The Voters' Curses: The Upsides and Downsides of Political Engagement

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Abstract

Scholars have long deplored voters' lack of interest in politics and argue greater political engagement would improve the performance of democracy. We consider a model of elections where successful communication of political messages during campaigns requires efforts by politicians and a representative voter. The voter's incentive to pay attention to politics affects the effectiveness of the electoral process as screening and disciplining device. The performance of the electoral process *and* the voter's level of political activity are low when the voter cares little about politics–this is the *curse of the apathetic voter*–, or cares a lot about politics–this is the *curse of the engaged voter*. Consequently, an engaged voter is not always an active voter and fostering political engagement (e.g., by lowering the cost of political information or facilitating policy changes) might have negative consequences on voter's attention to politics and welfare.

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1 Introduction

Democracies require an active electorate to perform well. A representative's incentive to act in the voters' interest depends on their attention and oversight (Tocqueville, 1840; Mill, 1861). The extent to which voters are able to fulfill their democratic duties is heavily debated. Some argue that voters are incompetent (Campbell et al., 1960), do not have consistent political beliefs (Converse, 1964), and tend to reward or punish politicians based on outcomes politicians have no control over (Achen and Bartels, 2004). Others argue that voters "are no fools" (Key, 1966): they make the best possible choice given the alternatives and information available to them (Downs, 1957). Despite these disagreements, these scholars share a common premise: an engaged electorate would improve democratic performance.

We formally investigate that premise through the lenses of a theory of elections where we distinguish between voters' *engagement*–that is, their incentive to pay attention to politics–and their *attention*–that is, their cognitive involvement with the electoral process. We show that there exists a *curse of the apathetic voter*. Consistently with previous theories of democratic politics, we find when voters have too little incentive to pay attention to politics, the performance of the democratic system–measured in term of voters' welfare–declines. More surprisingly, we uncover a *curse of the engaged voter*. Voters can be hurt and their level of political activity might decrease substantially when they care too much about politics. We show that the electoral process loses its effectiveness as screening and disciplining device as politicians rationally anticipate that the electoral reward from running on different platforms changes with voters' engagement. Politicians' equilibrium behavior places limits on how active voters can be. In other words, voters' lack of attention to politics is not equivalent to voters' lack of interest. This result has important policy implications since well-intentioned interventions aimed at encouraging an engaged electorate might prove unsuccessful or even counterproductive.

Our theory builds upon a formal model of elections where a representative voter chooses between two candidates, who can be either competent or non-competent. Candidates commit either to a status quo policy or to some new policy, which imposes an additional policy cost on the politician.[1] The new policy is beneficial to the voter only if implemented by a competent candidate, and welfare-damaging, otherwise. We interpret the voter's net benefit from the new policy implemented by a competent politician as her political engagement: her incentive to pay attention

[1] Henceforth, we use the pronoun 'she' and 'he' for the voter and politician, respectively.

to the electoral campaign. The voter does not observe a candidate's competence or his platform, but can learn the latter during the electoral campaign. Our primary theoretical innovation is to model electoral campaigns as a joint effort between the voter and candidates, building on Dewatripont and Tirole (2005). How informed the voter is depends on the candidates' *and* the voter's communication efforts, and the effectiveness of a candidate's attempts to reach the voter increases with her attention to the campaign. Our modeling approach to electoral campaigns follows Zaller's (1992) "reception axiom", which states "the greater a person's level of cognitive engagement with an issue, the more likely he or she is to be exposed to and comprehend–in a word, receive–political messages concerning that issue."

For the voter, the electoral process performs best (her welfare is maximized) when competent politicians campaign on the new policy, whereas incompetent politicians choose the status quo policy. We demonstrate that this welfare-maximizing separating equilibrium exists only if the voter's political engagement lies in an intermediate range. A separating equilibrium does not exist when voter's political engagement is low. Even if (only) competent candidates were to propose the new policy, the voter would exert little communication effort. The resulting low probability that the voter learns a candidate's platform means that competent candidates have little electoral incentive to run on the new policy. Consequently, they would deviate and run on the status quo policy. When political engagement is low, the voter pays *too little* attention to politics to sustain the welfare-maximizing separating equilibrium; this is the *curse of the apathetic voter*.

More surprisingly, a separating equilibrium does not exist when political engagement is high. If only competent candidates were to propose the new policy, the voter would exert high communication effort. The resulting high probability of successful communication would depress the electoral chances of non-competent candidates who do not campaign on the new policy. Consequently, these candidates would deviate and mimic competent candidates by campaigning on a reformist platform. When political engagement is high, the voter pays *too much* attention to politics to sustain the welfare-maximizing separating equilibrium; this is the *curse of the engaged voter*.

The curse of the apathetic voter produces policy inertia and status quo bias. The curse of the engaged voter implies that when the voter cares a lot about politics, the electoral process loses its effectiveness as screening and disciplining device since both competent and non competent candidates commit to the new policy. The voter pays less attention to politics, as she correctly anticipates that different types of politicians pool on the same type of campaign, and suffers a welfare loss. Even though the voter's level of political engagement is high, the voter becomes less politically active.

Our results show that increased political engagement does not necessarily improve the performance of the electoral process. Policies meant to foster interest in politics, such as recent proposals to increase subsidies for public service broadcasting to lower the cost of political information (Soroka et al., 2013; O'Mahen, 2013), might actually reduce voter's attention to politics and worsen the performance of the electoral process.

In contrast, we show that the voter might benefit from imposing a higher cost of implementing the new policy on politicians. When this policy cost is relatively low, the return from being in office and implementing the new policy is large, and candidates have a strong incentive to exert communication efforts. The voter then pays close attention to the campaign (due to complementarities in communication), and the curse of the engaged voter implies that the voter's welfare-maximizing equilibrium cannot be sustained. This paper suggests thus an alternative rationale, unrelated to the traditional 'tyranny of the majority' argument (Madison's Federalist 9 and 51, 1788), for institutional arrangements that increase the cost of making policy changes (i.e., vetoes, supermajority requirements, etc.). By increasing institutional inertia, a voter commits not to listen to politicians too much and ensures the electoral process retains its effectiveness as screening device.

More generally, this paper describes an important trade-off for the design of political institutions. Institutional arrangements that make policy changes difficult (i.e., a high cost of implementing new policies) mute the curse of the engaged voter and the voter is better off when demand for policy change is high. However, it exacerbates the curse of the apathetic voter competent politicians have less incentives to implement welfare-improving policy changes when political engagement is relatively low. When crises (defined as a time when political engagement is high) are rare (frequent), the curse of the apathetic (engaged) voter should be the main concern and low (high) institutional inertia is more likely to be optimal.

The rest of the paper is organized as follows. In the next section, we review the literature. In Section 3, we describe our theory of elections and some general preliminary results. In Section 4, we uncover the existence of the curse of the apathetic voter and the curse of the engaged voter. In Section 5, we discuss voter's attention and welfare in different equilibria. In Section 6, we discuss the implications of our results. Section 7 concludes. Proofs are collected in Appendix A. In a supplemental appendix, we show that provided that the screening problem faced by the voter is severe enough, the separating equilibrium on which this paper focuses (i.e., where only competent candidates commit to the new policy) is welfare maximizing (Appendix B).[2]

2 Literature review

It has long been recognized that the responsiveness of democratic systems decrease when voters are not politically involved (Tocqueville, 1840; Mill, 1861). However, the extent to which voters have the capacity to fulfill their democratic duty has been heavily debated by several generations of scholars. Several studies document voters' incompetence (Campbell et al., 1960; Delli Carpini and Keeter, 1996), lack of consistent beliefs (Lippmann, 1925; Converse, 1964; Zaller, 1992), or lack of the necessary discerning abilities to punish or reward politicians (Achen and Bartles, 2004; Wolfers, 2007; Leigh, 2009; Healy and Malhotra, 2009). Other scholars have argued that "voters are no fools", they make the best possible choice given the alternatives available to them (Key, 1966), the information presented to them (Popkin, 1991; Sniderman et al., 1993; Lupia and McCubbins, 1998) and the cost and benefit of collecting political information (Downs, 1957; Page, 1978).

Despite these major disagreements, both strands of the literature share two common features. First, they consider exclusively voters, thereby disregarding how politicians' platform and electoral communication might respond to varying levels of voters' engagement and attention. Second, they argue that a more engaged electorate would improve the performance of the democratic system. This paper shows that this claim needs to be qualified when the strategic interdependency between voters and politicians is accounted for. Fostering political engagement might actually reduce voters' welfare *and* attention to politics. Furthermore, how much voters care about politics cannot be inferred from how much attention they pay to politics.

The importance of considering the strategic interdependency between voters and politicians has been stressed in the political agency literature. As Ashworth and Bueno de Mesquita (2013) points out, once this interdependency is taken into account it is no longer clear that voters benefit from being highly rational or more informed. In particular, too much information might hurt the voter by inducing politicians to pander to voters (Prat, 2005; Fox, 2007; Fox and Van Weelden, 2012), to promote too much policy changes (Levy, 2007), or to behave too uniformly (Ashworth and Bueno de Mesquita, 2013). We share several features with this literature, but also show that the problem

[2]The supplemental appendix can be found on the corresponding author's website: `http://home.uchicago.edu/swolton/Research.html`

might be more fundamental than previously thought. The voter is never too informed in our model, but she might care too much about politics. We also show that electoral competition, far from alleviating the negative consequences of voters' incentives to listen to politics, might exacerbate it.[3]

In this paper, we equate voters' attention to politics with attention to electoral campaigns. This follows a long research tradition which has stressed the importance of electoral campaigns for the functioning of democracy (Key, 1966; Page and Brody, 1972; Page, 1978; Alvarez, 1997). During campaigns, voters learn about candidates and their platforms (Franklin, 1991; Brians and Wattember, 1996; Freedman et al., 2004) and candidates "*inform, persuade, and mobilize*" voters (Norris, 2002 p.128, emphasis in the text; see also Salmore and Salmore, 1989; Holbrook, 2011).[4] As illustrated by John Zaller's "reception axiom," the effect of an electoral campaign on voters' electoral decision depends on their attention to it (see also McAllister, 2002; Franz, 2011; Murphy, 2011).

In formal works on the electoral process, most notably Hotelling-Black-Downs models, voters generally observe costlessly and perfectly candidates' platform (Persson and Tabellini, 2000). We are not the first to relax these assumptions. A more recent line of research acknowledges that it is costly to inform voters about a candidate's platform or valence (Prat, 2002; Coate, 2004a and b; Ashworth, 2006; Wittman, 2007; Prato and Wolton, 2013a), change their evaluation of candidates by increasing name recognition (Grossman and Helpman, 1996), or increase the salience of some issues (Aragonès et al., 2013). Other papers highlight how voters can use campaign performance to learn about candidates' competence, but assume costless dissimination of information (Bhattacharya, 2012; Dewan and Hortala-Vallve, 2013), who are passive recipient of electoral information. Hortala-Vallve et al. (2013) considers a model where candidates choose a tax policy and voters need to pay a cost to learn candidates' platforms. Candidates are all identical and so more incentives to learn candidates' platforms always benefit the median voter. We show that this result no longer holds when candidates are heterogeneous in term of competence.[5]

[3] The idea that electoral competition encourages risk-taking is also present in Dewan and Hortala-Vallve (2013).

[4] It is not surprising then that candidates spend millions during campaigns. According to the Center for Responsive Politics, Barack Obama and John McCain spent \$1.06bn during the 2008 presidential campaign, and Barack Obama and Mitt Romney's expenditures amounted to \$1.15bn during the 2012 presidential campaign.

[5] Several other papers examine voters' incentives to acquire information (Feddersen and Sandroni, 2006; Austen-Smith and Feddersen, 2009; Gershkov and Szentes, 2009; Oliveros, 2013; Tyson, 2013). But voters then choose between fixed alternatives and so these papers cannot study the strategic interdependence between voters and politicians.

3 A theory of elections and preliminary results

Our theory of elections builds upon a formal model featuring a one-period, three-player game with two candidates (1 and 2) and a representative voter. The candidates compete for an elected office, which they value. Before the campaign, each candidate $j \in \{1, 2\}$ privately observes his type $t_j \in \{c, n\}$ (where c denotes competent and n denotes non-competent politician), and commits to a platform: either the status quo policy ($p_j = 0$) or some new policy ($p_j = 1$), which he can implement at an additional policy cost. It is common knowledge that the proportion of competent candidates is $q = Pr(t = c)$. The new policy is beneficial to the voter (compared to a party's traditional policy) only if it is implemented by a competent politician.

The new policy can be thought as an experiment where success does not depend on the state of the world (as in Callander 2011a and b), but on a politician's competence.[6] It can be a change of economic paradigm such as Latin America moving from import substitution industrialization to free market in the 1980's. It can also take the form of institutional reforms such as the decentralization reform in Bolivia in 1994 (see Grindle, 2000). It can be related to a policy overhaul on an important issue such as environmental policy (e.g., Nixon's reform in 1970), health care policy (e.g., Obama's reform in 2009-2010), or labor market policy (e.g., the reforms in New Zealand in the 1990's). Using Carmines and Stimson's (1980) terminology, the new policy corresponds to a *hard issue*, whereas the status quo policy is an *easy issue*, less technical and with a more established presence in public discussion.

In line with the literature on voters' behavior, we consider an imperfectly informed voter. She does not know candidates' competence and can only observe candidates' platforms if she pays attention to the electoral campaign. We assume that how informed the voter is depends on her and candidates' communication efforts. We model electoral communication as a team problem, building on Dewatripont and Tirole (2005). A player exerts communication effort at a cost, and other players do not observe his effort. When candidate j exerts communication effort $y_j \in [0, 1]$ and the voter exerts communication effort $x_j \in [0, 1]$ toward candidate j, the probability that the voter observes the candidate's platform is $y_j x_j$ (Figure 1). After the campaign, the voter elects one of the two candidates, denoted by $e \in \{1, 2\}$.

[6] For example, competent politicians are more successful at designing the scope, pace of some policy change, and the compensation of winners and losers resulting from it (Haggard and Webb, 1993). They might be less likely to pander to vested interests (Krueger, 1993). Badly engineered policy changes impose a large cost on society as the experience of Latin America in the 1980s illustrates (Dornbusch, 1988; Krueger, 1993).

Notice that our assumptions regarding the campaigning technology imply that fixing the voter's attention, a higher candidate's communication effort (e.g., increased number of ads) increases the probability that the voter becomes informed about what the candidate will do if elected. Inversely, for a given number of ads from a candidate, if the voter pays more attention, the probability she learns the candidate's platform increases. Our campaigning technology satisfies Zaller (1992)'s reception axiom, which states that greater cognitive engagement with an issue increases the probability a voter receives a candidate's message. It is also in line with empirical evidence documenting that voters learn incrementally (Neuman et al., 1992).

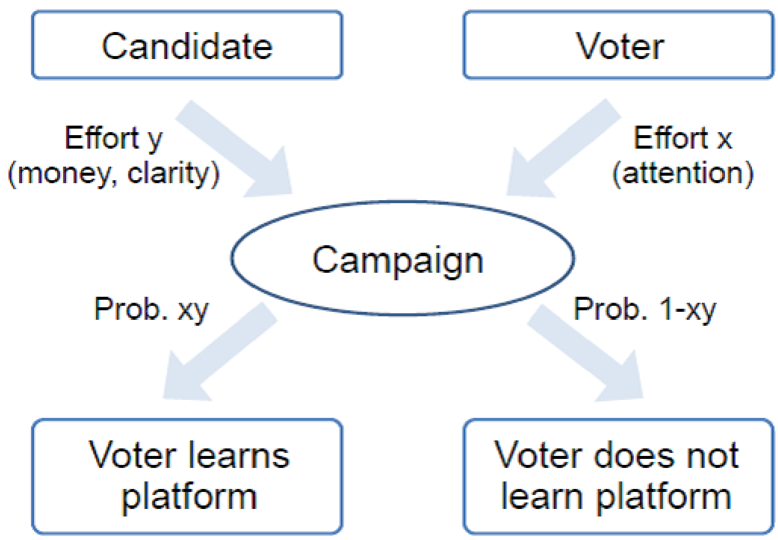


Figure 1: Campaign as a team effort

The voter's utility function depends on the policy implemented by the elected candidate. When a candidate implements the status quo policy, the voter's payoff is 0. When a candidate implements the new policy, the voter's payoff depends on the politician's competence. When the elected politician is competent, the voter gets a utility gain of $G > 0$. When he is non-competent, the voter experiences a utility loss of $L < 0$.[7] We refer to the parameter G as the *gain from change* for the voter.

As explained above, listening to candidates is costly for the voter (captured by a cost function $C_v(.)$). This cost can be understood as the effort of deciphering a candidate's message or the

[7]The main results of this paper (the existence of a curse of the apathetic voter and a curse of the engaged voter) would go through if there were $N > 1$ voters instead of one as long as there is sufficient commonality of interest between voters. In this case, voters' level of attention is still directly affected by G, which is the key force driving our results as we show below.

opportunity cost of paying attention to the campaign instead of undertaking other activities.[8] The voter's utility function is:

$$u_v(p_e, x_1, x_2) = \begin{cases} p_e G - C_v(x_1) - C_v(x_2) & \text{if } e \text{ is competent} \\ p_e L - C_v(x_1) - C_v(x_2) & \text{otherwise} \end{cases} \tag{1}$$

Candidates are office-motivated, and we normalize their payoff from being outside of office to 0. If elected, a politician gets a payoff of 1 if he implements the status quo policy and $1 - k_t,\ t \in \{c, n\}$ if he implements the new policy ($p = 1$). The policy cost of implementing the new policy depends on the politician's competence: $0 < k_c < k_n < 1$. As noted by Hall and Deardoff (2006), any policy change entails a cost for politicians promoting it: cost of collecting information, striking a bargain with veto players, etc. We suppose that a competent politician is more able at undertaking these tasks.[9]

We also suppose that communicating with the voter is costly for candidates (function $C(.)$). Candidates can make broad statements without substance or announcements detailing a candidate's plan (Dewan and Hortola-Vallve, 2013). We focus on the second type of discourse, which we deem more costly than vague statements. This cost can be assimilated to the difficulty of defining and disseminating (i.e., airing ads, organizing meetings, conventions, press conferences, etc.) a clear and effective message to the voter in a noisy environment.

Candidate j ($j \in \{1, 2\}$)'s utility is:

$$u_j(p_j, y_j; t) = \begin{cases} 1 - k_t p_j - C(y_j) & \text{if elected} \\ -C(y_j) & \text{otherwise} \end{cases} \tag{2}$$

To summarize, the timing of the game is:

1. Nature draws the candidates' type: $t_j \in \{c, n\},\ j \in \{1, 2\}$.

2. Each candidate observes (only) his type and chooses a platform: the status quo policy ($p_j = 0$), or the new policy ($p_j = 1$); $j \in \{1, 2\}$.

[8]For example, it could represent the opportunity cost of watching parties' nominating convention in the U.S., candidates' press conferences, or news reports about candidates, rather than more entertaining TV programs. The assumption that the communication effort is directed simplifies the analysis without affecting the main results.

[9]A type c candidate's policy cost can also be lower if politicians care about their place in history books, which depends on the impact of policy changes (Howell, 2013). At the price of complicating the exposition, we can also assume that the politician cares about the voter's welfare (as long as its weight in his utility function is less than the gain from being elected).

3. The electoral campaign takes place. Candidates 1 and 2, and the voter exert communication efforts, respectively: y_1, y_2, and $\mathbf{x} = (x_1, x_2)$.

   With probability $y_j x_j$, communication is successful: the voter observes candidate j's platform (p_j). Otherwise, the voter does not learn p_j.

4. The voter elects one of the two candidates: $e \in \{1, 2\}$.

5. The elected candidate e implements p_j and payoffs are realized.

Note that candidates can only communicate their platform; they cannot credibly reveal their type to the voter directly.[10] For analytical tractability, we assume that candidates implement the policy they have chosen.[11] This implies communication affects only their chances of being elected, not their payoff once in office.

In what follows, we assume the following.

Assumption 1. $-L/G = \tau > \frac{q}{1-q}$

Assumption 1 implies that the voter, absent updates on her prior about candidate j's type, prefers the status quo policy to the new policy. Therefore, a competent politician who chooses $p_j = 1$ must convince the voter that he is competent to be elected.

Assumption 2. *The cost functions $C_v(.)$ and $C(.)$ satisfy the following properties:*

i: $C_v(.)$ and $C(.)$ are twice continuously differentiable;

ii: $C_v'(0) = 0 = C'(0)$ and $\lim_{x \to 1} C_v'(x) = \infty = \lim_{y \to 1} C'(y)$;

iii: $C_v''(0) = 0 = C''(0)$ and $C_v''(x) > 0,\ \forall x \in (0, 1], C''(y) > 0,\ \forall y \in (0, 1]$;

iv: The third derivatives exist and satisfy: $C_v'''(.) \geq 0$ and $C'''(.) \geq 0$ on $[0, 1]$.

[10]The main results of this paper still hold when the voter receives a signal of the candidate's competence as long as this signal is sufficiently noisy. This is because the voter does not care about competence per se, but wants to elect a competent candidate *who commits to the new policy*. Therefore, the voter always has some incentive to exert communication effort to learn about a candidate's platform. Consequently, the mechanism driving the curse of the apathetic voter and the curse of the engaged voter (described below) is still present with noisy signals.

[11]This can be justified by assuming, for example, that, in unmodeled period 2, the voter receives information about candidates' platforms and is able to hold his elected representative accountable if she does not uphold his commitment.

Assumptions 2.i and 2.ii are analogous to assumptions on the communication cost function in Dewatripont and Tirole (2005). We add two novels assumption: Assumptions 2.iii and Assumptions 2.iv. Assumptions 2.iii is a sufficient condition for competent candidates and the voter to exert strictly positive communication effort when candidates play a separating strategy profile (i.e., only competent candidates commit to the reform policy).[12] Assumptions 2.iv guarantees that the equilibrium communication strategies are unique when candidates play a separating strategy profile.

The equilibrium concept is Perfect Bayesian Equilibrium (PBE) in pure strategies (with the caveat that the voter tosses a fair coin to decide which candidate to elect when indifferent), and excluding weakly-dominated strategies. A formal definition of the equilibrium can be found in Appendix A (see Definition 1). The term 'equilibrium' refers to this class of equilibria. We study the simplest set-up to convey the intuition for our results. In particular, in the present model, the assumption that candidates are symmetric is key to derive our results. In a previous draft of the manuscript (Prato and Wolton, 2013b), we extend the set-up to include asymmetries and show our main results still hold true.

We now present some general preliminary results regarding the equilibrium behavior of the voter and candidates. First, the voter's electoral decision. The voter elects the candidate who gives her the highest expected payoff given her beliefs about the candidates' competence, which are shaped by the electoral campaign. The voter infers a candidate's competence from his campaign performance. Our first result is that successful communication always raises the voter's equilibrium posterior that the candidate is competent and as a consequence, his electoral chances.

Lemma 1. *In any equilibrium, a candidate's probability of winning the election is (weakly) greater after successful communication.*

Given the voter's election rule, we consider when a candidate chooses to invest in informative communication with the voter. We find that candidates do not always engage in costly communication.

Lemma 2. *In any equilibrium, a candidate exerts strictly positive communication effort if and only if he commits to the reform policy ($p = 1$).*

[12] We assume that $C_v''(0) = 0 = C''(0)$ for exposition purposes. It is sufficient that the second derivatives of both communication cost functions are bounded above at 0.

Due to the absence of a policy cost, committing to the status quo policy ($p = 0$) can be understood as a default option for a politician. A candidate has no incentive to pay a cost to reveal that he commits to his default option. Consequently, the voter places high probability on a candidate promising no change when communication is unsuccessful, implying a candidate must exert some strictly positive communication effort when he commits to the reform policy. An important consequence of Lemma 2 is that a candidate faces a double cost when he chooses $p = 1$. First, he must pay a policy cost (k_t), but only if he is elected. Second, he must incur a communication cost $C(y)$, borne regardless of the electoral outcome.

4 The voter's curses

In this section, we describe the curse of the apathetic voter and the curse of the engaged voter. We study under which conditions there exists an equilibrium when candidates play a separating strategy, that is a candidate commits to the new policy only if competent. We will refer to this equilibrium as separating (slightly abusing the usual terminology). We focus on this equilibrium because for a given gain from change (G), the voter's welfare is maximized when candidates play a separating strategy as long as the screening problem faced by the voter is serious enough (see Appendix B).[13] By the analysis above (Lemmata 1 and 2), a separating equilibrium exists only if for a competent candidate, the electoral reward for committing to the new policy is greater than the policy cost and the communication cost; this is a competent candidate's incentive compatibility constraint. A non-competent candidate's incentive compatibility constraint is the reverse inequality: his policy cost must be large enough so that he chooses the status quo policy.

We first study the players' communication strategies when candidates separate. The next lemma shows that candidates' and voter's equilibrium communication strategies are unique.

Lemma 3. *Suppose a separating equilibrium exists. The equilibrium communication efforts are unique and satisfy:*

i. type n candidates exerts no communication effort: $y_j^*(n) = 0,\ j \in \{1, 2\}$;

[13] When non-competent politicians' policy cost is large, the screening problem faced by the voter is relatively mild and an asymmetric assessment when a candidate chooses the new policy independent of his competence and his opponent chooses the new policy only if competent might lead to a better expected welfare for the voter (see Appendix B for more details).

ii. type c candidates and the voter exert strictly positive communication efforts: $y_1^*(c) = y_2^*(c) \equiv y^*(c) > 0$ *and* $x_1^* = x_2^* \equiv x^* > 0$*, where* $y^*(c)$ *and* x^* *are the solution of:*

$$C'(y^*(c)) = \frac{1-k_c}{2}x^* \tag{3}$$

$$C_v'(x^*) = q(1-q)\frac{G}{2}y^*(c) \tag{4}$$

A non-competent politician does not need to invest in communication since he commits to the status quo policy, the default option (see Lemma 2). A competent candidate and the voter instead exert communication effort. Their level of effort equalizes the marginal benefit of an additional unit of communication effort with its marginal cost. The marginal benefit for a competent candidate is equal to the increased probability of being elected times the payoff from being in office net of the policy cost. The voter invests in communication to avoid an electoral mistake: electing a non-competent candidate $-j$ (where $-j$ denote candidate j's opponent) when the candidate j is competent and commits to the new policy ($j \in \{1,2\}$). The marginal benefit of additional communication effort is a reduction in the probability of electing the wrong candidate times the utility gain from avoiding such an electoral mistake. Consequently, the voter's communication effort depends on the gain from change G.

It can be noted that the voter's communication effort depends on a competent candidate's communication effort, and vice versa. This is due to the complementarity in the campaigning technology ($x_j * y_j,\ j \in \{1,2\}$). As a competent candidate exerts more communication effort (e.g., organizes more press conferences), paying attention to the campaign is more efficient for the voter. As the voter pays more attention, any political message has greater chance to reach the voter.

Using the previous lemma, we can state the necessary and sufficient conditions for the existence of a separating equilibrium. We find that a separating equilibrium exists when a competent candidate's policy cost is low enough and a non-competent politician's policy cost is large enough.

Proposition 1. *There exist a unique* $k_c^* : \mathbb{R}_+ \to (0,1)$ *and* $k_n^* : \mathbb{R}_+ \times [0,1] \to (0,1)$ *such that a separating equilibrium exists if and only if*

i. A type c's policy cost is not too large: $k_c \leq k_c^*(G)$

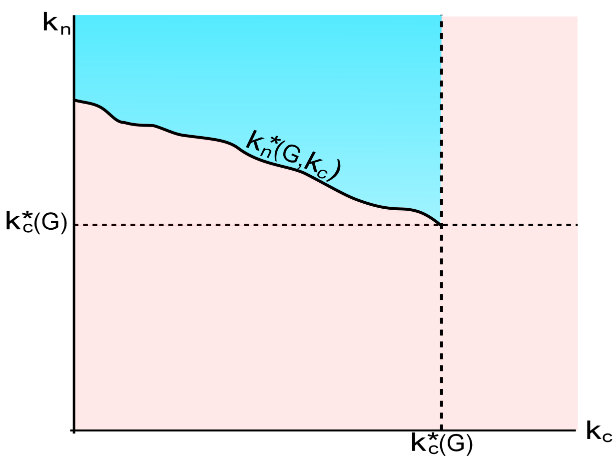
ii. A type n's policy cost is large enough: $k_n \geq k_n^*(G, k_c)$

This result accords with intuition since committing to the new policy acts as a signal of a politician's competence and this type of threshold conditions is common in signaling games.

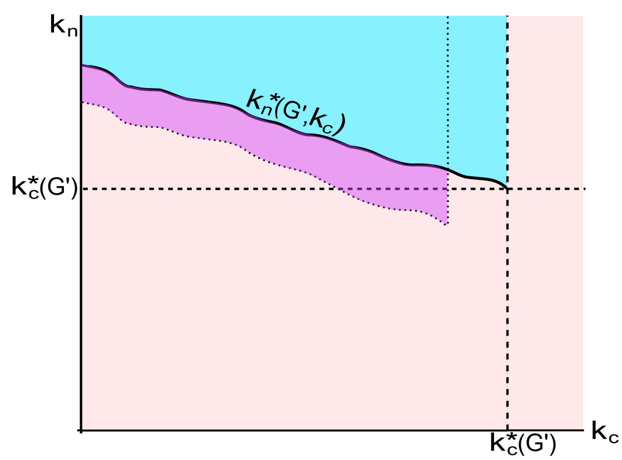
More surprisingly, we find that a non competent candidate's threshold ($k_n^*(k_c)$) depends on the competent candidate's policy cost. As the following corollary shows, the threshold for a non-competent politician is strictly higher than the threshold for a competent politician (see Figure 2)

Corollary 1. *$\forall k_c \leq k_c^*(G)$, we have: $k_n^*(G, k_c) \geq k_c^*(G)$, with strict inequality if $k_c < k_c^*(G)$.*

Corollary 1 implies that a non-competent candidate has *less* incentive to commit to the status quo policy than a competent one. A non-competent candidate, when he deviates and runs on the new policy, free-rides on the competent politician's and voter's communication efforts. This implies a high return on communication (high electoral reward compared to the communication cost). To satisfy the non-competent candidate's incentive compatibility constraint, his policy cost must then be relatively high (compared to a competent candidate's) to compensate for this free-riding effect.



(a) For low gain from change G



(b) For high gain from change $G' > G$

Figure 2: Equilibrium conditions

The blue area in the figure corresponds to policy costs such that a separating equilibrium exists.

As we noted above, the voter and a competent candidate $-j$ choose their communication effort to avoid an electoral mistake and increase their electoral prospect, respectively. However, as Remark 1 shows, their communication efforts also have an unanticipated consequence (from their perspective) on both types of candidate j's incentives to commit to the new policy.

Remark 1. *When candidates play a separating strategy, an increase in the voter's or candidate $-j$'s communication efforts:*

i. relaxes the incentive compatibility constraint of type c candidate j;

ii. tightens the incentive compatibility constraint of type n candidate j ($j \in \{1, 2\}$).

When the voter pays more attention to candidates' messages, the return on committing to the new policy increases for *both* competent and non-competent candidates. This is a consequence of two cumulative effects. First, the voter learns candidates' platform (in particular, candidates' commitment to the new policy) with greater probability. Consequently, a competent candidate is more likely to be elected and thus has more incentives to promise changes. Conversely, a non-competent candidate is less likely to be elected when he faces a competent opponent and thus has fewer incentives to commit to the status quo policy. As such, electoral competition increases the incentives of a non-competent candidate to commit to harmful policy change. This level effect of increased attention is the key mechanism driving our results, and does not depend on the campaigning technology used in this paper.

Greater voter attention also has a second effect. It increases the efficiency of candidates' communication efforts and consequently, the return on communication for candidates committing to the new policy. As explained above, candidates have then greater incentive to run on a reformist platform. This complementary effect depends on our assumptions on the campaigning technology, but it is only second-order to derive our results.

A similar logic explains why both types of candidate j are more prone to commit to the new policy when a competent candidate from the competing party increases his communication effort.

As the voter pays more attention to the electoral campaign, both competent and non-competent candidates have greater incentives to commit to the new policy. But the voter's level of attention is not exogenous in this set-up. In particular, it depends on the voter's gain from change.

Lemma 4. *When candidates play a separating strategy:*

i. the voter's communication effort x^* increases with the gain from change (G);

ii. type c candidates' communication efforts $y^*(c)$ increase with the voter's gain from change (G).

When the gain from change increases, the benefit of avoiding an electoral mistake increases. Therefore, the voter becomes more attentive to the electoral campaigns to select the right kind of politicians. Since the voter's communication effort increases, the benefit of investing in communication increases for candidates due to the complementary of communication efforts in the campaigning technology. Thus, competent candidates' communication effort increases as well.

Using Remark 1 and Lemma 4, we find that a separating equilibrium exists if and only if the voter's gain from change is in an intermediate range.

Proposition 2. *There exists an open non-empty set of policy costs* $(k_c,\ k_n)$ *such that there exist a unique* $\underline{G} > 0$ *and* $\overline{G} \in (\underline{G}, \infty)$ *such that a separating equilibrium exists if and only if the voter's gain from change is in an intermediate range:*

$$\underline{G} \leq G \leq \overline{G}$$

As a direct consequence of Proposition 2, we find a non-monotonic relationship between the voter's gain from change and the voter's welfare (see Figure 3b below for an illustration).

Corollary 2. *There exists a non-empty open set of policy costs such that an increase in the voter's gain from change can decrease the voter's equilibrium expected payoff.*

Suppose only competent types commit to the new policy and the gain from change is low. The benefit of avoiding an electoral mistake is low so the voter exerts little communication effort (Lemma 4). This means that the probability that the voter learns a candidate's platform is low and there is little electoral reward for committing to the new policy for a competent candidate. Consequently, a competent candidate proposes the status quo policy and a separating strategy cannot be an equilibrium. When the voter has little to gain from the new policy, she exerts *too* little communication effort for a separating equilibrium to exist, since the voter fails to internalize the effect of her communication effort on a competent politician's incentives to commit to the new policy. This is *the curse of the apathetic voter.*

Conversely, suppose candidates play a separating strategy and the gain from change is high. The benefit of avoiding an electoral mistake is high so the voter pays a lot of attention to the campaign (Lemma 4). There is a high probability that the voter learns candidate's platform and so a high electoral reward for committing to the new policy. Consequently, a non competent candidate deviates and commits to the new policy and a separating equilibrium cannot exist. When the voter has a lot to gain from the new policy, she exerts *too* high a communication effort for a separating equilibrium to exist, since the voter fails to internalize the impact of her communication effort on a non-competent candidates' incentives to commit to the new policy. This is *the curse of the engaged voter.*

The comparison of Figures 2a and 2b illustrates how the curse of the engaged voter affects the equilibrium conditions. When the gain from change increases, the threshold for competent candidates (k_c^*) increases (i.e., moves right on the figures), but the threshold for the non-competent candidates ($k_n^*(.)$) increases as well. As a consequence of these two effects, there exist policy costs such that a separating equilibrium exists when the gain from change is G, but no longer exists when the gain from change increases to G' strictly greater than G. These parameter values are represented in purple in Figure 2b.

As explained above, a competent candidate's communication effort depends on his benefit from being in office and implementing the new policy. The complementarity in the campaigning technology implies that voter's attention to the campaign also depends on (competent) candidates' communication efforts. Consequently, we get the following result.

Lemma 5. *When candidates play a separating strategy:*

i. the voter's communication effort x^* decreases with a type c's policy cost (k_c);

ii. a type c candidate's communication effort $y^*(c)$ decreases with his policy cost.

We know that a candidate's incentive to commit to the new policy depends on the voter and his opponent's communication efforts (Remark 1), which depend on the policy cost of implementing the new policy (Lemma 5). These two result lead to the following proposition and corollary.

Proposition 3. *Fix a non-competent candidate's policy cost k_n such that $k_n > k_c^*(G)$, then there exists a unique $\underline{k_c}(G) \in [0, k_c^*)$ such that a separating equilibrium exists if and only if $k_c \geq \underline{k_c}(G)$. The lower bound $\underline{k_c}(G)$ is increasing with G (strictly if $\underline{k_c}(G) > 0$).*

Corollary 3. *There exists a non-empty open set of policy costs such that a decrease in a competent politician's policy cost (k_c) may decrease the voter's expected equilibrium payoff.*

Suppose candidates play a separating strategy (i.e., only competent politicians commit to the new policy) and competent candidates' policy cost (k_c) is low. Competent candidates have a lot to gain from being in office and implementing the new policy. Consequently, they exert high communication effort when they run on a reformist platform. Due to the complementarity in the campaigning technology, the voter also exerts high communication effort. It is thus very likely that the voter learns a competent candidate's commitment to the new policy. The electoral reward for committing to the new policy is high, the probability of winning the election for a non-competent candidate when he proposes the status quo policy is low (because a competent opponent's electoral chances are high). As a result, non-competent candidates prefer to deviate and commit to the new policy. A separating strategy cannot be part of an equilibrium.

This point is illustrated in Figure 2. The threshold for non-competent candidates $k_n^*(.)$ decreases with the policy cost for competent politician k_c. This implies that an increase in k_c can make a separating equilibrium possible even if the non-competent politician's policy cost k_n is kept constant (in the figure, this corresponds to the policy costs moving from the red to the blue area where a separating equilibrium exists).

Proposition 3 also indicates that the optimal policy cost from the voter's perspective depends on the gain from change. When the gain from change is high, the voter pays much attention to the campaign and consequently, competent candidates exert greater communication effort. This implies that the policy cost for competent politician needs to be large to sustain a separating equilibrium. Consequently, when the gain from change is high, a high policy cost is optimal for the voter. Inversely, when the gain from change is low, a low policy cost for competent politicians is optimal for the voter.

5 Voter's attention and welfare

In the previous section, we established that the welfare-maximizing separating equilibrium does not always exist. When a separating equilibrium does not exist, multiple equilibria are possible. An equilibrium where no candidate commits to the new policy always exists. Under certain condition on the ratio of the gain from change over the loss from change, we can show that there exists an asymmetric equilibrium when one candidate commits to the new policy whether competent or not, whereas his opponent commits to the status quo policy independent of his type.[14] Potentially, there exists also an equilibrium when both candidates commit to the new policy whatever their competence. In these last two cases, electoral communication is not aimed at learning candidates' platforms, but serves as an imperfect screening device since competent politicians exert more communication effort as they have more to gain from being in office and implementing the new

[14]We show the existence of such an equilibrium and discuss its implications in a companion paper (Prato and Wolton, 2014).

policy ($k_c > k_n$). Successful communication is a positive signal of a candidate's competence.

All these candidates for equilibrium share two common features. First, the voter's expected welfare is lower than when candidates play a separating strategy. The non-existence of a separating equilibrium implies a welfare loss for the voter (see Appendix B for more details). Second, as the next proposition shows, the voter can decrease her attention to politics. When no candidate proposes the new policy, the voter has nothing to gain from listening to the electoral campaign and so exerts no effort. When the non-competent types of candidate 1 and/or candidate 2 run on a reformist platform, the voter has less to gain from successful communication since she might elect the wrong kind of politician who implements a welfare-reducing policy change. Consequently, when the screening process she faces is serious enough (that is, k_n is not too large), she again pays less attention to the campaign. Politicians' equilibrium behavior places limits on how attentive, active the voter can be.

Proposition 4. *Denote $\overline{x}(G)$ the voter's highest combined equilibrium communication effort as a function of the gain from change. For a non-empty open set of policy costs, we have:*

i. $\overline{x}(G) = 2x^*(G),\ \forall G \in [\underline{G}, \overline{G}]$*;*

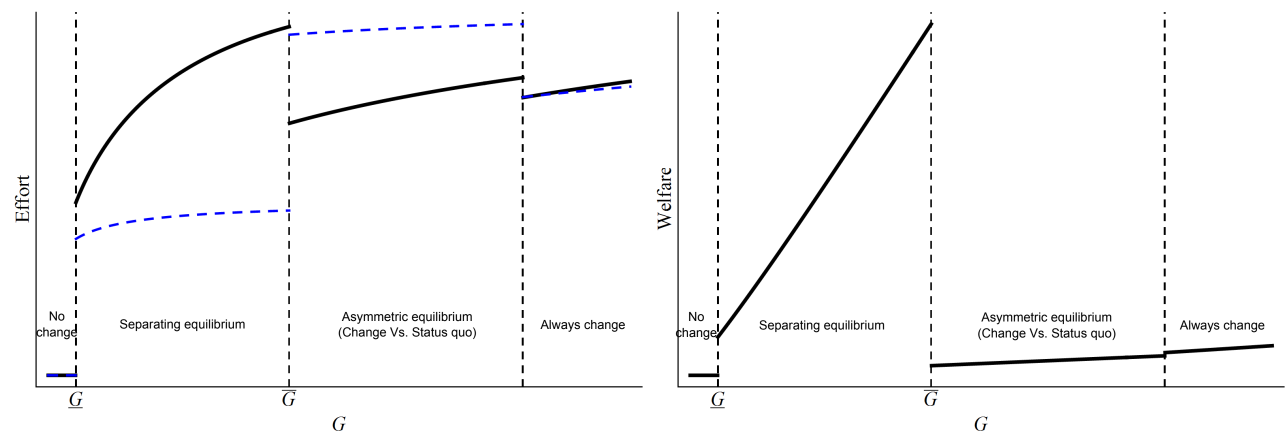
ii. $\overline{x}(G) < \overline{x}(\underline{G})$ *for all* $G \leq \underline{G}$*;*

iii. there exists $\widehat{G} > \overline{G}$ *such that* $\overline{x}(G) < \overline{x}(\overline{G})$ *for all* $G \in (\overline{G}, \widehat{G})$*.*

Figure 3 summarizes the main findings of this section. Figure 3a shows the voter's communication effort towards candidate 1 as well as candidate 1's expected communication effort as a function of the gain from change G. When a separating equilibrium exists ($G \in [\underline{G}, \overline{G}]$), the voter is very active. This is because the voter has a lot to gain from learning candidates' platform since only competent candidates commit to the new policy and she is certain to benefit from it. When the gain from change is below $\underline{G}$, a separating equilibrium does not exist due to the curse of the apathetic voter. An equilibrium when no candidate proposes the new policy exists, and the voter exerts no communication effort. When the gain from change is above $\overline{G}$, a separating equilibrium does not exist due to the curse of the engaged voter. When a non-competent candidate 1 runs on a reformist platform as in Figure 3a, the voter pays strictly less attention towards candidate 1. After successful communication, the voter is not certain she faces a competent candidate who will implement a welfare-improving policy change. This uncertainty reduces the benefit from successful communication, and consequently the voter's equilibrium communication effort.

The analysis above reveals one of the key implications of our theory. The voter's attention to the campaign does not determine how much she learns from it, but rather *what* the voter can learn from the campaign determines how much attention she pays to it

Figure 3b illustrates the negative consequences of the voter's curses on her welfare. It shows the voter's expected equilibrium welfare as a function of her gain from change. As indicated above, the voter's expected welfare is highest in a separating equilibrium. When no candidate proposes the new policy, the voter gets a payoff of 0. When candidate 1 commits to the new policy independent of his type, the voter gets a strictly positive expected payoff since electoral communication acts as an imperfect screening device. A competent candidate exerts more effort since he has more to gain from being in office and implementing the new policy ($k_c > k_n$). Successful communication is a sufficiently accurate signal of competence so that the voter's expected welfare is higher than in the case when every candidate proposes the status quo policy.



(a) Communication efforts

(b) Voter's expected welfare

Figure 3

In figure 3a, the dark line is the voter's communication effort toward party 1 candidate; the blue dotted line is party 1 candidates' average communication effort. In figure 3b, the dark line is the voter's welfare.

(parameter values: $q = 1/2,\ k_c = 1/4,\ k_n = 1/2,\ \tau = 1.01,$

$C_v(x) = (1/5)(x + (1-x)\log(1-x) - x^2/2),\ C(y) = (1/10)(y + (1-y)\log(1-y) - y^2/2)).$

6 Implications

Our result suggests that the electoral process performs best (i.e., the voter's welfare is maximized) when two conditions are met. First, it is essential that the gain from change is intermediary (Proposition 2). Second, it is necessary that the the cost of implementing policy change is sufficiently high (Proposition 3).

In our theory, the gain from change corresponds to the voter's political engagement, that is how much the voter cares about politics. Consequently, our first condition has important implications for voters' role in democracy. Scholars have long debated voters' capacity to fulfill their democratic duties, with some arguing that voters are at best incompetent (e.g., Campbell et al., 1960; Converse, 1964; Achen and Bartles, 2004) and others asserting that voters are no fools (e.g., Key, 1966; Page, 1978; Lupia and McCubbins, 1998). But all scholars agree that more engaged voters would improve the performance of democratic systems. Our paper shows that this claim needs to be qualified. The curse of the engaged voter implies that when the voter's political engagement is high, the electoral process loses its effectiveness as screening and disciplining device. Both competent and non-competent politicians propose the new policy. The voter reduces her attention to politics (Proposition 4), is unable to distinguish between the two and consequently, might be worse off (Corollary 2). This decrease in the voter's attention indicates that we cannot deduce how much voters care about politics from voters' level of activity.

An important implication of our theory is that political engagement can have negative consequences even when one considers fully *rational* voters who are motivated by selecting the *right* kind of politician. This conclusion complements the well-known danger of the "transient impulses" of passion which can lead to undesirable political outcomes (e.g., Federalist no.71).

Different proposals have been advanced to foster political engagement. Scholars have argued in favor of increased subsidies for public service broadcasting to decrease the cost of political information (Soroka et al., 2013; O'Mahen, 2013). As the next proposition shows, this policy would have an ambivalent effect on the voter's welfare in our model. It would alleviate the curse of the apathetic voter and facilitate welfare-improving policy change when the voter is disengaged. But it would also exacerbate the curse of the engaged voter and impede welfare-improving policy change when the voter's political engagement is high.

Proposition 5. *Suppose that the voter's cost of communication decreases from $C_v(x)$ to $\breve{C}_v(x) = \lambda C_v(x)$, with $\lambda < 1$. There exist non-empty open sets of policy costs, λ and G such that the voter's expected equilibrium welfare and level of attention are lower with $\breve{C}_v(.)$ than $C_v(.)$.*

As stated above, a second favorable condition for welfare-improving policy change is that (for a given level of political engagement) the cost of implementing the alternative is sufficiently high. This policy cost depends on the institutional environment faced by elected politicians such as number of veto players, supermajority requirement, constraints on the use of emergency procedures, etc.. Our results imply that increasing the status quo bias in institutions (i.e., increasing the policy costs) can improve the voter's welfare. Our argument is unrelated to the traditional idea of preventing a tyranny of the majority (Federalist no.10 and 51).[15] Greater status quo bias in institutions increases a competent candidate's policy cost. This reduces his communication effort when he commits to the new policy and consequently, it softens electoral competition and partially mutes the curse of the engaged voter. A non-competent candidate who commits to the status quo policy has still a relatively high probability of winning the election and less incentive to run on a harmful reformist platform. Greater status quo bias also increases non-competent politicians' policy cost, which decreases further their incentives to promise changes. Paradoxically, an institutional environment ex ante less favorable to policy change might actually promote policy change. The reason is that high policy costs preserve the effectiveness of the electoral process as a screening and disciplining device, especially in times where political engagement is high.

However, there exists a trade-off in the design of institutions. Imposing a relatively high policy cost ensures that commitment to the new policy still signals a candidate's competence when political engagement is high. But it also exacerbates the curse of the apathetic voter. The voter is less able to incentivize competent politicians to implement the new policy when political engagement is low. If crises correspond to a time when the gain from change is high (see for example, Drazen and Grilli, 1993), then understanding the frequency of crises–particularly, but not exclusively, economic crises–may help resolve this trade-off. If crises are frequent, the curse of the engaged voter should be the main concern and a high status quo bias in institutions might be optimal. Inversely, if crises are rare, the curse of the apathetic voter is the main problem and policy costs should be low.[16]

7 Conclusion

In this paper, we show that the commonly assumed premise that a more engaged electorate improves the democratic process must be qualified. In line with previous theories, we find that there

[15] Our argument is also different than Gehlbach and Malesky's (2010), who show that additional veto players can be beneficial because they increase the cost of buying votes for an organized minority who wishes to stall welfare-improving reforms, and Hao Li (2001), who demonstrates that an institutional status quo bias can mitigate free riding problems in a group.

[16] In the latter case, institutional change is more complicated since a decrease in policy costs has conflicting effects: both competent and non-competent politicians have greater incentives to run on a reformist platform. This again justifies institutions making implementation of policy changes difficult.

exists a curse of the apathetic voter. Too little interest in politics leads to bad political outcomes for the voter. More surprisingly, this paper shows that there exists a curse of the engaged voter. Too much incentives to pay attention to politics might lead to a lower equilibrium welfare and a less active voter since political communication loses almost entirely its informational value due to politicians' equilibrium response to the voter's engagement.

Our theory yields two important predictions for the study of democracy. First, it is not possible to deduce from voters' level political activity how much they care about politics. Second, policies meant to increase voters' political engagement (such as increased subsidies for public service broadcasting or facilitating policy changes) might have negative unintended consequences on voters' welfare and attention to politics as a result of the curse of the engaged voter.

Our paper is a first step towards a better understanding of voters' and politicians' strategic choices of attention and communication, as well as their influence on the performance of the democratic process. As such, the use of a representative voter and a common value environment seem natural. We are aware, however, that these assumptions might conceal interesting effects which deserve further attention in future research. We believe an extension of our theoretical framework could prove useful to study the influence of special interest groups and of varied groups of voters with distinct policy preferences on policy-making.

Appendix A: Proofs

We first introduce some notation. Denote by $\sigma_j(t) = (p_j(t_j), y_j(t_j)) \in \{0,1\} \times [0,1]$ the strategy (policy choice and communication effort) of a type t candidate j ($t \in \{c,n\},\ j \in \{1,2\}$). The tuple of strategies is denoted by $\sigma_j \equiv (\sigma_j(c), \sigma_j(n))$. Denote by $m_j \in \{\emptyset, p_j\}$ the outcome of candidate j's campaign, i.e. whether the message is observed by the voter. If $m_j = \emptyset$ ($m_j = p_j$), communication has been unsuccessful (successful). We also denote by $\mu(m_j, x_j) = \mu_j$ the voter's posterior belief that candidate j is competent conditional on observing m_j and her communication effort x_j. Finally, denote voter's electoral strategy (probability of electing candidate 1): $s_1(m_1, m_2, \mathbf{x}) \in [0,1]$.

Definition 1. *The players' strategies form a Perfect Bayesian Equilibrium if the following conditions are satisfied*[17]

1) $s_1(m_1, m_2, \mathbf{x}) = \begin{cases} 1 \\ 1/2 \\ 0 \end{cases}$

$\Leftrightarrow E_\mu(u_v(p_1, x_1, x_2)|m_1, \sigma_1) \gtreqless E_\mu(u_v(p_2, x_1, x_2)|m_2, \sigma_2)$;

2) $y_j(t_j, p_j) = arg\max_{y \in [0,1]}\ E(u_j(p_j, y; t_j)|\mathbf{x}, s_1, \sigma_{-j}),\ j \in \{1,2\},\ t_j \in \{c,n\}$;

3) $\mathbf{x} = arg\max_{x,x'}\ E(u_v(p_e, x, x')|s_1, \sigma_1, \sigma_2)$;

4) $\forall j \in \{1,2\},\ t_j \in \{c,n\},\ p_j(t_j) = \begin{cases} 1 \\ 0 \end{cases} \Leftrightarrow E(u_j(1, y_j(t_j,1); t_j)|\mathbf{x}, s_1, \sigma_{-j}) \gtrless E(u_j(0, y_j(t_j,0); t_j)|\mathbf{x}, s_1, \sigma_{-j})$;

5) $\mu(m_j, x_j)$ *satisfies Bayes' rule whenever possible.*

Note that condition 1) is equivalent to: after observing m_j and m_{-j}, the voter elects candidate j with probability 1 rather than his opponent $(-j)$ ($j \in \{1,2\}$) if and only if ($\forall m_j,\ m_{-j},\ \sigma_j$, and σ_{-j}):

$$\mu_j p_j(c) G + (1-\mu_j) p_j(n) L > \mu_{-j} p_{-j}(c) G + (1-\mu_{-j}) p_{-j}(n) L \tag{5}$$

We first prove Lemma 1. We introduce the following notation. Denote by $\Gamma(\sigma_j(t), \sigma_{-j})$ the probability that a type t candidate j is elected when she plays strategy $\sigma_j(t)$ and his opponent

[17] When indifferent, we suppose that candidates follow the strategy which maximizes the voter's welfare as it is usual.

plays σ_{-j} $(t \in \{c, n\})$. We have:

$$\Gamma(\sigma_j(t), \sigma_{-j}) = E\left[\mathbb{I}_A + \frac{\mathbb{I}_B}{2}\middle| p_j(t), y_j(t); \sigma_{-j}\right]$$

where A is the event: 'equation (5) holds' and B is the event when both sides are equal. The expectation operator is over the probability of successful communication with candidate $j \in \{1, 2\}$, candidate $-j$ and candidate $-j$'s type. It is obvious that $\Gamma(\sigma_j(t), \sigma_{-j})$ is increasing with $\mu(p_j(t); \sigma_j)p_j(c)G + (1 - \mu(p_j(t); \sigma_j))p_j(n)L$ and $\mu(\emptyset; \sigma_j)p_j(c)G + (1 - \mu(\emptyset; \sigma_j))p_j(n)L$.

Lemma 6. *There is no equilibrium when a competent candidate j chooses $p_j(c) = 0$ and a non-competent candidate j chooses $p_j(n) = 1$.*

Proof. The proof is by contradiction.

First, suppose a non-competent candidate j plays $\sigma_j(n) = (1, y_j(n)),\ y_j(n) > 0$ and a competent candidate j chooses $p_j(c) = 0$. When communication with the voter is successful, a non-competent candidate j is elected with strictly positive probability if and only if (by (5)):

$$L \geq \mu(m_{-j}, x_{-j})p_{-j}(c)G + (1 - \mu(m_{-j}, x_{-j}))p_{-j}(n)L,\ m_{-j} \in \{\emptyset, p_{-j}(t)\}$$

When communication with the voter is not successful, a non-competent candidate j is elected with strictly positive probability if and only if:

$$(1 - \mu(\emptyset, x_j))L \geq \mu(m_{-j}, x_{-j})p_{-j}(c)G + (1 - \mu(m_{-j}, x_{-j}))p_{-j}(n)L$$

Under our assumptions on the cost functions (see Assumption 2) and $y_j(n) > 0$, we have $\mu(\emptyset, x_j) \in (0, 1)$. Then it must be that: $(1 - \mu(\emptyset, x_j))L > L$. Therefore, a type n candidate's probability of being elected is strictly greater when $m_j = \emptyset$. Because a candidate always values being in office ($k_n < 1$) and communication is costly, $\sigma_j(n) = (1, y_j(n))$ is strictly dominated by $\sigma_j(n) = (1, 0)$. Hence we have reached a contradiction.

Now suppose a non-competent candidate j plays $\sigma_j(n) = (1, 0)$. Since the voter never observes his platform, his choice of $p_j(n)$ does not affect his probability of being elected. Since the new policy is costly ($k_n > 0$), it must be that $\sigma_j(n) = (1, 0)$ is strictly dominated by $(0, 0)$. This completes the proof. □

A non-competent candidate never wants to choose $p = 1$ when a competent type chooses $p = 0$. By separating, he simultaneously lowers the probability of election and his expected payoff conditional on election (due to the policy cost).

Proof of Lemma 1. Fix candidate $-j$'s strategy σ_{-j}. Using Lemma 6, we need to consider only three cases: 1) $p_j(c) = 0,\ p_j(n) = 0$, 2) $p_j(c) = 1,\ p_j(n) = 0$, and 3) $p_j(c) = 1,\ p_j(n) = 1$.

In case 1), successful communication has no impact on the probability of being elected since the voter's payoff does not depend on a candidate's type.

In case 2), using a similar reasoning as in the proof of Lemma 2, we can show that a type n exerts zero communication effort. Successful communication thus reveals a candidate is competent and implements the reform policy. The voter's expected payoff of electing candidate j is higher after successful communication. Consequently, candidate j's probability of winning the election is higher after successful communication (see (5)).

In case 3), at the communication subform both types solve the same maximization problem modulo the policy cost. A type n's value of office is lower under the assumption that $k_c < k_n$. Therefore, a type c's communication effort is weakly higher (as a result of condition 2 in Definition 1).[18] Successful communication thus weakly increases the voter's posterior regarding candidate j's competence and thus her expected payoff from electing candidate j. The probability she elects candidate j is higher. □

Proof of Lemma 2. Necessity:

To prove necessity, we prove the counterpart: $p_j = 0 \Rightarrow y_j = 0$.

On the equilibrium path, given $p_j(t)$ a type t candidate j chooses $y_j(t)$ to maximize:

$$\max_{y \geq 0} \Gamma((p_j(t), y), \sigma_{-j})(1 - p_j(t)k_t) - C(y),\ j \in \{1, 2\}\ t \in \{c, n\} \tag{6}$$

$y_j(t)$ affects $\Gamma(.;.)$ only through the probability that the voter observes $m_j(t) = p_j(t)$.

Using Lemma 6, we just need to focus on two cases: 1) $p_j(c) = p_j(n) = 0$ and 2) $p_j(c) = 1$ and $p_j(n) = 0$.

Take case 1). We have: $\mu(m_j(t) = 0; \sigma_j) * 0 + (1 - \mu(0; \sigma_j)) * 0 = 0 = \mu(m_j(t) = \emptyset; \sigma_j) * 0 + (1 - \mu(\emptyset; \sigma_j)) * 0$. So it does not matter whether the voter observes $m_j(t) = p_j(t)$ or $m_j(t) = \emptyset$ (because

[18] This can also be shown by contradiction using a similar reasoning as in Lemma 6. If we have $y(n) > y(c)$, then a type n has a successful deviation to communication effort $y(c)$ so it cannot be an equilibrium strategy.

the voter anticipates correctly candidates' strategy in equilibrium). Since communication is costly, it must be that: $y_j(t) = 0$.

Take case 2). We have: $\mu(m_j = 0; \sigma_j) = 0$. This implies that: $\mu(m_j(n) = 0; \sigma_j) * G + (1 - \mu(0; \sigma_j)) * 0 = 0 < \mu(m_j(n) = \emptyset; \sigma_j) * G + (1 - \mu(\emptyset; \sigma_j)) * 0$. The strict inequality comes from Assumption 1 and the fact that the voter does not observe a candidate's message with probability 1 (Assumption **??**), so we have: $\mu(m_j(t) = \emptyset; \sigma_j) > 0$, and Assumption 1. Since $\Gamma(.,.)$ is increasing with $\mu(m_j(t); \sigma_j) * G$, a type n candidate j wants to minimize the probability that the voter observes $m_j = 0$. Since, in addition communication is costly, it must be that a type n candidate j chooses $y_j(n) = 0$ when $p_j(n) = 0$ and $p_j(c) = 1$.

Sufficiency:

Now consider the case of a candidate choosing $p = 1$. Using Lemma 6, we just need to focus on two cases: 1) $p_j(c) = p_j(n) = 1$ and 2) $p_j(c) = 1$ and $p_j(n) = 0$.

Take case 1). Suppose both types choose $y = 0$. Then using the same reasoning as in Lemma 6, we can see that $\sigma_j(1, 0)$ is weakly dominated by $(0, 0)$ so it cannot be an equilibrium.

Suppose only a non-competent type communicates. We have then: $\mu(m_j(t) = 1; \sigma_j) * G + (1 - \mu(1; \sigma_j)) * L = L < \mu(m_j(t) = \emptyset; \sigma_j) * G + (1 - \mu(\emptyset; \sigma_j)) * L$. So a non-competent type does not want to communicate (since communication is costly and reduces his electoral chances). Therefore, it cannot be an equilibrium. Suppose only a competent type communicates. Then, we have using the same reasoning as in Lemma 6, that $\sigma_j(n) = (1, 0)$ is weakly dominated by $(0, 0)$ so it cannot be an equilibrium. Therefore, the only possibility left is that: $y_j(c) > 0$ and $y_j(n) > 0$ when $p_j(c) = p_j(n) = 1$ is on the equilibrium path.

Lastly, consider case 2). Suppose $y_j(c) = 0$. Then, as above, we can easily show that $\sigma_j(c) = (1, 0)$ is weakly dominated by $(0, 0)$ since $k_c > 0$. This implies that $p_j(c) = 1$ cannot be an equilibrium choice when $y_j(c) = 0$.

Summarizing this, we get that $p = 1$ is an equilibrium choice only if $y = 1$ which completes the proof. □

Lemma 7. *A separating equilibrium exists only if* $\mu(m_1 = \emptyset, x_1^*)G = \mu(m_2 = \emptyset, x_2^*)G$ *where* $\mathbf{x}^* = (x_1^*, x_2^*)$ *is the voter's equilibrium communication efforts.*

Proof. The proof is by contradiction. Suppose $\mu(m_1 = \emptyset, x_1^*)G > \mu(m_2 = \emptyset, x_2^*)G$. Since by Lemma 2, we must have $y_j^*(n) = 0,\ j \in \{1, 2\}$, the above inequality implies that a type n candidate 2 is never elected. In fact, the voter always elects candidate 1 when both candidates' communication is not successful, by (5). A type n candidate 2's expected utility is thus 0, but if a type n candidate 2 pretends to be competent by choosing strategy $\hat{\sigma}_2(n) = (1, \hat{y}_2(n))$, where $\hat{y}_2(n)$ is his optimal communication effort, his expected utility is strictly positive (see the proof of Proposition 1 for more details). Therefore, a type n candidate 2 prefers to commit to the reform policy and a separating equilibrium cannot exist. The same reasoning shows that $\mu(m_1 = \emptyset, x_1^*)G < \mu(m_2 = \emptyset, x_2^*)G$ is impossible on the equilibrium path. $\square$

Proof of Lemma 3. By Lemma 2, we have: $y_j^*(n) = 0, \ j \in \{1, 2\}$.
Consider now a competent candidate. Without loss of generality (WLOG), we focus on a (competent) candidate 1. He takes his opponent's (y_2) and the voter's ($\mathbf{x} = (x_1, x_2)$) communication efforts as given. His expected utility, when he chooses communication effort y_1, is:

$$\begin{aligned} V_1(1, y_1; c) = q &\left(y_1 x_1 * (1 - y_2 x_2) + \frac{y_1 x_1 * y_2 x_2}{2} + \frac{(1 - y_1 x_1)(1 - y_2 x_2)}{2} \right) (1 - k_c) \\ &+ (1 - q) \left(y_1 x_1 + \frac{1 - y_1 x_1}{2} \right) (1 - k_c) - C(y_1) \end{aligned}$$

A competent candidate gets $1 - k_c$ when he gets elected, and 0 otherwise. When he faces a competent candidate 2, he wins with probability 1 when he communicates successfully with the voter is successful and his opponent does not; with probability 1/2 when both communicate successfully (since the voter is indifferent) and when both are unsuccessful; and probability 0, otherwise. Remember that by Lemma 7, the voter must be indifferent between both candidates when communication with both is unsuccessful. When he faces a non-competent candidate, he wins the election with probability 1 when communication is successful (this occurs with probability $y_1 x_1$). When communication is unsuccessful, he wins with probability 1/2. In all cases, he has to pay his cost of communication.

After rearranging, we get that a competent candidate 1 chooses his communication effort y_1 to maximize:

$$\max_{y_1 \in [0,1]} \left(\frac{1 + y_1 x_1}{2} \right) (1 - k_c) - q(1 - k_c) \frac{y_2 x_2}{2} - C(y_1)$$

We get the following First-Order Condition (FOC):

$$C'(y_1(c)) = \frac{1 - k_c}{2} x_1$$

Similarly, for a competent candidate 2, we get: $C'(y_2(c)) = \frac{1-k_c}{2}x_2$.

Now let's consider the voter's communication effort. He chooses $\mathbf{x}$ such as to maximize:

$$\max_{x_1,x_2\in[0,1]^2} \left\{ \begin{array}{c} q^2 * G + \overbrace{(1-q)}^{1}\overbrace{q}^{2}\left(y_2x_2 * G + (1-y_2x_2) * \frac{G}{2}\right) \\ +(1-q)q\frac{G}{2}(1+y_1x_1) - C_v(x_1) - C_v(x_2) \end{array} \right\}$$

In a separating equilibrium, using (5), the voter randomizes between both candidates when communication with both is successful or unsuccessful (Lemma 7). When communication is successful only with candidate 1 (2), she elects candidate 1 (2).

We thus have the following FOC:

$$\begin{aligned} C_v'(x_1^*) =& q(1-q)\frac{G}{2}y_1 \\ C_v'(x_2^*) =& q(1-q)\frac{G}{2}y_2 \end{aligned}$$

We can see that $y_j^*(c)$ and x_j^* ($j \in \{1,2\}$) are defined by the following system of two equations:

$$\begin{aligned} C'(y_j^*(c)) =& \frac{1-k_c}{2}x_j^* \\ C_v'(x_j^*) =& q(1-q)\frac{G}{2}y_j^*(c),\ j \in \{1,2\} \end{aligned}$$

We now show there exists a unique strictly positive solution to this system of equations. By Lemma 2, it must be the players' equilibrium communication strategies.

Denote: $h(x) = q(1-q)\frac{G}{2}(C')^{-1}\left(\frac{1-k_c}{2}x\right) - C_v'(x)$. By Assumption 2, this function is continuously differentiable. A necessary condition for the existence of a strictly positive $y_j^*(c)$ and $x_j^*,\ j \in \{1,2\}$ is that the function $h(x)$ has a 0 on $(0,1)$. Under Assumption 2, $h(0) = 0$ and $\lim_{x\to 1} h(x) = -\infty$. Therefore, it is sufficient that $h'(0) > 0$. We have:

$$h'(x) = \frac{q(1-q)\frac{G}{2}\frac{1-k_c}{2}}{C''\left((C')^{-1}\left(\frac{1-k_c}{2}x^*\right)\right)} - C_v''(x^*)$$

By Assumption 2.iii, we have that $h'(0)$ has the same sign as $q(1-q)\frac{G}{2}\frac{1-k_c}{2}$ so $h'(0) > 0$ (i.e., $h'(x) \xrightarrow{x\to 0} +\infty$). Hence there exists a strictly positive solution to (3) and (4).

This solution is unique if $h''(x) \leq 0$. Using chain rules, we get:

$$h''(x) = -\frac{q(1-q)\frac{G}{2}\left(\frac{1-k_c}{2}\right)^2 C'''\left((C')^{-1}\left(\frac{1-k_c}{2}x\right)\right)}{C''\left((C')^{-1}\left(\frac{1-k_c}{2}x\right)\right)^3} - C_v'''(x)$$

Since $C(.)$, $C'(.)$ and $C_v'(.)$ are convex, we have that $h''(.) \leq 0$.

This implies that $y_1^*(c) = y_2^*(c)$ and $x_1^* = x_2^*$ and the equilibrium communication strategies are unique as claimed. $\square$

Before proving Proposition 1, we show Lemmata 8 and 9.

Lemma 8. *We have: $C''(y^*(c))C_v''(x^*) > q(1-q)\frac{G}{2}\frac{1-k_c}{2}$, where $y^*(c)$ and x^* are the strictly positive solutions to (3) and (4).*

Proof. Using the properties of $h(x)$, defined in the proof of Lemma 3, we know that we must have: $h'(x^*) < 0$ (since $h(x) \xrightarrow{x \to 1} -\infty$ and $h''(x) \leq 0$). We have:

$$\begin{aligned} h'(x^*) =& \frac{q(1-q)\frac{G}{2}\frac{1-k_c}{2}}{C''\left((C')^{-1}\left(\frac{1-k_c}{2}x^*\right)\right)} - C_v''(x^*) \\ =& \frac{q(1-q)\frac{G}{2}\frac{1-k_c}{2} - C''(y^*(c))C_v''(x^*)}{C''(y^*(c))} \end{aligned}$$

Where we use $C'(y^*(c)) = \frac{1-k_c}{2}x^* > 0$ by Lemma 3. Therefore, $C''(y^*(c))C_v''(x^*) - q(1-q)\frac{G}{2}\frac{1-k_c}{2} > 0$. $\square$

Lemma 9. *The voter and competent candidate's communication effort (resp. x^* and $y^*(c)$ defined in Lemma 3) have the following properties:*

1. $\frac{\partial y^*(c)}{\partial k_c} < 0$ *and* $\frac{\partial x^*}{\partial k_c} < 0$
2. $\frac{\partial y^*(c)}{\partial G} > 0$ *and* $\frac{\partial x^*}{\partial G} > 0$

Proof. We only show point 1. Point 2. follows using a similar reasoning. By the Implicit Function Theorem (IFT), we have:

$$\begin{aligned} \frac{\partial y^*(c)}{\partial k_c}C''(y^*(c)) &= -\frac{x^*}{2} + \frac{1-k_c}{2}\frac{\partial x^*}{\partial k_c} \\ \frac{\partial x^*}{\partial k_c}C_v''(x^*) &= q(1-q)\frac{G}{2}\frac{\partial y^*(c)}{\partial k_c} \end{aligned}$$

Rearranging, we get:

$$\frac{\partial y^*(c)}{\partial k_c} = -\frac{\frac{x^*}{2}C_v''(x^*)}{C''(y^*(c))C_v''(x^*) - q(1-q)\frac{G}{2}\frac{1-k_c}{2}}$$
$$\frac{\partial x^*}{\partial k_c}C_v''(x^*) = q(1-q)\frac{G}{2}\frac{\partial y^*(c)}{\partial k_c}$$

By Lemma 8, $C''(y^*(c))C_v''(x^*) > q(1-q)(G)(1-k_c)/4$. So we must have: $\frac{\partial y^*(c)}{\partial k_c} < 0$ and $\frac{\partial x^*}{\partial k_c} < 0$ (given $x^* > 0,\ y^* > 0$ and Assumption 2.iii). □

Proof of Proposition 1. From Lemma 3, we know competent candidates' and the voter's communication strategies when the candidates play a separating strategy.

We determine when a competent candidate j $(j \in \{1,2\})$ prefers campaigning on $p_j = 1$ (with communication effort $y_j^*(c)$) than deviating and choosing to uphold the status quo $(p_j = 0)$. When a competent candidate chooses $p_j = 1$, he gets:

$$\begin{aligned} V_j(1, y_j^*(c); c) =& \frac{1 + y_j^*(c)x_j^* - qy_{-j}^*(c)x_{-j}^*}{2}(1-k_c) - C(y_j^*(c)) \\ =& \frac{1 + (1-q)y^*(c)x^*}{2}(1-k_c) - C(y^*(c)) \end{aligned}$$

where the second line comes from the fact that we have $y_j^*(c) = y^*(c),\ j \in \{1,2\}$ and $x_j^* = x^*,\ j \in \{1,2\}$ (see Lemma 3).

When he deviates and chooses to campaign on the status quo policy $(p = 0)$, he gets:

$$V_j(0,0;c) = \frac{1-q}{2} + q\frac{1 - y_{-j}^*(c)x_{-j}^*}{2} = \frac{1 - qy^*(c)x^*}{2}$$

He has 50% chance of being elected against a non-competent candidate and against a competent candidate conditional on communication not being successful. He gets 1 when he is elected since he does not implement the new policy. By Lemma 2, he does not exert any communication effort when he chooses $p_j = 0$.

We have that a competent candidate j prefers $p_j = 1$ to $p_j = 0$ if and only if: $V_j(1, y^*(c); c) \geq V_j(0,0;c)$. We show that $\exists! k_c^* \in (0,1)$ such that this condition is satisfied if and only if $k_c \leq k_c^*$.

Using Lemma 9, we know that $y^*(c)$ and x^* are decreasing with k_c. Using the Envelope Theorem (and (3)), we get:

$$\begin{aligned}\frac{dV_j(1,y^*(c);c)}{dk_c} &= -\frac{1+qy^*(c)x^*}{2}+\frac{(1-q)y^*(c)\partial x^*/\partial k_c - qx^*\partial y^*(c)/\partial k_c}{2}(1-k_c) \text{ (using FOC)}\\ &< -q\frac{x^*\partial y^*(c)/\partial k_c}{2}(1-k_c) < -q\frac{x^*\partial y^*(c)/\partial k_c}{2}\end{aligned}$$

We also have:

$$\begin{aligned}\frac{dV_j(0,0;c)}{dk_c} &= -q\frac{y^*(c)\partial x^*/\partial k_c + x^*\partial y^*(c)/\partial k_c}{2}\\ &> -q\frac{x^*\partial y^*(c)/\partial k_c}{2}\end{aligned}$$

Therefore, $d(V_1(1,y^*(c);c)-V_1(0,0;c))/dk_c < 0$. If it exists, there is a unique $k_c^*(G)$ defined as the solution to $V_1(1,y^*(c);c) = V_1(0,0;c) \Leftrightarrow \frac{y^*(c)x^*-2C(y^*(c))}{1+(1-q)y^*(c)x^*} = k_c$ such that the (IC) of a competent type is satisfied for all $k_c \leq k_c^*(G)$. Given that x^* and $y^*(c)$ depend on G, we have: $k_c^*(.)$ is a function of G.

To show existence, remember x^* and $y^*(c)$ are strictly positive. The objective function of a competent candidate j is: $V_j(1,y:c) = \left(\frac{1+y_j^*(c)x^*}{2}\right)(1-k_c) - q(1-k_c)\frac{y^*_{-j}(c)x^*}{2} - C(y)$. Take $k_c \to 0$, $V_j(1,y^*(c);c) > V_j(0,0;c) = \frac{1-qy^*_{-j}(c)x^*}{2}$. (Slightly abusing notation), take $k_c \to 1$, $V_1(1,y^*(c);c) = 0 < V_1(0,0;c)$. By the Intermediate Value Theorem, k_c^* exists and $k_c^*(G) \in (0,1)$.

We now consider a non-competent candidate's incentive compatibility constraint. When he chooses $p_j = 0$, he gets:

$$V_j(0,0;n) = \frac{1-qy^*(c)x^*}{2}$$

When he campaigns on $p_j = 1$, he invests $\hat{y}^*(n)$ in communication, where (using a similar reasoning as in the proof of Lemma 2) $\hat{y}^*(n)$ is defined by:

$$C'(\hat{y}^*(n)) = \frac{1-k_n}{2}x^* \tag{7}$$

His expected utility is then:

$$V_j(1,\hat{y}^*(n);n) = \left(\frac{1+\hat{y}^*(n)x^* - qy^*(c)x^*}{2}\right)(1-k_n) - C(\hat{y}^*(n))$$

A non-competent candidate prefers $p_j = 0$ to $p_j = 1$ if and only if: $V_j(0,0;n) \leq V_j(1,\hat{y}^*(n);n)$. We show that there exists a unique $k_n^* : \mathbb{R}_+ \times [0,1) \to [0,1]$ such that this condition is satisfied $\forall k_n \geq k_n^*(G,k_c)$. Since $V_j(0,0;n)$ and $V_j(1,\hat{y}^*(n);n)$ depend on $y^*(c)$ and x^*, which depends on k_c and G, $k_n^*(.)$ depends on k_c and G. For uniqueness, note that $dV_j(1,\hat{y}^*(n);n)/dk_n = -\frac{1+\hat{y}^*(n)x^*-(1-q)y^*(c)x^*}{2} < 0$ and $dV_j(0,0;n)/dk_n = 0$. To prove the existence of $k_n^*(G,k_c)$, we apply the same reasoning as in the existence of $k_c^*(G)$. □

Lemma 10. *$k_c^*(G)$ is increasing with $y^*(c)$ and x^*.*[19]

Proof. Ignoring the argument in k_c^* for simplicity. We have that k_c^* is defined as the unique solution to $k_c^* = \frac{y^*(c)x^*-2C(y^*(c))}{1+(1-q)y^*(c)x^*}$. The left hand side is increasing with x^*. To see that it is increasing with $y^*(c)$, denote $R(y^*(c)) = \frac{y^*(c)x^*-2C(y^*(c))}{1+(1-q)y^*(c)x^*}$ and $S(y^*(c)) = (x^* - 2C'(y^*(c)))(1+(1-q)y^*(c)x^*) - (1-q)x^*(y^*(c)x^* - 2C(y^*(c)))$. We have: $sign(R'(y^*(c))) = sign(S(y^*(c)))$.

$$
\begin{aligned}
S(y^*(c)) &= (x^* - (1-k_c^*)x^*)(1+(1-q)y^*(c)x^*) - (1-q)x^*(y^*(c)x^* - 2C(y^*(c))) \\
&= x^*k_c^*(1+(1-q)y^*(c)x^*) - (1-q)x^*(y^*(c)x^* - 2C(y^*(c))) \\
&= qx^*(x^*y^*(c) - 2C(y^*(c))) > 0
\end{aligned}
$$

The first line comes from (3), the last line from the definition of k_c^* and $k_c^* > 0$ by Proposition 1.

Using these two results, we see that we must have k_c^* increasing with $y^*(c)$ and x^*. □

Lemma 11. *$k_n^*(G,k_c)$ is increasing with $y^*(c)$ and x^* (and does not depend on $\hat{y}^*(n)$).*

Proof. Ignoring the argument in k_n^* for simplicity. k_n^* is defined by: $k_n^* = \frac{\hat{y}^*(n)x^*-2C(\hat{y}^*(n))}{1+\hat{y}^*(n)x^*-(1-q)y^*(c)x^*}$. By inspection, it is increasing with $y^*(c)$. Regarding x^*, we know that $\partial k_n^*/\partial x^*$ has the same sign as: $\hat{y}^*(n)(1+\hat{y}^*(n)x^* - qy^*(c)x^*) - (\hat{y}^*(n) - qy^*(c))(\hat{y}^*(n)x^* - 2C(\hat{y}^*(n)))$ which reduces to: $\hat{y}^*(n) + (\hat{y}^*(n) - qy^*(c))2C(\hat{y}^*(n))$. Since $\hat{y}^*(n) - qy^*(c) > -1$ and $\hat{y}^*(n) > \hat{y}^*(n)x^*$. We have $\hat{y}^*(n) + (\hat{y}^*(n) - qy^*(c))2C(\hat{y}^*(n)) > \hat{y}^*(n)x^* - 2C(\hat{y}^*(n)) > 0$. (We know from Proposition 1 that $k_n^* > 0 \Leftrightarrow \hat{y}^*(n)x^* - 2C(\hat{y}^*(n)) > 0$). By the Envelope Theorem, k_n^* does not depend on $\hat{y}^*(n)$. □

Lemma 12. *We have that:*

i. $\partial k_c^*(G)/\partial G > 0$

ii. $\partial k_n^*(G,k_c)/\partial G > 0$ *and* $\partial k_n^*(G,k_c)/\partial k_c < 0$.

[19]Remember that in the definition of k_c^*, $y^*(c)$ and x^* are both evaluated at $k_c = k_c^*$ (see Proposition 1).

Proof. From Lemma 9, we know that x^* and $y^*(c)$ increase with G and decrease with k_c. $k_c^*(G)$ is increasing with x^* and $y^*(c)$ (see Lemma 10). Therefore, $k_c^*(G)$ increases with G. $k_n^*(G, k_c)$ is increasing with $y^*(c)$ and x^* (and it does not depend on $\hat{y}^*(n)$, see Lemma 11). Therefore, $k_n^*(G, k_c)$ increases with G and decreases with k_c. $\square$

Proof of Corollary 1. In what follows, we ignore the gain from change to alleviate the exposition. All the results hold for all G. From Lemma 12, we know that $k_n^*(k_c)$ is decreasing with k_c. It is thus sufficient to prove that $k_n^*(k_c^*) = k_c^*$ to prove the Corollary.

Suppose $k_c = k_c^*$. When (slightly abusing notation) $k_n = k_c^*$, then $\hat{y}^*(n) = y^*(c)$ and $V(1, \hat{y}^*(n); n) = \frac{1+y^*(c)x^*-(1-q)y^*(c)x^*}{2}(1-k_c^*) - C(\hat{y}^*(n)) = V(0,0;n)$, where the last equality follows from the definition of k_c^* and $V(0,0,n) = V(0,0,c)$. This implies that $k_n^*(k_c^*) = k_c^*$. $\square$

Proof of Remark 1. A type c candidate j's (IC) is (see the proof of Propositon 1):

$$\begin{aligned}
V_j(1, y_j^*(c); c) =& \frac{1 + y_j^*(c)x_j^* - qy_{-j}^*(c)x_{-j}^*}{2}(1-k_c) - C(y_j^*(c)) \\
&\geq \frac{1 - qy_{-j}^*(c)x_{-j}^*}{2} = V_j(0,0;c) \\
\Leftrightarrow \frac{y_j^*(c)x^*}{2}(1-k_c) - C(y_j^*(c)) &\geq \frac{1 - qy_{-j}^*(c)x^*}{2}k_c
\end{aligned}$$

It is clear that the left-hand-side is increasing with x^* and the right hand side is decreasing with x^* and $y_{-j}^*(c)$, which proves the claim for a competent candidate. Using a similar reasoning, we can show that an increase in x^* and $y_{-j}^*(c)$ tightens a type n candidate (remember the inequality is reversed for a type n's (IC)). $\square$

Proof of Lemma 4. See Lemma 9. $\square$

Lemma 13. *There exist a unique $\overline{k_c} > 0$ and a unique $\overline{k_n}(k_c) : [0,1) \to [0,1]$ which satisfy $k_c < \overline{k_n}(k_c)$, $\forall k_c \in (0, \overline{k_c})$ such that, for any given $k_c \in (0, \overline{k_c})$ and any given $k_n \in (k_c, \overline{k_n}(k_c))$, there exists a unique $\underline{G} > 0$, $\underline{G} < \overline{G} < \infty$ such that a separating equilibrium exists if and only if $G \in [\underline{G}, \overline{G}]$.*

Proof. We first prove necessity.

Proposition 1 defines necessary and sufficient conditions such that candidates separate. Denote

$\overline{k_c} = \lim_{G\to\infty} k_c^*(G)$.[20] If $k_c > \overline{k_c}$, a competent candidate's incentive compatibility constraint is never satisfied. Assume then that $k_c < \overline{k_c}$.

We know that $k_c^*(G)$ increases with G (Lemma 12). We also have: $\lim_{G\to 0} k_c^*(G) = 0$. To see that, note that we must have $x^* = 0$ when $G = 0$. This implies $y^*(c) = 0$. A competent candidate gets $(1 - k_c)/2$ if she chooses $p_j = 1$ and $1/2$ if she chooses $p_j = 0$. Therefore, we must have: $\lim_{G\to 0} k_c^*(G) = 0$.

We thus have: $\lim_{G\to 0} k_c^* = 0 < k_c < \overline{k_c}$. By the Theorem of Intermediate Values and Lemma 12, there exists a unique $\underline{G}$ such that $k_c^*(\underline{G}) = k_c$ and $k_c^*(G) \geq k_c,\ \forall G \geq \underline{G}$.

We now define the upper bound on G. There exists a separating equilibrium only if $k_n \geq k_n^*(G, k_c)$.

We have that $k_n^*(G, k_c)$ increases with G (see Lemma 12). Denote $\overline{k_n}(k_c) = \lim_{G\to\infty} k_n^*(G, k_c)$. By Proposition 1, $\overline{k_n}(0) < 1$. Since $k_n^*(G, k_c)$ decreases with k_c, we have: $\overline{k_n}(k_c) < 1$.

We show that $\forall k_n < \overline{k_n}(k_c)$, there exists a unique $\overline{G} < \infty$ such that $\forall G \geq \overline{G},\ k_n^*(G, k_c) \geq k_n$. We have: $k_n^*(k_c, \underline{G}) = k_c < k_n$ (the equality comes from Corollary 1 and the definition of $\underline{G}$, i.e. $k_c = k_c^*(\underline{G})$), so we must have $\overline{G} > \underline{G}$

Given any $k_c \in (0, \overline{k_c})$ and $k_n \in (k_c, \overline{k_n}(k_c))$, we thus have that there exist unique $\underline{G} > 0$ and $\underline{G} < \overline{G} < \infty$ such that a separating equilibrium exists only if $G \in [\underline{G}, \overline{G}]$.

We now prove sufficiency.

Consider the following assessment:

- The candidates' strategies are: $\sigma_j = ((1, y^*(c)), (0, 0)),\ j \in \{c, n\}$, $y^*(c)$ defined in Lemma 3;
- The voter's communication strategy is: $\mathbf{x}^* = (x^*, x^*)$, x^* defined in Lemma 3;
- The voter's electoral strategy is: $s(m_1 = 1, m_2 = \emptyset, \mathbf{x}^*) = 1,\ s(m_1 = 1, m_2 = 1, \mathbf{x}^*) = 1/2,\ s(m_1 = \emptyset, m_2 = 1, \mathbf{x}^*) = 0,\ s(m_1 = \emptyset, m_2 = \emptyset, \mathbf{x}^*) = 1/2$

It is easy to check that the voter's electoral strategy is a best response to the candidates' strategies given the voter's Bayesian posterior. The communication efforts are best responses according to Lemma 3. Lastly, given $k_c \in (0, \overline{k_c})$, $k_n \in [0, \overline{k_n}(k_c))$, and $G \in [\underline{G}, \overline{G}]$, the candidates' policy

[20] Assumption 2 guarantees that $y^*(c)$ and x^* are continuous and bounded in G. This implies that $k_c^*(G)$ is continuous and bounded in G (see the proof of Proposition 1). Therefore, the limit is well-defined.

choices (and strategies) are incentive compatible by the reasoning above and Proposition 1. Thus, the separating assessment described above is an equilibrium according to Definition 1. □

Proof of Proposition 2. The proof follows directly from Lemma 13. □

Proof of Corollary 2. Denote $V_v^e(G)$ the voter's maximal ex-ante expected equilibrium welfare as a function of G. Suppose $k_c < \overline{k_c}$ and $k_n < \overline{k_n}(k_c)$ such that there exist $\underline{G}$, $\overline{G}$ such that a separating equilibrium $\forall G \in [\underline{G}, \overline{G}]$ (Proposition 2). For a given G, the voter's expected payoff is strictly higher in a separating assessment than any other assessment for a non-empty open set of policy costs (see Appendix B for more details). Therefore, there exists a non-empty open set of policy costs such that $V_v^e(\overline{G} - \delta) > V_v^e(\overline{G} + \delta)$, with $\delta > 0$.[21] □

Proof of Lemma 5. See Lemma 9 □

Proof of Proposition 3. We only prove necessity. Sufficiency follows a similar reasoning as in the proof of Proposition 2.

From Proposition 1, we know that a separating equilibrium exists only if $k_n \geq k_n^*(G, k_c)$.

Suppose $k_n > k_n^*(G, 0)$. By Proposition 1 and Lemma 12, we know that a separating equilibrium always exists then. We can thus note: $\underline{k_c}(G) = 0 < k_c^*(G)$. It is clear that $\underline{k_c}(G)$ is constant in a neighborhood of G in this case.

Suppose now $k_n \leq k_n^*(G, 0)$. Implicitly define $\underline{k_c}(G)$ by $k_n = k_n^*(\underline{k_c}(G), G)$. By Corollary 1 ($k_n^*(G, k_c^*(G)) = k_c^*(G) < k_n$), Lemma 12 ($k_n^*(.)$ decreases with k_c), and the theorem of intermediate values, $\underline{k_c}(G)$ exists, is unique and satisfies $\underline{k_c}(G) < k_c^*$. Furthermore, $k_n \geq k_n^*(G, k_c) \Leftrightarrow k_c \geq \underline{k_c}(G)$.

Using the definition of $\underline{k_c}(G)$ above and the implicit function theorem, it is easy to see that $\underline{k_c}(G)$ strictly increases with G by Lemma 12. □

Proof of Corollary 3. Suppose G and k_n are such that $k_n \in (k_c^*(G), k_n^*(G, 0)]$ (this interval is non-empty since $k_n^*(G, k_c)$ is decreasing with k_c, which implies $k_c^*(G) = k_n^*(G, k_cj(G)) < k_n^*(G, 0)$). Denote $k_c^h = \underline{k_c}(G) + \gamma$ and $k_c^l = \underline{k_c}(G) - \gamma$, with $\gamma > 0$. A separating assessment maximizes the voter's ex-ante expected welfare (see Appendix B). We thus have that there exists $\overline{\gamma} > 0$ such that $\forall \gamma \in [0, \overline{\gamma}]$, the voter is better off when $k_c = k_c^h$ (since a separating equilibrium exists) than when $k_c = k_c^l$ (since a separating equilibrium does not exist). Hence, the claim holds. □

[21] In Appendix B, we show that there exists $\breve{k}_n(G, k_c) > k_c$ such that the voter's ex-ante expected payoff is highest when the candidates play a separating strategy. The claim thus holds for the following set: $\{k_c \in (0, \overline{k_c},\ k_n \in (0, \overline{k_n}(0) | k_c < k_n < \max\{\breve{k}_n(\overline{G}, k_c), \overline{k_n}(k_c)\}\}$. This set is non-empty since $\overline{G} \to \underline{G}$ as $k_n \to k_c$ and $k_c < \max\{\breve{k}_n(\underline{G}, k_c), \overline{k_n}(k_c)\}$.

Lemma 14. *There exists $\widehat{k_n} : \mathbb{R}_+ \times [0,1] \to (k_c, 1]$ continuous in both its arguments such that for a given G, the voter's combined communication effort in a separating assessment is strictly greater than the voter's combined communication effort in all other possible assessments for all $k_n \in (k_c, \widehat{k_n}(G, k_c))$.*

Proof. We first compare the voter's communication efforts in a separating assessment and in a pooling assessment for a given G.

In a separating assessment, the voter's and competent candidates' communication efforts are defined by the following system:

$$\begin{aligned} C'(y^*(c)) &= \frac{1-k_c}{2} x^* \\ C'_v(x^*) &= q(1-q)\frac{G}{2} y^*(c) \end{aligned}$$

Using a similar reasoning as in Lemma 3, we can show that in a pooling assessment ($p_j(t) = 1,\ \forall j \in \{1,2\},\ t \in \{c,n\}$), the communication efforts are defined by:

$$\begin{aligned} C'(y^p(c)) &= \frac{1-k_c}{2} x^p \\ C'(y^p(n)) &= \frac{1-k_n}{2} x^p \\ C'_v(x^p) &= q(1-q)\frac{G-L}{2}(y^p(c) - y^p(n)) \\ &= q(1-q)(1+\tau)\frac{G}{2}(y^p(c) - y^p(n)) \end{aligned}$$

Using a similar reasoning as in Lemma 3, we can show that there exists at least one positive solution. For our claim, we simply need to consider the solution with the highest communication effort by the voter, denoted x^p. Using the same reasoning as in Lemmata 8 and 9, we can show that the voter's and competent candidates' communication efforts are continuously increasing with G and k_n and continuously decreasing with k_c.

Now, as $k_n \to 1$, it is clear that $x^p > x^*$ (since $y^p(n) \to 0$ and $(1+\tau)G > G$). Inversely, as $k_n \to k_c$, it is clear that $x^p \to 0$ (since $y^p(n) \to y^p(c)$) and so $x^p < x^*$. By the theorem of intermediate value, there exists a unique $\widehat{k_n}^p(G, k_c) \in (k_c, 1)$ such that $x^p < x^*$ for all $k_n < \widehat{k_n}^p(G, k_c)$ (since both x^p and x^* are continuous in G and k_c, $\widehat{k_n}^p(G, k_c)$ is continuous in G and k_c).

Using a similar logic (for details, see Appendix B), we can show:

i) in an assessment when $p_j(c) = p_j(n) = 1$ and $p_{-j}(c) = p_{-j}(n) = 0$, there exists a unique

$\widehat{k_n}^{p_j}(G,k_c) \in (k_c,1]$ (continuous in G and k_c) such that the voter's communication effort towards candidate j in this assessment denoted $x_j^{p_j}$ satisfies $x_j^{p_j} < 2x^*$ for all $k_n < \widehat{k_n}^{p_j}(G,k_c)$ (continuous in G and k_c) for all $j \in \{1,2\}$ (by Lemma 2, $x_{-j}^{p_j} = 0$);
ii) in an assessment when $p_j(c) = p_j(n) = 1$ and $p_{-j}(c) = 1$, $p_{-j}(n) = 0$, there exists $\widehat{k_n}^{a}(G,k_c) \in (k_c,1]$ (continuous in G and k_c) such that the voter's communication effort towards candidate j in this assessment denoted x_j^a satisfies $x_1^a + x_2^a < 2x^*$ for all $k_n < \widehat{k_n}^{a}(G,k_c)$ for all $j \in \{1,2\}$.

The claim holds for $\widehat{k_n}(G,k_c) = \min\{\widehat{k_n}^{p}(G,k_c), \widehat{k_n}^{p_j}(G,k_c), \widehat{k_n}^{a}(G,k_c)\}$. $\square$

Lemma 15. *For all $k_c \in (0,\overline{k_c})$, there exists $\widehat{\widehat{k_n}}(k_c) > k_c$ such that for all $k_n \in (k_c, \widehat{\widehat{k_n}}(k_c))$, we have: $k_n < \widehat{k_n}(\overline{G},k_c)$.*

Proof. Suppose $\widehat{k_n}(G,k_c)$ is decreasing with G. The reasoning extends easily to the other cases (just replace $\widehat{k_n}(\overline{G},k_c)$ by $\min_{G\in(0,\overline{G}]} \widehat{k_n}(G,k_c)$ below). From Lemma 14, we know that $\widehat{k_n}(G,k_c) > k_c$, $\forall G$. From the proof of Proposition 3, we have that $\overline{G} \to \underline{G}$ as $k_n \to k_c$. Slightly abusing notation, this implies that $k_n = k_c < \widehat{k_n}(\underline{G},k_c) = \widehat{k_n}(\overline{G},k_c)$. By continuity of $\widehat{k_n}(G,k_c)$ in G and k_c, there exists $\widehat{\widehat{k_n}}(k_c) > k_c$ such that $\forall k_n \in (k_c, \widehat{\widehat{k_n}}(k_c))$ we have: $k_n < \widehat{k_n}(\overline{G},k_c)$. $\square$

Proof of Proposition 4. For $k_c \in (0,\overline{k_c})$ and $k_n \in (k_c, \widehat{\widehat{k_n}}(k_c))$, we have that the voter exerts strictly more communication effort in a separating assessment than in other assessment for all $G \leq \overline{G}$ (Lemmata 14 and 15). This directly implies point i.. Point ii. follows from the fact that x^* is increasing with G. Point iii. from the fact that the maximum total communication effort is unique and equal to $2x^*$ at $G = \overline{G}$. $\square$

Lemma 16. *There exists a non-empty open set of policy costs $\mathcal{K}^G$ and $\underline{\lambda}^G \in [0,1)$ such that for all $\lambda \in (\underline{\lambda}^G, 1)$, there exists a non-empty open set $\mathcal{G}^{\lambda^G} \subset \mathbb{R}_+$ such that the voter's expected equilibrium welfare is lower with $\breve{C}_v(.)$ than $C_v(.)$ for all $G \in \mathcal{G}^{\lambda^G}$.*

Proof. When the communication cost function is $\breve{C}_v(x)$, equations (4) and (3) become:

$$
\begin{aligned}
C_v'(\breve{x}_j^*) &= q(1-q)\frac{G/\lambda}{2}\breve{y}^*(c) \\
C'(\breve{y}^*(c)) &= \frac{1-k_c}{2}\breve{x}_j^*
\end{aligned}
$$

A decrease in the communication cost function is thus equivalent to an increase in the gain from change G.

We know there exists a non-empty open set of policy costs such that an increase in G can decrease the voter's welfare (Corollary 2). Denote this set $\mathcal{K}^G$. Suppose there exists $G^h \in [\underline{G}, \overline{G})$ such that $\forall G > \overline{G}$, we have that the voter's expected equilibrium welfare satisfies $V_v^e(G) < V_v^e(G^h)$. Then denote $\underline{\lambda}^G = 0$ and for all $\lambda \in (0,1)$, the claim holds for $\mathcal{G}^{\lambda^G} = (\min\{G^h, \overline{G}/\lambda\}, \overline{G})$.

Suppose there is no such G^h. Define $\phi : [\underline{G}, \overline{G}] \to (\overline{G}, \infty)$ as $\phi(G) = \arg\min \ \{Z \in (\overline{G}, \infty) \,|V_v^e(G) = V_v^e(Z)\}$ for all $G \in [\underline{G}, \overline{G}]$. Define also $\underline{\lambda}^G = \max_{G \in [\underline{G}, \overline{G}]} \frac{G}{\phi(G)}$. By Corollary 2, $\underline{\lambda}^G < 1$. And the claim holds true for $\mathcal{G}^{\lambda^G} = (\max\{\underline{G}, \overline{G}/\underline{\lambda}^G\}, \overline{G})$. □

Lemma 17. *There exists a non-empty open set of policy costs $\mathcal{K}^x$ and $\underline{\lambda}^x \in [0,1)$ such that for all $\lambda \in (\underline{\lambda}^x, 1)$, there exists a non-empty open set $\mathcal{G}^{\lambda^x} \subset \mathbb{R}_+$ such that the voter's expected equilibrium welfare is lower with $\breve{C}_v(.)$ than $C_v(.)$ for all $G \in \mathcal{G}^{\lambda^x}$.*

Proof. Using Proposition 4 and a similar reasoning as in Lemma 16, we can show that there exists $\underline{\lambda}^x \in [0,1)$ and $\mathcal{K}^x$ such that the claim holds true for $\mathcal{G}^{\lambda^x} = (G_l, \overline{G})$, where G_l is a lower bound satisfying $G_l < \overline{G}$. □

Proof of Proposition 5. Using Lemmata 16 and 17, there exist an open set of policy costs $\mathcal{K}^G \cap \mathcal{K}^x$ (from Corollary 2 and Proposition 4, one can check that the intersection is not empty) and $\underline{\lambda} = \max\{\underline{\lambda}^G, \underline{\lambda}^x\} \in [0,1)$ such that the claim holds true for the non-empty sets $\mathcal{K}^G \cap \mathcal{K}^x$, $(\underline{\lambda}, 1)$, and $\mathcal{G}^\lambda = \mathcal{G}^{\lambda^G} \cap \mathcal{G}^{\lambda^x}$ (which is non empty by Lemmata 16 and 17). □

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