviate to 0 after observing $m = 1$ whenever $\omega R/2 > (1-\omega)\Delta$. An equilibrium then fails to exist for $n \to \infty$ when voters randomize uniformly upon convergence (an equilibrium always exists when we relax this assumption, see below). Notice that there may not exist an equilibrium for relatively small n with a negligible probability a candidate is partisan by the same reasoning. However, since we focus on information aggregation in very large electorate, this is not so much a concern for our analysis.

This section establishes that electoral incentives impede information aggregation. A fully divergent candidates' strategy profile (i.e., $x_J(m) = 0$ and $x_{-J}(m) = 1$, $m \in \{\emptyset, 0, 1\}$) is not incentive compatible because candidates when informed would find it profitable to follow their signal. An assessment in which uninformed candidates diverge is not always incentive compatible since the candidate proposing the least (ex-ante) popular option 0 would gain electorally from pandering to voters and offering policy 1.[13] In the next section, we study various extensions of our baseline set-up and whether they permit to recover full information aggregation.

5 Extensions

In all that follows, we suppose the likelihood a candidate is partisan is negligible like in Section 4. We consider changes to the baseline model first on the supply side (candidates) and then on the demand side (voters).

No candidates' commitment

Previous research on information aggregation (e.g., Razin, 2003; McMurray, 2017; Battaglini, 2017) has shown that politicians can use information revealed by vote tally (or public protest) to design appropriate policies. It is thus important to consider whether our unfeasibility result holds when we relax the assumption that candidates commit to a platform. In this subsection, we thus assume that in stage 4 of the timing (see Section 2), the candidate with the most vote is elected, observes the vote tally, and implements a policy $x_e \in \{0, 1\}$. All other assumptions remain unchanged.

While informed candidates have a dominant strategy to follow their signal when elected, uninformed candidates must be able to interpret the message voters send through their vote. We choose the natural approach that the elected politician, when uninformed, implements the policy that receives the most votes (other approaches are possible which would lead to similar results after relabeling). As a result, voters' behavior is unchanged. First, informed voters always cast a vote for the candidates proposing the correct policy. Second, conditional on candidates proposing divergent platform, uninformed voters prefer to abstain for n large enough. Indeed, given informed voters' strategy, uninformed voters' problem is isomorphic to the case of electing the wrong politician.

[13] Notice that this implies that when candidates are always informed (i.e., $\pi = 1$) full information aggregation is possible as established previously by Gratton (2014).

Due to voters' behavior, candidates face the same electoral incentives with and without commitment.[14] When the electoral gain from proposing policy 1 is sufficiently large, uninformed candidates thus converge to policy 1. Since voters then randomize between the two candidates, no information is provided to the elected candidate who then chooses the most likely policy 1. Denoting $Q_{nc}(n)$ the probability that the correct policy is implemented under no commitment (nc), we obtain the following proposition.

Proposition 4. *If and only if* $(1-2\alpha)\frac{\omega}{2}R > \alpha(1-\pi)(1-\omega)\Delta$, *there exists* $\epsilon > 0$ *such that in all equilibria,* $\lim_{n\to\infty} Q_{nc}(n) < 1-\epsilon$.

Since relaxing candidates' commitment has little effect on our core insights, we return in what follows to a setting in which candidates implement the platform they propose.

Third candidate entry

In the baseline model, information aggregation is unfeasible because one policy option ($x = 0$) is not always available to voters despite being optimal. This suggests a role for some third candidate to enter the race by championing the policy deserted by the other candidates. We now study whether such possibility enables information aggregation.

Suppose that after observing candidates A and B's platform choices and a message $m_C \in \{\emptyset, 0, 1\}$ with the same properties as m_J, $J \in \{A, B\}$, a third candidate—denoted C—decides whether to enter at cost $c > 0$. C thus chooses $x_C \in \{\mathcal{N}, 0, 1\}$, where $\mathcal{N}$ denotes no entry and $x_C = x$ entry at policy $x \in \{0, 1\}$. For simplicity, we assume that candidate C is office-motivated and his utility function takes the following form $U_C(x, z, e) = \mathbb{I}_{\{e=C\}}R - \mathbb{I}_{\{x_C \neq \mathcal{N}\}}c$, with $\mathbb{I}$ the indicator function.

Before proceeding to the analysis, we need to introduce some additional notation. Denote $\Pi^n_C(z; x_A, x_B, x_C)$ the probability that C wins in state z when platforms x_A, x_B, x_C are proposed. As before, we suppose that voters uniformly randomize (between possibly three candidates) upon convergence. Similarly, denote $\beta(m_C; x_A, x_B)$ C's posterior that the state is $z = 0$ conditional on his message and opponents' platforms. Finally, the cost-benefit ratio of entering is $W(c) := \frac{c}{R}$.

Since C is purely office-motivated, being informed or not affects his entry decision only through his ex-ante winning probability. We assume that when indifferent C does not enter (without loss of

[14] Recall that voters randomize uniformly when candidates converge. This assumption plays a role here. We show later that when it is relaxed, information aggregation is feasible even with candidates' commitment.

generality). As such. after observing message m_C, C thus proposes policy $x_C \in \{0,1\}$ if and only if $\beta(m_C; x_A, x_B)\Pi_C^n(0; x_A, x_B, x_C) + (1-\beta(m_C; x_A, x_B))\Pi_C^n(1; x_A, x_B, x_C) > W(c)$.[15] The baseline analysis corresponds to the case $W(c) \geq 1$. In this subsection, we also restrict the analysis to the case of $W(c) \geq 1/3$ (which eliminates the case in which C prefers to imitate A and B when they converge) and $\alpha \geq 1/3$ (so state $z = 0$ is not too unlikely, we establish in the Appendix that this assumption does not affect our core insights).

Denote $Q_{EC}(n)$ the probability that the correct policy is implemented when third candidate entry is possible. The next proposition establishes that the presence of a potential third candidate is not sufficient to discipline candidates A and B. For some parameter values, full information aggregation is still not feasible. Worse, the possibility of third candidate entry may actually render full information aggregation more difficult when the cost of entry is intermediary. Let $\underline{W} := \max\left\{\frac{\alpha(1-\pi)^2}{\alpha(1-\pi)^2+1-\alpha}, \frac{1}{3}\right\}$.

Proposition 5. *When $\alpha \geq \frac{1}{3}$, there exists a sequence of equilibria with $\lim_{n\to\infty} Q_{EC}(n) = 1$ only if:*
(i) $W(c) \geq \frac{1}{2}$ and $(1-2\alpha-\alpha\pi(1-\pi))\frac{\omega}{2}R \leq \alpha(1-\pi)^2(1-\omega)\Delta$, or
(ii) $W(c) \in \left(\underline{W}, \frac{1}{2}\right)$ and $(1-2\alpha)\frac{\omega}{2}R \leq \alpha(1-\pi)^2(1-\omega)\Delta$, or
(iii) $W(c) \in \left(\frac{1}{3}, \underline{W}\right]$.

When the cost of entry is large so C never enters at a policy position occupied by another party ($W(c) > 1/2$), the threat of entry partially disciplines uninformed candidates. The electoral gain from abandoning policy 0 is lower and so the condition for full information aggregation to be feasible is relaxed. Note, however, that information aggregation is not guaranteed for all parameter values. This is because an uniformed candidate C does not have sufficient incentives to enter at policy 0 even when A and B converge to 1. Candidate C cannot distinguish whether A and B propose the popular option because they are uninformed or the state of the world is 1.[16] In turn, when the cost of entry is very low (case (iii) of Proposition 5), C is willing to enter at 0 after $m_C = \emptyset$ when A and B propose 1 when uninformed. This equilibrium guarantees full information aggregation.

[15] When C puts some weight on policy, the threshold $W(c)$ then depends on x_C. This complicates the analysis without affecting this section's main results.

[16] Assuming A and B propose $x = 1$ when uninformed, C's posterior that the state of the world is 0 upon observing $x_A = 1 = x_B$ and $m_C = \emptyset$ is $\frac{\alpha(1-\pi)^2}{\alpha(1-\pi)^2+(1-\alpha)} < 1/2$.

For intermediary cost of entry (case (ii)), the threat of candidate C actually renders full information aggregation more difficult. $W(c) < 1/2$ implies that an informed candidate C enters at the correct policy when candidates diverge. C's strategy is thus the same whether an uninformed candidate proposes 0 or 1 (when his opponent offers 1 when uninformed). Thus, there is no electoral cost for candidate J to pander to the electorate. In addition, because of C's willingness to enter when informed, the risk that the wrong policy is implemented decreases (both J's opponent and C must be uninformed, $J \in \{A, B\}$). The combination of these two effects generates stronger incentives for A and B to converge to policy option 1 when uninformed.

Coordinated voting strategy

Having explored the robustness of our results to changes to the 'supply side', we now turn to the demand side of politics—voters. We begin by considering a version of the baseline model in which voters, rather than randomizing uniformly, can coordinate on more complex (symmetric) strategies conditional upon candidates' convergence. Our next result shows that when coordination is possible, full information aggregation becomes feasible.

Proposition 6. *There exists $\overline{n}^\tau$ such that for all $n \geq \overline{n}^\tau$, there exists voters' strategies conditional on candidates' convergence ($\tau_i^*(J, m; x, x)$ for all $J \in \{A, B\}$, $m, x \in \{\emptyset, z\} \times \{0, 1\}$) such that in equilibrium:*
(i) there is information aggregation in the limits: $\lim_{n \to \infty} Q_{NP}^\tau(n) = 1$;
(ii) voters are strictly better off with independent than partisan candidates for finite n: $Q_{NP}^\tau(n) > Q_P(n)$.

To maximize the probability that the correct policy is implemented, voters want to encourage informed candidates to follow their signal and uninformed candidates to diverge. To encourage divergence, (for example) voters coordinate on voting strategy which reward candidate A for offering 0 and punish him for proposing 1. Observe that point (ii) of Proposition 6 indicates that voters are then better off with independent compared to partisan candidates. This is because they benefit from informed candidates using their information to converge on the correct policy which guarantees it is implemented even if the electorate is finite.

It is important to note that Proposition 6 relies on voters' perfect indifference conditional on convergence. Indeed, it requires voters play a different strategies conditional on the policy candidates converge on. As such, it is susceptible to the Fearon's critique (Fearon, 1999). Any small shock who breaks indifference would break the equilibrium we constructed.[17] To illustrate this point, we explicitly model a valence shock δ which favors (without loss of generality) candidate B.

Valence advantage

In this section, we explicitly incorporate a valence advantage in citizens' utility function by assuming that each voter gets a (common) additional payoff $\delta \in (0, 1)$ when candidate B is elected (the baseline model corresponds to $\delta = 0$). That is, a citizen i's utility function now assumes the following form: $U_i(x, z; e) = -\mathbb{I}_{\{x \neq z\}} + \mathbb{I}_{\{e=B\}}\delta$. The rest of the model remains unchanged.

First, observe that conditional on convergence, each voter always votes for B. Indeed, a voter conditions her electoral decision on the event that she is decisive. Since her vote has no effect on policy outcome (candidates commit to their platform), she always gets a higher payoff by electing candidate B. Second, we obtain that the swing voter's curse holds in a setting with asymmetric policy option. Conditional on A and B diverging, for a large enough electorate, uninformed voters abstain. Even though voters prefer A to B everything else equals, they prefer A implementing the correct policy to B implementing the wrong policy (since $\delta < 1$). Hence, we can extend the reasoning in Feddersen and Pesendorfer (1996) to this setting. The next Lemma summarizes voters' behavior.

Lemma 2. *When candidates converge, all voters vote for candidate B.*
When candidates diverge, an informed voter follows her signal. Further, there exists $\overline{n}^{\phi}_{\delta}(\beta)$ such that for all $n \geq \overline{n}^{\phi}_{\delta}(\beta)$, an uninformed voter abstains.

Given voters' behavior, candidate B has strong incentive to match candidate A's platform. This incentive is particularly strong for an uninformed candidate B (in a large electorate, an informed B is almost certain to win if he proposes the correct policy and his opponent does not, so he follows his signal). In turn, an uninformed candidate A can only win with non-negligible probability by distinguishing himself from his opponent's proposal The platform games between both uninformed candidates thus resemble a hide-and-seek game and the equilibrium is in mixed

[17] Gratton (2014) also constructs specific voters' strategy to sustain full information aggregation. This strategy, however, is sustained by out-of-equilibrium beliefs conditional on divergence which generate a dominant strategy. In our set-up, voters' coordinated strategy is conditional on convergence and thus more fragile.

strategies for relatively high office-motivation.[18] As uninformed candidates mix, the probability of convergence on the suboptimal policy is strictly positive; hence, information aggregation is unfeasible. In this setting, the highest probability that the correct policy is implemented in an electorate of size n is denoted by $Q^{\delta}_{NP}(n)$. We obtain:

Proposition 7. *There exists* $\epsilon^{\delta} > 0$ *such that* $\lim_{n\to\infty} Q^{\delta}_{NP}(n) < 1 - \epsilon^{\delta}$ *if and only if*

$$\alpha\omega R > \frac{\alpha - \alpha\pi}{\alpha - (1-\alpha)\pi}(1-\alpha)(1-\omega)\Delta$$

The analysis in the previous subsection helps to explain why full information aggregation is not feasible. Recall that to sustain full information aggregation, voters should reward different candidates depending on which option they converge to. When B has a valence advantage, this is no longer possible as the same candidate (B) wins conditional on convergence *for all* policies.

Imperfectly observed platforms

The previous subsection has illustrated the fragility of coordination in voters' electoral strategies. In this final extension, we return to the case of an (unmodeled) symmetric shock so voters uniformly randomize conditional on convergence. Instead, we assume that voters do not necessarily observe candidates platforms. This assumption is in line with survey evidence that voters know very little about politics and what candidates stand for (e.g., Campbell et al., 1980; Delli Carpini and Keeter, 1996).

Formally, we assume that before making her electoral decision, voter i observes two messages: (i) $m_i \in \{\emptyset, 0, 1\}$ and (ii) $\mathbf{r} \in \{(\emptyset,\emptyset), (\emptyset, x_B), (x_A, \emptyset), (x_B, x_A)\}$. The first message m_i reveals the state of the world if $m_i \neq \emptyset$ and has thus similar properties as in the baseline set-up. The second message $\mathbf{r} = (r_A, r_B)$ fully reveals the platform of candidate $J \in \{A, B\}$ if and only if $r_J \neq \emptyset$. We assume that the probability a voter learns candidate J's platform is i.i.d. (across candidates) and satisfies: $Pr(r_J = x_J) = p \in (0,1)$ (the baseline model has $p = 1$). Note that even when a voter does not observe x_J, she may correctly anticipate candidates' equilibrium strategies from the state.

Denote $Q_{NI}(n)$ the highest probability that the correct policy is implemented in an electorate of size n when platforms are not perfectly observed. Our next result establishes that full information aggregation is feasible as long as the likelihood voters observe a one platform is not too low or

[18] See also Bhattacharya (2016) for similar candidates' behavior in a different set-up.

candidates are not fully office-motivated. Further, under these conditions, the correct policy is more likely to be implemented when candidates are independent rather than partisan.

Proposition 8. *When platforms are imperfectly observed and $p > (1-p)^2$ or $\omega < 1$,*
(i) $\lim_{n\to\infty} Q_{NI}(n) = 1$*;*
(ii) there exists $\overline{n}^{ip}$ *such that for all finite* $n \geq \overline{n}^{ip}$, $Q_P(n) < Q_{NI}(n)$*).*

To understand this result, consider the assessment in which informed candidates follow their signal and an uninformed candidate A (B) proposes $x_A = 0$ ($x_B = 1$). Consider the choice of voter i who learns the state is 0 but does not observe any platform. Anticipating candidates' strategies, this voter casts a vote for candidate A since such candidate always proposes the right policy when $z = 0$. Similarly, a voter who learns $z = 1$ but does not observe candidates' platforms votes for B. That is, due to candidates' strategy, policy $x = 0$ becomes A's owned policy and $x = 1$ becomes B's. Hence, A is rewarded for proposing $x = 0$ and B for proposing $x = 1$ which ensures that the strategies are incentive compatible.[19]

This subsection establishes that more information (about candidates' platforms) hurt voters. It increases uninformed candidates' incentive to pander to the electorate by proposing the ex-ante most likely option. Even though candidates lack reputation concerns (as in Prat, 2005; Fox and Van Weelden, 2012), transparency is costly because it induces pandering in the context of information aggregation.[20]

6 Conclusion

Elections are meant to both aggregate dispersed information in the electorate and provide incentives to politicians. This paper shows that these two functions can be in conflict. When candidates' office-motivation is large relative to the policy cost of implementing the wrong policy, candidates'

[19] When the electorate is very poorly informed ($p \leq (1-p)^2$), there is a greater proportion of voters observing only the state than observing both the state and a candidate's platform. A is then more likely than B to win in state $z = 0$ even if he offers policy $x = 1$. Even if the electoral benefit from proposing $x = 1$ is small (since it is B's owned policy), the absence of electoral cost may lead a purely office-motivated candidate ($\omega = 1$) to deviate (for candidates with possibly small policy-motivation, the policy cost is never worth the reward for n sufficiently large). Hence, the proposition does not necessarily hold when $p \leq (1-p)^2$ and $\omega = 1$.

[20] Prato and Wolton (2017) show that transparency can hurt voters in a pure moral hazard environment by encouraging politicians to offer safe rather than risky policies. Wolinsky (2002) finds that the quality of a committee's recommendation can increase if the decision-maker observes only the committee's final vote rather than its deliberation. This result is, however, driven by committee members' (equivalent to the voters in our setting) incentives to hide information rather than the decision-maker's (the candidates).

electoral incentives render full information aggregation unfeasible. Uninformed candidates pander to voters by converging to the ex-ante most popular policy. Voters' electoral choices and their aggregate consequences cannot be understood separately from candidates' incentives to offer varied policy options.

The fundamental problem we uncover can be resolved if candidates are partisan and polarized, voters can coordinate on an appropriately designed electoral strategy or when they imperfectly observe candidates' platforms. In contrast, the possibility of third candidate's entry or asymmetry in voters' evaluation of candidates are imperfect remedies.

Our set-up omits many important aspects of elections. For example, in our framework, candidates are identical and voters are not engaged in screening politicians. Whether adverse selection can be combined with information aggregation is an interesting avenue for future research. We also leave no role for special interest groups and campaign spending. Understanding whether these features impede or favor information aggregation is also critical in the current campaign regulatory environment. Only then can we really evaluate whether elections can perform the many functions political economy and theory ask of them.

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A Proofs for Section 4

Following Feddersen and Pesendorfer (1996) (henceforth referred to as FP), we denote $\sigma_{z,x}(\tau)$ the probability of 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 $\sigma_J(z; x_A, x_B)$ the probability a randomly drawn voter votes for $J \in \{A, B\}$ in state z as a function of candidates' platforms $(x_A, x_B) \in \{0,1\}^2$.

Proof of Lemma 1

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

$$\begin{aligned}\sigma_{0,0}(\tau) =& \sigma_A(0; 0, 1) = (1 - p_\phi)(q + (1 - q)\tau_A(\emptyset; (x_A, x_B)))\\ \sigma_{1,1}(\tau) =& \sigma_B(1; 0, 1) = (1 - p_\phi)(q + (1 - q)\tau_B(\emptyset; (x_A, x_B)))\end{aligned}$$

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

$$\begin{aligned}\sigma_{0,1}(\tau) =& \sigma_B(0; 0, 1) = (1 - p_\phi)(1 - q)\tau_B(\emptyset; (x_A, x_B))\\ \sigma_{1,0}(\tau) =& \sigma_A(1; 0, 1) = (1 - p_\phi)(1 - q)\tau_A(\emptyset; (x_A, x_B))\end{aligned}$$

As in FP, $\sigma_{x,x}(\tau) = \sigma_{\neg x,x}(\tau) + q(1 - p_\phi)$. Let $Eu(x|m; x_A, x_B, \tau)$ be the expected utility associated with voting for the candidate committing to $x \in (x_A, x_B)$ or abstaining $x = \phi$ conditional on (i) message m, (ii) candidates' platforms (x_A, x_B), and (iii) uninformed citizens' strategy profile τ. We can thus use the proof of FP's Proposition 1 in Fey and Kim (2002) (simply replacing α with the posterior $\beta(\emptyset, (x_A, x_B)))$ to establish that $Eu(0|\emptyset; 0, 1, \tau) = Eu(1|\emptyset; 0, 1, \tau) \Rightarrow Eu(\phi|\emptyset; 0, 1, \tau) > Eu(0|\emptyset; 0, 1, \tau)$. Further, if there exists $\epsilon > 0$ such that $\sigma_{\neg x,x}(\tau) - \sigma_{x,\neg x}(\tau) > \epsilon$, then there exists $\overline{n}^\emptyset(\beta)$ such that for all $n \geq \overline{n}^\emptyset(\beta)$ $Eu(\neg x|\emptyset; 0, 1, \tau) > Eu(\phi|\emptyset; 0, 1, \tau) > Eu(x|\emptyset; 0, 1, \tau)$ (FP's

Lemma 1.A). Finally, using a similar logic as in the proof of FP's Proposition 3.(iii) for $n \geq \overline{n}^{\emptyset}$ we obtain that abstention is a dominated strategy so $\tau_{\phi} = 1$. $\square$

For the proof of the next propositions, denote $\Pi_J^n(z; x_A, x_B)$ the ex-ante probability that candidate $J \in \{A, B\}$ wins in state $z \in \{0, 1\}$ when candidates propose platforms $(x_A, x_B) \in \{0, 1\}^2$ and the electorate is of size $2n+1$. Also, let $\Pi^n \equiv \frac{(1-(1-p_{\phi})q)^{2n+1}}{2}$. Given the voters' strategy, $\Pi_J^n(z; x_A, x_B) = 1 - \Pi^n$ whenever $x_J = z$ and $x_{\neg J} = \neg z$.

Proof of Proposition 2

The proof proceeds by contradiction. Suppose there is a divergent equilibrium and assume without loss of generality that $x_A(m_A) = 0$ for all $m_A \in \{\emptyset, 0, 1\}$. Suppose further that $n \geq \overline{n}^{\emptyset}(\alpha)$ so that uninformed voters abstain conditional on divergence. After observing $m_A = 1$, candidate A's incentive compatibility constraint (IC) is:

$$\Pi_A^n(1; 0, 1)(\omega R - (1-\omega)\Delta) \geq \frac{\omega R}{2}.$$

The right-hand side follows from our assumption that voters randomize uniformly when candidates propose similar platform and the correct policy $x = 1$ is always implemented. When A proposes $x_A = 0$, he wins the election with ex-ante probability $\Pi_A^n(1; 0, 1) = \frac{(1-(1-p_{\emptyset})q)^{2n+1}}{2}$ (only if all voters abstain or no voter is informed). For all $n \geq 1$, $\Pi_A^n(1; 0, 1) < 1/2$, so A's (IC) is never satisfied for $n \geq \overline{n}^{\emptyset}(\alpha)$, which completes the proof. $\square$

Proof of Proposition 3

First, observe that by extending the reasoning in the proof of Proposition 2, candidates follow their signal ($x_J(m) = m$ for $m \neq \emptyset$, $J \in \{A, B\}$). To see that, first denote $\Gamma_J(x; z) := \pi\gamma_J(x; z) + (1-\pi)\gamma_J(x; \emptyset)$ the ex-ante probability that $J \in \{A, B\}$ chooses x in state z. Fixing B's strategy, observe that A's expected payoff from following his signal $m = z$ and doing the opposite are, respectively

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

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

Since $\Pi_A^n(z; z, \neg z) \geq 1/2 \geq \Pi_A^n(z; \neg z, z)$, A prefers to follow his signal. By symmetry, the claim follows for B.

Second, we show that under the condition stated in the proposition, in any equilibrium $x_A(\emptyset) \neq x_B(\emptyset)$ with probability strictly less than 1. To the contrary, suppose without loss of generality that $x_A(\emptyset) = 0$ and $x_B(\emptyset) = 1$. Candidate A's (IC) when uninformed is then:

$$\begin{aligned}
&\alpha \left\{ \begin{array}{c} \pi \Pi_A^n(0;0,0)\omega R \\ +(1-\pi)\Big(\Pi_A^n(0;0,1)\omega R - \Delta \Pi_B^n(0;0,1)(1-\omega)\Big) \end{array} \right\} + (1-\alpha)\Pi_A^n(1;0,1)(\omega R - \Delta(1-\omega)) \\
&\geq \alpha \left\{ \begin{array}{c} \pi \Pi_A^n(0;1,0)(\omega R - \Delta(1-\omega)) \\ +(1-\pi)\Big(\Pi_A^n(0;1,1)\omega R - \Delta(1-\omega)\Big) \end{array} \right\} + (1-\alpha)\Pi_A^n(1;1,1)\omega R \qquad (3)
\end{aligned}$$

Under our assumptions, $\Pi_A^n(z; x, x) = 1/2$. Further, $\Pi_A^n(z; z, \neg z) = 1 - \Pi^n = \Pi_B^n(z; \neg z, z)$ for $z \in \{0, 1\}$. As $n \to \infty$, Equation 3 becomes:

$$\alpha\omega\left(1 - \frac{\pi}{2}\right) R \geq \alpha(1-\pi)\left(\frac{\omega}{2}R - \Delta(1-\omega)\right) + (1-\alpha)\frac{\omega}{2}R$$

Notice that if $(1 - 2\alpha)\frac{\omega}{2}R \leq \alpha(1-\omega)(1-\pi)\Delta$, then Equation 3 holds as n goes to infinity and the candidates' strategy ($x_A(m) = \mathbb{I}_{\{m=1\}}, x_B(m) = \mathbb{I}_{\{m\neq 0\}}$) is incentive compatible (using the proof of Proposition 2, it can be checked that a candidate has no incentive to deviate after $m \neq \emptyset$). Further, given the uninformed voters' strategy (Lemma 1), this equilibrium guarantees that $\lim_{n\to\infty} Q_{NP}(n) = 1$.

Instead, if $(1 - 2\alpha)\frac{\omega}{2}R < \alpha(1-\omega)(1-\pi)\Delta$,then Equation 3 does not hold for large enough n. In any equilibrium, then one candidate's strategy must satisfy: $\gamma_J(0; \emptyset) \in (0, 1)$. We now show that this implies that the associated probability the correct probability is implemented—denoted $Q_{PC}(n; \gamma)$—does not converge to 1 as n goes to infinity. Given uninformed voters' strategy (Lemma 1), we obtain: $\lim_{n\to\infty} Q_{NPC}(n; \gamma) = 1 - (1-\pi)^2\big[\alpha\gamma_A(1; \emptyset)\gamma_B(1; \emptyset) + (1-\alpha)\gamma_A(0; \emptyset)\gamma_B(0; \emptyset)\big]$. Information aggregation ($\lim_{n\to\infty} Q_{NPC}(n; \gamma) = 1$) 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 $\gamma_J(0; \emptyset) = \gamma_{-J}(1; \emptyset) = 1$, which is not an equilibrium strategy. □

Proof of Corollary 1

The corollary follows from Propositions 1 and 3 given that $\lim_{n\to\infty} Q_P(n) = 1$. □

Proof of Corollary 2

Direct from observation of the necessary and sufficient condition in the text of Proposition 3 given $\alpha > 1/2$ and $R > 0$. $\square$

Proof of Corollary 3

By Proposition 2, there is no divergent equilibrium. Further, observe that due to the negligible probability that a candidate is partisan, 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 independent candidates' strategy. Hence, by Lemma 1, there exists n large enough such that uninformed voters abstain. This implies that for n large enough, informed candidates follow their signal in any equilibrium (proof of Proposition 3). We now show that for n large enough, under the condition of the corollary, uninformed candidates converge to 1. From the proof of Proposition 3, for n large enough, uninformed A has a strictly dominant strategy to propose $x_A(\emptyset) = 1$ even if B proposes $x_B(\emptyset) = 1$ with probability 1 (if $\gamma_B(1;\emptyset) < 1$, the electoral benefit of proposing 1 is higher and the policy cost lower for A). By symmetry, B has a strictly dominant strategy to propose $x_B(\emptyset) = 1$ even if $\gamma_A(1;\emptyset) = 1$. Hence, there exists a unique sequence of equilibria such as the claim holds. $\square$