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Mystifying but not misleading: when does political ambiguity not confuse voters?

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Abstract The purpose of political campaigns in democracies is to provide voters with information that allows them to make "correct" choices, that is, vote for the party/candidate whose proposed policy or "position" is closest to their ideal position. In a world where political talk is often ambiguous and imprecise, it then becomes important to understand whether correct choices can still be made. In this paper we identify two elements of *political culture* that are key to answering this question: (i) whether or not political statements satisfy a so-called "grain of truth" assumption, and (ii) whether or not politicians make statements that are comparative, that is contain information about politicians' own positions relative to that of their adversaries. The "grain of truth" assumption means that statements, even if vague, do not completely misrepresent the true positions of the parties. We find that only when political campaigning is comparative and has a grain of truth, will voters always make choices as if they were fully informed. Therefore, the imprecision of political statements should not be a problem as long as comparative campaigning is in place.

Keywords Information disclosure · Political competition · Comparative campaigning · Voting · Asymmetric information

JEL Classification D82 · D83 · D72 · M37

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1 Introduction

For a well functioning democracy it is important that voters are able to determine which politician (political party or presidential candidate) would best represent their political views. Without accurate information, voters may make "wrong" choices and it is not clear whether the party or candidate with the largest vote share best represents the majority opinion of the population. This is ever more relevant as politicians are notorious for making statements that are ambiguous and stretch the truth. During political campaigns, they try to convince the electorate of the policy or reforms that they intend to implement once their party is in power, and in general, hardly any restriction can be imposed on truthfulness and precision of the provided information.[1] In such environment a key concern is whether the ambiguity of political statements disorients voters and leads to "wrong" choices or whether under some conditions voters are still able to identify the party or candidate they like best.

This paper proposes an analytical framework to study this issue. It considers political campaigns wherein candidates' statements can be vague and identifies two conditions on these campaigns that generically are necessary and sufficient for "correct" voting decisions in *any* equilibrium. The first condition is that the statements are comparative in nature in that they involve a discussion of not only own intended policies but also the intended policies of the adversaries. We will refer to this case as *comparative political campaigning*. The second condition is what we call a "grain of truth" condition, and what originally was called "verifiability" by Milgrom (1981) and Milgrom and Roberts (1986). The "grain of truth" condition basically requires that candidates should not be able to lie blatantly about either their own or their adversaries' positions, but it leaves them the possibility of being vague and not disclosing these positions precisely. Only when both conditions hold will voters be able with probability one to *always* (that is, in any equilibrium) decipher their preferred party, the one they also would have chosen had they received full information about the candidates' intended policies. In this sense, the paper draws attention to these two features of political discourse that must be present in any democratic society for political campaigning to be useful.

To analyze information disclosure in political campaigns we consider a simple spatial model of elections. Two political parties have positions on a line segment that represents a space of different policies or reforms that a party can advocate. Focusing on the incentives for information disclosure, in the baseline model we regard the positions themselves as fixed, and we address the strategic choice of positions in an extension.[2] In either case, we examine the situation where political parties know not only their own position, but also that of their adversary. This assumption reflects the fact that political parties usually have a strong interest in learning their chances of success in the elections and therefore have an incentive to find out the true, intended policy of their rival. Voters do not know the positions of the parties and have to rely on the statements that are disclosed. They do not take those statements at face value, and consider which party has an incentive to deliver

[1] The fact that politicians' talks can be and often are ambiguous is well known and documented in the literature (Downs 1957; Kelley 1961; Page 1976; Campbell 1983; Edelman 1985; Laslier 2006).

[2] Thus, the main body of our paper studies the mirror image of traditional spatial models of elections, going back to Hotelling (1929), Black (1948) and Downs (1957). While in that literature political parties choose their positions and the electorate is immediately informed about them, in the central case of our model positions cannot be chosen, but what is disclosed about them is a result of strategic competition between the parties.

which statement. Voters derive utility from voting for the party whose true position is closest to their ideal policy.[3] Parties choose the information they release about their political positions by announcing a subset of positions on the unit line. They do so with the objectove of maximizing their share of votes in the total voter turnout, which—at least in electoral systems with *proportional representation*—determines their share in political power, such as a percentage of parliamentary seats won. In footnotes and in the final section we compare our results in this setting with the results we would obtain under an alternative *majority rule* specification. The latter is more appropriate for modeling presidential elections, where candidates care only about whether or not they win the campaign.

We perform an equilibrium analysis of this model. First, suppose that the grain of truth condition does not hold and each party is free to make any statement it likes. In that case, the model transforms into a cheap talk game wherein a very large set of outcomes can be supported in equilibrium even under comparative campaigning.[4] To see this, note that if in equilibrium both parties do not disclose any information, then upon observing a deviation to a more precise statement, voters can have arbitrary beliefs, and these beliefs can always be chosen so that the deviation is not gainful. It is also clear that if statements are completely uninformative, then voters may easily make the wrong choice, i.e., a choice they would regret had they received perfect information about political positions. The main part of the paper therefore focuses on political statements that do satisfy the grain of truth condition and analyzes the second dimension of political culture: whether or not politicians make comparative statements. We show that without comparative campaigning, there exists a continuum of equilibria with disclosure statements ranging from full disclosure to full nondisclosure. To see why parties may create maximum fuzziness in this case, consider that voters know that candidates are aware not only about their own position, but also about the position of their adversary. If one party unexpectedly discloses its own position, voters may believe that the party does so only because it knows that the position of the adversary is closer to the median voter than its own. Given such beliefs, parties are better off under maximal fuzziness. It is then straightforward that a nondisclosure equilibrium in this case often results in wrong voting choices. We say that such equilibrium is *ex-post inefficient*, in the sense that with positive probability voters regret the choices they made after the true policies of the parties become transparent. Moreover, the overall vote shares obtained by politicians in such nondisclosure equilibria are often different from those that they would obtain under full information. Therefore, the resultant division of power and implemented government policy in this case also may differ from those that would prevail under full disclosure.

Under comparative campaigning, the situation is different. In that case, each party can always guarantee itself and the other party the vote shares associated with full disclosure. If these vote shares are distorted owing to some nondisclosing statements, it then must be the case that at least one of the parties has an incentive to disclose both its own and the adversary's position. This leaves open the possibility of the existence of some special types of nondisclosure equilibria where parties' vote shares are the same as under full disclosure. We show that if such equilibria exist, then in a *generic* set of parties' types, the voters will

[3] This assumption, that utility is derived directly from voting, is standard in the literature on "expressive" voting (see, e.g., Brennan and Hamlin 1998; Schuessler 2000; Glaeser et al. 2005; Clark and Lee 2016).

[4] See, Crawford and Sobel (1982) and the subsequent literature on cheap talk games. The main focus of the cheap talk literature is on studying how informative *some* equilibria can be, whereas our focus is on the informativeness of *all* equilibria. Also, we focus on one-dimensional information asymmetries, whereas Battaglini (2002) and Chakraborty and Harbaugh (2010, 2014) consider multi-dimensional settings.

still be able with probability one to deduce their most preferred party and hence, vote as they would do under full information. Moreover, as parties vote shares in these equilibria are the same as under full disclosure, the resultant government policy also is the same. Thus, we conclude that vagueness of statements in political campaigns is guaranteed only to not mislead voters if these statements are comparative and have a grain of truth. Essentially, the imprecision of political statements that are at least "minimally truthful" should not be a problem as long as politicians are able to correct their opponent whenever that is in their own interest.

In an extension of the model, we show that the main thrust of our results continues to hold when political parties can choose their positions. In that case, the median voter theorem applies and both parties' positions are perfectly deduced by voters when parties engage in comparative political campaigning. Without comparative campaigning a continuum of nondisclosure equilibria exist where parties choose positions that are different from the median voter. Thus, in the former case voters can always vote for the party that they would have also chosen under full information, while in the latter, "mistaken" choices are common.

Finally, we show that if parties can also choose whether or not to engage in comparative campaigning, then generically, all equilibria with full or partial disclosure are ex-post efficient. Moreover, the mere ability of parties to make comparative statements is key for this result. Thus, in line with the general message of the paper, as long as both parties can make comparative statements and the grain-of-truth condition holds, political ambiguity will not confuse voters.

Our paper is most closely related to the literature on strategic ambiguity in electoral competitions. Most of this literature focuses on the incentives of political candidates to be ambiguous. Among early contributions, Shepsle (1972) shows that ambiguity may be rational if a majority of voters are risk loving, and Page (1976) argues that ambiguity can be used by candidates to distract voters from the issues of conflict, focusing their attention instead on issues of consent. Later theoretical models have offered a range of further explanations of why politicians may prefer to be ambiguous.[5]

Our main contribution to this literature lies in the *welfare implications* of political ambiguity rather than in understanding the causes of it. In particular, the key insight of this paper is that ambiguity is not necessarily "bad" for voters even when they are risk averse, as long as two conditions—the grain of truth and parties' ability to make comparative statements—are fulfilled. In this case (and only then), all equilibria, even those that are not fully revealing, are such that with probability one voters' ex-post utility from voting is the same as under full disclosure, so that voters almost never regret their choices after the uncertainty has been resolved.

In general, little research has been conducted on the role of comparative statements. Recent exceptions that are most closely related to our work are Schipper and Woo (2016) and Demange and Van der Straeten (2017). Both papers assume that politicians do not lie, but may make statements that are either ambiguous or completely uninformative on one of the candidates. Schipper and Woo (2016) report an unraveling result: all issues that voters may not have been aware of are raised, and all information on candidates' positions (on all issues) is revealed to voters even in the absence of comparative campaigning. The reason why comparative political campaigning is not necessary to rule out other equilibria in Schipper and Woo (2016) is that they consider the possibility of microtargeting of specific

[5] See for example, Alesina and Cukierman (1990), Glazer (1990), Chappell (1994), Aragones and Neeman (2000), Jensen (2009), Frenkel (2014) and Kartik et al. (2015).

voters and allow for just a few voters, whereas we consider situations wherein microtargeting is not possible and each voter's influence on the election outcome is negligibly small. Comparative campaigning is also examined in Demange and Van der Straeten (2017), but in their model information about the opponent is "leaked involuntarily" rather than chosen strategically. More generally, the element of strategic interaction between parties, which is key in our analysis, is omitted from their model, as parties choose disclosure strategies taking into account the effect on voters of their own strategy only.

Our paper is also complementary to the literature on positive and negative political campaigning represented, for example, by Polborn and Yi (2006), Li and Li (2013) and Bhattacharya (2016).[6] Positive campaigning means that a political candidate reveals (usually favorable) information about himself, while negative campaigning indicates (usually detrimental) information about the rival. In our model, non-comparative statements can be thought as representing the case of positive campaigning, while the notion of comparative statements, providing information about *both* competing candidates, is new. Moreover, in our paper we are primarily interested in the extent of information disclosure under different kinds of political campaigns and to that end we allow for a continuum of possible disclosure strategies. By contrast, in the "two-type models" of the aforementioned papers, the focus is on the choice between negative and positive campaigning and the range of disclosure outcomes is much more limited. For example, in Polborn and Yi (2006) candidates either remain silent or provide correct, precise information on their own or the opponent's characteristic, and in Bhattacharya (2016) the information is fully revealed only about the true type of the "focal" candidate, who is the target of both candidates' campaigns, and nothing is revealed otherwise.[7]

Finally, our paper is related to a large literature on the disclosure of product characteristics by firms. Most of this literature considers vertical product differentiation addressing whether disclosure laws forcing firms to reveal their product's quality are necessary or whether firms have a natural incentive to disclose their information voluntarily.[8] Milgrom (1981) proved a well-known unraveling argument establishing that if buyers care about quality, then for any set of qualities that send the same message, the best quality firm has an incentive to distinguish itself by voluntarily disclosing the quality of its product. Thus, full disclosure is the unique equilibrium outcome. We study a very different environment where the players' characteristics are horizontally rather than vertically differentiated, so that there is no best "quality" that voters agree upon. Nevertheless, we show that when players *know* and are able to *reveal* both players' positions, a logic similar to the unraveling argument can be used as this is a constant sum game.[9] This ability of parties to disclose both their positions is key for the unraveling argument to go through in the political environment we study.

Recently, some papers have studied the disclosure of horizontal product attributes (see, e.g., Anderson and Renault 2009; Sun 2011; Celik 2014; Koessler and Renault 2012;

[6] Other related papers on the determinants of positive and negative campaign spending include Harrington and Hess (1996), Chakrabarti (2007) and Brueckner and Lee (2015).

[7] Despite their difference in modeling assumptions and focus, Polborn and Yi (2006) and our paper deliver results that are similar in flavor. Positive/non-comparative campaigning in both papers results in less informed electoral choices, while negative campaigning in Polborn and Yi (2006) and comparative campaigning in our model facilitate "correct" voting decisions.

[8] See, e.g., Viscusi (1978), Grossman and Hart (1980), Grossman (1981), Jovanovic (1982), Milgrom (1981), Daughety and Reinganum (1995) and Board (2003).

[9] The sum of parties' vote shares is always equal to one.

Janssen and Teteryatnikova 2016). As mentioned above, the key feature distinguishing these models from the models of vertical product differentiation is that buyers (or voters) have different preferences regarding the "best" attribute. Therefore, the unraveling argument as such does not apply and equilibria may be (partially) pooling. In our model, this is demonstrated by the multiplicity of nondisclosing (and ex-post inefficient) equilibria in case of non-comparative campaigning. More generally, our paper builds on the analysis of Janssen and Teteryatnikova (2016), but excludes the price setting stage, that is key in competition between firms, and adds a possibility of voluntary and costly voting, that is essential in voting behavior. The absence of price competition makes the analysis cleaner and allows us to study the welfare implications of nondisclosure and parties' position choice.

The rest of the paper is organized as follows. The next section describes the model. Section 3 describes a full disclosure equilibrium, introduces the notion of equilibrium ex-post efficiency and explains that without the grain or truth assumption, inefficient voting is common. We then focus on the scenario wherein the grain of truth condition holds. Sections 4 and 5 provide the analysis of the two main cases considered—with and without comparative campaigning. Section 6 presents the model extensions and finally, Sect. 7 concludes.

2 Model

In this section we first introduce: elections as a game between two political parties and voters in the environment with incomplete information. We then describe the timing of the game and the grain of truth condition—a restriction on parties' statements that will be important for most of our analysis. Finally, we define an equilibrium of the game and discuss properties of parties' payoffs that will be key for our results.

2.1 Players, information and incentives

Consider elections where two parties compete for votes by making statements about their intended policies or policy platforms. The policy platform of each party is represented by a position x_i, $i \in \{1, 2\}$, on the unit interval. Positions that are close to zero can be regarded as left-wing, while those close to one are right-wing. In the central case of this model policy positions of both parties are regarded as exogenous. Voters have preferences over the policy spectrum and the ideal policy of a voter is denoted by λ. λ follows a continuous distribution g with full support on [0, 1], symmetric around the middle point 0.5.[10] Note that such specification addresses horizontal, rather than vertical differentiation in policies, and no single policy is best for all voters.

Political parties know not only their own position, but also the position of the adversary, while voters do not know the true positions of the political parties and have to rely on the statements that are disclosed. Notice that since parties know their both positions, the *type* of each party is the *pair* of positions, (x_1, x_2), where the first element stands for the position of party 1.

[10] The assumption of symmetry around 0.5 is not crucial for the results. The changes one would need to introduce under *arbitrary* distribution with full support on [0, 1] are nominal and have to do with the fact that the median voter is located not at 0.5 but at λ_{med}, where $\int_0^{\lambda_{med}} g(\lambda)d\lambda = \int_{\lambda_{med}}^1 g(\lambda)d\lambda$.

Parties intend to maximize their vote share in the elections, denoted by π_1 and π_2. If τ_i is voter turnout for party i, then the vote share of party 1 is $\pi_1 = \frac{\tau_1}{\tau_1+\tau_2}$ and the vote share of party 2 is $\pi_2 = \frac{\tau_2}{\tau_1+\tau_2}$. As in electoral systems with *proportional representation*, π_1 and π_2 can be thought of as reflecting the respective shares of party 1 and party 2 in political power, or a percentage of parliamentary seats won, or—as in Alesina (1988)—probabilities of being elected. Note that $\pi_1 + \pi_2 = 1$ for any election outcome.

Voters maximize their utility by voting for the party whose position is closest to theirs. That is, they vote "expressively"—in line with the conventional assumption in the literature on non-pivotal voting and "large" elections. To be more precise, the utility from voting for a party is decreasing in a *cost of mismatch* between the policy of the party and voter's own view. We consider the costs of mismatch that have a standard property that for any two voters which are equidistant from the party for which they vote, the costs of mismatch are the same: for any λ_1 and λ_2 such that $|\lambda_1 - x_i| = |\lambda_2 - x_j|$, we have $c(|\lambda_1 - x_i|) = c(|\lambda_2 - x_j|)$, where $c(\cdot)$ denotes a cost of mismatch. For example, this holds for such utility functions as $u_i(\lambda) = a - t|\lambda - x_i|$ or $u_i(\lambda) = t(\lambda - x_j)^2 - t(\lambda - x_i)^2$, where i refers to the party that a voter is voting for (j is the party that a voter is voting against) and a, t are positive constants. The most important implication of this property for our subsequent analysis is that given any two positions x_1, x_2 and given that voters are fully informed about them, the indifferent voter is located exactly in the middle, at $(x_1 + x_2)/2$. This is obvious from Fig. 1 that shows the position of the indifferent voter, $\widehat{\lambda}$, when the costs of mismatch are linear.

Voting is either compulsory, which involves full participation, or voluntary, which means that people vote only if their cost of voting does not exceed the utility gain.[11] The cost of voting is either zero or drawn from the same probability distribution for everyone independently of voters' political preferences (i.i.d. across voters). Moreover, to make things interesting, the support of cost distribution is assumed to be such that each voter votes and abstains with positive probability.

2.2 Timing and the grain of truth condition

The timing of the game in our benchmark model is as follows.

- At stage 0, Nature *independently* selects position x_1 for party 1 and x_2 for party 2 from a non-atomic density function $f(x)$.[12] Parties learn both positions but voters do not.
- At stage 1, both parties make costless statements about their positions. These statements may be precise and include just one point or vague and include multiple positions. Under *non-comparative political campaigning*, each party provides information only about its own position, and then a statement is a subset of the unit segment, $S_i \subseteq [0, 1]$, $i \in \{1, 2\}$. Under *comparative political campaigning*, each party can provide information about both parties' positions, and then a statement is a subset of the unit square, $S_i \subseteq [0, 1] \times [0, 1]$. Notice that in the different cases $S_i = [0, 1]$ or $S_i = [0, 1] \times [0, 1]$ can be interpreted as full nondisclosure of information by party i. In the following, the two cases—with and without comparative campaigning—will be examined separately, but unless stated otherwise, the same notation and definitions

[11] A prominent early model with costly voting is Ledyard (1984).

[12] The probability measure function is called non-atomic if it has no *atoms*, i.e., measurable sets which have positive probability measure and contain no set of smaller but positive measure.

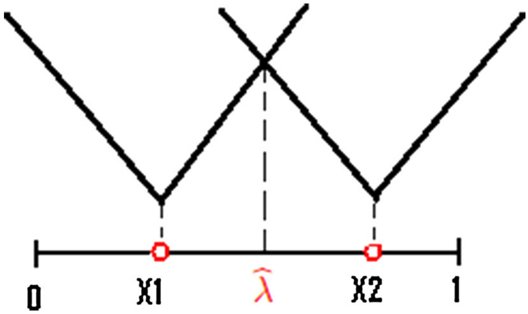


Fig. 1 Indifferent voter, $\hat{\lambda}$, under linear cost of mismatch

apply throughout.
The statements made by both parties are either not restricted in any sense and regarded as pure "cheap talk", or restricted by the *grain of truth* condition. This condition was originally introduced in Milgrom (1981) and referred to as verifiability. The grain of truth condition means that $x_i \in S_i$ for $i \in \{1, 2\}$ when there is no comparative campaigning, and $(x_1, x_2) \in S_i$ for $i \in \{1, 2\}$ when there is. The grain of truth condition ensures that even when political statements about the parties' proposed policies are fuzzy, plain lying (which is reporting a statement that does not contain the true position) is not possible, or is so costly that it is never optimal to do so.

- Finally, at stage 2, voters observe the statements of the two parties and decide whether to vote (if voting is voluntary) and, if so, for which party.

Voting decisions determine the payoffs/vote shares of the political parties and *ex-ante*, expected payoffs/utility of voters. *Ex-post* payoffs of voters are realized at the end of the game, when the outcomes of elections are implemented and uncertainty about the parties' true, intended policies is resolved. All aspects of the game are common knowledge.

2.3 Equilibrium

To solve the game, we apply the concept of a *strong perfect Bayesian equilibrium* (Fudenberg and Tirole 1991), where the only restriction on voters' beliefs off-the-equilibrium path is that they are identical across voters. The formal definition relies on the following specification of the strategy spaces. The strategy of party i is denoted by $s_i(x_i, x_j)$, where the image of s_i belongs to all subsets of [0, 1] (for non-comparative campaigning), or to all subsets of $[0, 1] \times [0, 1]$ (for comparative campaigning). The vector $v(\lambda, c_v, S_i, S_j)$ denotes the voting strategy of a voter with position λ and cost of voting c_v, when the parties' statements are S_i and S_j, respectively. We say that $v = (1, 0)$ if the voter votes for party 1, $v = (0, 1)$ if she votes for party 2, and $v = \emptyset$ if the voter abstains (only an option when voting is voluntary). Finally, $\mu_i(z|S_i, S_j)$ is the probability density that voters assign to $x_i = z$ when the parties announce S_i and S_j. Given this notation, the definition of a strong perfect Bayesian equilibrium can be stated as follows.

Definition A strong perfect Bayesian equilibrium of the game is a set of strategies s_1^*, s_2^* of the two parties, strategy v^* of a voter, and the probability density functions μ_1^*, μ_2^* that satisfy the following conditions:

1. For all S_1 and S_2, v^* is the voting decision that maximizes voter's expected utility. Under voluntary voting

$$v^*(\lambda, c_v, S_1, S_2) = \begin{cases} (1,0) & \text{if } \mathrm{E}\big(\mathrm{u}_1(\lambda)|\mu_1^*, \mu_2^*\big) \geq \max\{\mathrm{c_v}, \mathrm{E}\big(\mathrm{u}_2(\lambda)|\mu_1^*, \mu_2^*\big)\} \\ (0,1) & \text{if } \mathrm{E}\big(\mathrm{u}_2(\lambda)|\mu_1^*, \mu_2^*\big) \geq \max\{\mathrm{c_v}, \mathrm{E}\big(\mathrm{u}_1(\lambda)|\mu_1^*, \mu_2^*\big)\} \\ \emptyset & \text{if } \mathrm{c_v} > \max\{\mathrm{E}\big(\mathrm{u}_1(\lambda)|\mu_1^*, \mu_2^*\big), \mathrm{E}\big(\mathrm{u}_2(\lambda)|\mu_1^*, \mu_2^*\big)\} \end{cases} \quad (1)$$

Under compulsory voting

$$v^*(\lambda, c_v, S_1, S_2) = \begin{cases} (1,0) & \text{if } \mathrm{E}\big(\mathrm{u}_1(\lambda)|\mu_1^*, \mu_2^*\big) \geq \mathrm{E}\big(\mathrm{u}_2(\lambda)|\mu_1^*, \mu_2^*\big) \\ (0,1) & \text{if } \mathrm{E}\big(\mathrm{u}_2(\lambda)|\mu_1^*, \mu_2^*\big) \geq \mathrm{E}\big(\mathrm{u}_1(\lambda)|\mu_1^*, \mu_2^*\big) \end{cases} \quad (2)$$

2. Given 1. and given the statement made by the adversary, s_i^* is the statement that maximizes the payoff of party i, $i \in \{1,2\}$.
3. For all S_1 and S_2, a voter updates her beliefs, μ_1^*, μ_2^*, regarding the positions of the parties in the following way:[13]

   (i) According to Bayes' rule on the equilibrium path,
   (ii) Arbitrary off the equilibrium path.

   All voters have identical beliefs on and off the equilibrium path, and if the grain of truth condition holds, then it applies to statements both on and off the equilibrium path.

This definition implies that (1) for any observed statements of the two political parties, people either abstain (in case of voluntary voting) or vote for the party, whose perceived position, given the updated beliefs, maximizes their ex-ante, expected utility; (2) parties anticipate the best response choices of the electorate to any pair of their statements and choose the statements that maximize their share in political power; (3) voters update beliefs about parties' positions using Bayes' rule for any statements that occur with positive probability along the equilibrium path, and beliefs off the equilibrium path are arbitrary but identical across voters. Moreover, if statements satisfy the grain of truth condition, then even if they occur off the equilibrium path, voters should assign positive probability only to those positions of the parties that are a part of the statements.

2.4 Indifferent voter and parties' payoff properties

Let us denote by $\widehat{\lambda}$ the position of the *indifferent* voter, that is a voter whose utility from voting for either of the two parties is the same given the information disclosed. Formally:

[13] Note that owing to the fact that the probability density function f from which the parties' positions are drawn is non-atomic, the ex-ante probability of any specific position is zero. In this case, Bayes' rule should be applied as follows. Suppose that position z of party i belongs to the set of types $S = \{y, z\}$ that, given the equilibrium strategy, could make statement S_i. Then the probability of the event $x_i = z$ should be updated as

$$\mu_i^*(z|S_1, S_2) = \lim_{\varepsilon \to 0} \frac{F(z+\varepsilon) - F(z)}{F(z+\varepsilon) - F(z) + F(y+\varepsilon) - F(y)}.$$

Using l'Hôpital's rule,

$$\mu_i^*(z|S_1, S_2) = \lim_{\varepsilon \to 0} \frac{f(z+\varepsilon)}{f(z+\varepsilon) + f(y+\varepsilon)} = \frac{f(z)}{f(z) + f(y)}.$$

$$E\Big(u_1(\widehat{\lambda})|\mu_1^*,\mu_2^*\Big) = E\Big(u_2(\widehat{\lambda})|\mu_1^*,\mu_2^*\Big). \tag{3}$$

The indifferent voter's position is not well-defined only when (i) the solution of this equation lies outside the (0, 1) interval, in which case no voter is indifferent and everyone prefers the same party, or (ii) equality (3) holds for *any* $\widehat{\lambda}$, in which case all voters are indifferent between the two parties.[14]

For convenience, we will employ subscripts L and R for the party with the further left and further right perceived position, respectively, so that $E(x_L|\mu_L) < E(x_R|\mu_R)$. Then, as soon as $\widehat{\lambda}$ is well-defined, we will assume that parties' payoffs, π_L and π_R, satisfy the following condition: both payoffs are *fully determined* by $\widehat{\lambda}$, and π_L is strictly increasing in $\widehat{\lambda}$, while π_R is strictly decreasing in $\widehat{\lambda}$. This condition, though somewhat abstract, is in fact natural: the further right the location of the indifferent voter, the larger the pool of voters who favor the left-wing policy, and thus, the larger the share of votes for the party that is perceived as further left and the smaller the share of votes for the other party. For example, if voting is compulsory, this condition is always satisfied, as then the total election turnout is one and $\pi_L = \widehat{\lambda}$, $\pi_R = 1 - \widehat{\lambda}$.[15]

In the described environment, the payoffs of the two parties have a number of noteworthy properties. First, since the distribution of voter positions, g, is symmetric around 0.5 and the costs of voting are i.i.d. across voters, the payoffs of the two parties are the same if the indifferent voter is located in the middle of the unit interval: $\widehat{\lambda} = 0.5$ implies that $\pi_L = \pi_R = 0.5$. Second, when an indifferent voter is not well-defined, the payoffs of both parties are either the same—if all voters are indifferent—or the payoff of the party that is strictly preferred by all voters is one, while the payoff of the other party is zero.

Third, since π_L is strictly increasing in $\widehat{\lambda}$, π_R is strictly decreasing in $\widehat{\lambda}$ and at $\widehat{\lambda} = 0.5$ $\pi_L = \pi_R = 0.5$, it follows that $\pi_L > \pi_R$ if and only if $\widehat{\lambda} > 0.5$. This observation turns out to be important when voters are fully informed about parties' positions, as then $\widehat{\lambda} = (x_1 + x_2)/2$ and $\widehat{\lambda} > 0.5$ is equivalent to $|x_L - 0.5| < |x_R - 0.5|$. That is, the full disclosure payoff is strictly larger for the party that is located closer to 0.5, the median voter.[16] If, on the other hand, both parties are located at the same distance from 0.5, that is, if x_L and x_R are exactly symmetric around 0.5 or $x_L = x_R$, then the full disclosure payoffs of both parties are the same, $\pi_L = \pi_R = 0.5$.

The final observation is that since payoffs of both parties are fully determined by $\widehat{\lambda}$, which in turn is defined by (3), they depend only on the *expected* or *perceived* positions of the two parties but *not* on their actual positions. This observation is key for our equilibrium analysis as it implies that voter beliefs can be used to "punish" a deviating party.

[14] Note that in case of voluntary voting, the indifferent voter may actually prefer to abstain, depending on the realization of her voting cost. Nevertheless, the position of the indifferent voter marks the important threshold between voters who *never* vote for a given party and those who—conditional on voting—*always* vote for this party.

[15] In the Supplementary Appendix we also provide a specific example of voter preferences and costs in elections with voluntary voting that lead to this condition.

[16] Indeed, under full disclosure $\widehat{\lambda} > 0.5$ (and so $\pi_L > \pi_R$) if and only if $x_L + x_R > 1$, which is the case either when both $x_L \geq 0.5$ and $x_R > 0.5$, or when $x_L \leq 0.5 < x_R$ and positions x_L, x_R are not exactly symmetric around 0.5 but such that x_L is closer to 0.5 than x_R. In both cases, the position of the left party is closer to 0.5 than the position of the right party.

3 Full disclosure equilibria and ex-post efficiency

In this section we discuss the notion of ex-post efficiency and consider the simplest ex-post efficient equilibrium, where the true, intended policies of both parties are fully revealed.

Observe that when parties' true policies are fully revealed, voters are able to make fully-informed choices and thereby, maximize not only their ex-ante but also *ex-post* utility from voting, the two being the same in this case. In this sense, any fully disclosing equilibrium is *ex-post efficient*. Similarly, a non-fully revealing equilibrium is ex-post efficient whenever with probability one voters' choices are not distorted by uncertainty. This is the case when for a measure-one set of all party types that, according to the equilibrium strategy, could make a given non-fully revealing statement(s), voters' *ex-post* utility from voting (obtained after the uncertainty about this type has been resolved) is maximized,—that is, equal to the utility that would obtain under full disclosure. This requires that for all or almost all pooling types the following two conditions hold: (i) the position of the indifferent voter (if it is well-defined) under the equilibrium non-fully revealing statements is the same as under full disclosure, and (ii) parties' relative positions with respect to each other (who is left and who is right) are the same as their relative *perceived* positions under the nonrevealing statements. Other non-fully revealing equilibria are inefficient because given a nondisclosing statement, there is a positive probability that some or all voters make "wrong" choices, so that their ex-post utility from voting is lower than under full disclosure.

Note that this "utilitarian" notion of efficiency is, in fact, stronger than an alternative definition, concerned with the resultant policy that the elected government will implement. Indeed, as soon as all voters with probability one make the same choices as they would have made under full information, the resultant government policy, which can be defined as $x_1\pi_1 + x_2\pi_2$, also turns out to be the same as under full information.[17] The converse, on the other hand, is not always true.

In what follows we discuss the conditions on political campaigns under which *any* equilibrium, even if not fully-revealing, is ex-post efficient. The first condition is straightforward: all political statements must satisfy the grain of truth condition. Indeed, the alternative to that is a cheap talk game, wherein any type of political parties can make any statements.[18] In this case a large variety of equilibria obtain where voters are likely to vote for the "wrong" party. For example, complete nondisclosure, where both parties report that their positions are anywhere between zero and one, is an equilibrium outcome. A deviation from such nondisclosure strategies can be easily discouraged because voters regard parties' statements off the equilibrium path as absolutely uninformative and can interpret them in either way. If they believe, say, that only the party with the less popular position, farther from the median voter, may have incentives to deviate, no party would ever be tempted to do so.[19] Thus, the grain of truth condition in our model is a minimal requirement for any equilibrium to be ex-post efficient.

[17] Such a definition of the government policy is common in papers on elections with proportional representation. See, for example, Herrera et al. (2014, 2015), Lizzeri and Persico (2001) and Kartal (2015).

[18] See the seminal paper by Crawford and Sobel (1982) for reference on cheap talk games.

[19] Admittedly, these are special out-of-equilibrium beliefs that support the described equilibrium. However, as we explain in more detail later (Sect. 5), such beliefs cannot be ruled out by standard equilibrium refinements such as the Intuitive Criterion (Cho and Kreps 1987) and the Divinity Criterion, or D1 (Cho and Sobel 1990). Recall that both criteria restrict the receiver's beliefs to those types of senders for which deviating towards a given off-the-equilibrium message could improve their equilibrium payoff. On top of

For this reason, in the rest of the analysis we consider political elections where statements *do satisfy the grain of truth condition* and focus on the second and less straightforward condition for equilibrium ex-post efficiency. We study whether or not the comparative nature of statements helps voters' ability to make the "right" choices. However, before that we establish our first important result, showing that under the grain of truth condition the simplest ex-post efficient equilibrium—with full disclosure—exists irrespective of further requirements.[20]

Proposition 1 *Under the grain of truth condition full disclosure is always an equilibrium outcome.*

The proof of Proposition 1 is straightforward. Suppose that both parties of any type disclose their true position (or type) precisely. Suppose also that one party deviates from the fully disclosing strategy and makes a statement that does not reveal its position/type precisely. Then it is easy to show that given (a) the grain of truth condition (that statements must contain the true position/type), (b) the precise and truthful statement of the other party, and (c) the fact that parties' payoffs depend on expected rather than actual positions (that is they are fully determined by voter beliefs), voter out-of-equilibrium beliefs can always be constructed so that the party's deviation payoff is not larger than its equilibrium full disclosure payoff.

In the next two sections we now consider a possibility of not fully disclosing equilibria and their ex-post efficiency in two scenarios—with and without comparative political campaigning.

4 Comparative political campaigning

In the case of *comparative political campaigning* parties provide information not only about their own policy but also about the policy of their adversary. We find that in this case, nondisclosure can be an equilibrium outcome. However, any nondisclosure equilibrium has an important property that the uncertainty associated with nondisclosure does not, in general, affect optimal voting behavior that one should expect under full disclosure. That is, in a *generic* set of parties' types, nondisclosure does not distort voters' decisions with probability one.[21]

Footnote 19 continued
that, the D1 criterion considers that, among all potential deviators, the full weight is assigned to those types of senders who have the greatest incentive to deviate.

[20] With majority rule elections, such as presidential elections, where the candidate gaining the largest vote share wins (payoff is one), and the other candidate looses (payoff is zero), the same proposition and proof apply.

[21] In the case of presidential elections (majority rule principle) only the resultant policy, that is, the winning candidate is always determined "correctly", while the actual voters' choices might be different from those under full disclosure for many actual pooling types. For example, there exists an equilibrium where all types (x_1, x_2) such that $x_2 < x_1 < 0.5$ or $0.5 < x_1 < x_2$ (candidate 1 is located closer to 0.5 than candidate 2) pool, and where all types (x_1, x_2) such that $0.5 < x_2 < x_1$ or $x_1 < x_2 < 0.5$ (candidate 2 is located closer to 0.5 than candidate 1) pool. Such an equilibrium is not ex-post efficient according to our definition because given the pooling statements, the location of the indifferent voter is different from that for any actual pooling type, so that voters' choices are distorted with positive probability. However, the nature of pooling in this equilibrium (and in fact, in any nondisclosure equilibrium) is such that the candidate that is perceived as located closer to 0.5 is, in fact, located closer to 0.5. Therefore, the candidate that wins the election is the same as under full disclosure.

Proposition 2 *In case of comparative political campaigning, there does not exist an equilibrium where the set of types that (a) do not fully disclose and (b) make a statement inducing inefficient voters' choices has a positive measure. Thus, generically, the equilibrium is ex-post efficient.*

The idea of the proof is simple and based on two observations. First, since the sum of parties' payoffs is the same in any equilibrium (always equal to one) and parties can fully disclose both positions, the payoff of each party in any equilibrium must be the same as its full disclosure payoff.[22] Second, given that parties' payoffs are uniquely determined by $\widehat{\lambda}$ (whenever it is well-defined) and by who is left and who is right, the equality of any equilibrium payoff and full revelation payoff implies that for every generic pooling type two conditions must hold: (i) the indifferent voter is the same under given nondisclosing equilibrium statements and under full disclosure, and (ii) the relative positions of parties with respect to each other are the same as their relative *perceived* positions (implied by the nondisclosing statements).

Conditions (i) and (ii) immediately imply that a nondisclosure equilibrium is ex-post efficient. It is only when the indifferent voter is not well-defined, that this argument does not go through. In the proof we show that this can only be the case in equilibrium when *all* nondisclosing types belong to the upward- and downward-sloping diagonals of the $[0,1] \times [0,1]$ square, where parties' positions are either equal to each other or exactly symmetric around 0.5. Thus, equilibrium nondisclosure with possible loss of efficiency can occur only in a non-generic set of types, where parties' positions have this special relationship to each other.[23]

Note that according to Proposition 2, it is the inefficiency and not nondisclosure that is non-generic. The nondisclosure of parties' types is, in fact, common, even though any such nondisclosing equilibrium is *weak* (as nondisclosure is never strictly preferred to full disclosure). One example of such nondisclosure equilibrium is schematically shown on Fig. 2.[24] In this equilibrium all types (x_1, x_2) on any downward-sloping segment $x_1 + x_2 = const$ above the 45° line (where $x_1 < x_2$) pool with each other. Symmetrically, all types on any downward-sloping segment $x_1 + x_2 = const$ below the 45° line also pool. Finally, all types exactly on the 45° line, where $x_1 = x_2$, pool with each other. This results in a situation where no type in the whole unit square fully reveals parties' positions, and yet the induced voters' choices are the same as under full disclosure, so that the equilibrium is ex-post efficient.

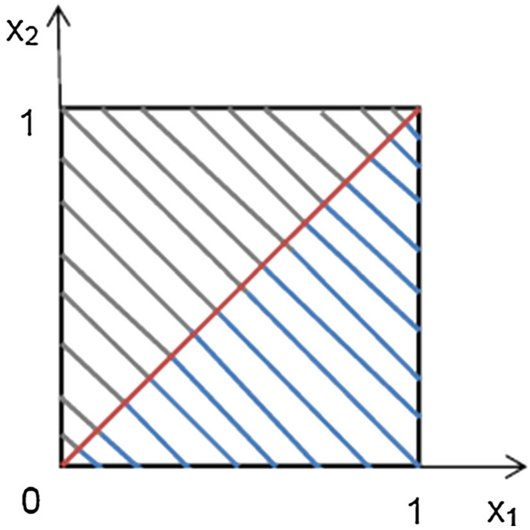
To see this note that the nature of pooling among types in this equilibrium is such that (i) the indifferent voter associated with a nondisclosing statement is the same as the indifferent voter associated with full disclosure of any pooling type, and (ii) the actual relative positions of the two parties at any pooling type are the same as their perceived relative positions given a nondisclosing statement. Indeed, for nondisclosure on the downward-sloping segments, $\widehat{\lambda} = \frac{1}{2}(x_1 + x_2)$ (which is the same for all types on a given

[22] Note that this logic is similar to the traditional unraveling argument in the literature on quality disclosure (e.g., Milgrom 1981). However, our setting is very different: it features horizontal rather than vertical differentiation, a constant sum of players' payoffs and a two-dimensional type space.

[23] Note that symmetric or equal positions of the two parties are non-generic owing to the assumption that both positions are drawn independently from a non-atomic probability distribution. In Sect. 6.1 we consider an alternative model specification with strategic positions and show that our conclusions remain conceptually similar: full disclosure turns out to be the unique equilibrium outcome under comparative, but not non-comparative, campaigning.

[24] The proof of equilibrium is provided in the "Appendix".

Fig. 2 An equilibrium where any type in $[0, 1] \times [0, 1]$ pools with some other types but voters' choices are not distorted



segment), and party 1 is always located to the left of party 2 above the 45° line, the opposite is true below the 45° line. For nondisclosure along the 45° line, *all* voters are indifferent between parties 1 and 2, and both parties of any type have the same location. Thus, nondisclosure in the described equilibrium does not mislead voters.

There do, however, exist nondisclosure equilibria, where pooling in a *non-generic* set of types is likely to lead voters to vote for the party that they actually like less. One example of such equilibrium is provided in the "Appendix". According to Proposition 2, all equilibria of this kind are very peculiar in the sense that types that pool and by doing that mislead voters with positive probability, are such that parties' positions have a very special relationship to each other.

5 Non-comparative political campaigning

Let us now consider the case where parties do *not* engage in comparative political campaigning (and the grain of truth condition holds). Thus, a statement of each party includes information about its own policy only. Formally, this means that while the type space is two-dimensional, the action space (statements) is one-dimensional.

We find that when no comparative campaigning is used, there exists a broad variety of not fully disclosing equilibria that are ex-post inefficient. Moreover, the resultant government policy may also be different from the one under full disclosure. For example, the strategy profile where types reveal $\Phi \subseteq [0, 1]$ if and only if both positions $x_1, x_2 \in \Phi$, whereas the other types fully disclose their positions, is an equilibrium for *any* compact set Φ. Such equilibrium induces nondisclosure in the symmetric set $\Phi \times \Phi$, which for $\Phi = [0, 1]$ coincides with the whole type space. All of these nondisclosure outcomes are such that parties 1 and 2 are perceived by voters as absolutely identical and hence, gain equal shares in political power. However, for most of the *actual* types in $\Phi \times \Phi$ (those where $x_1 \neq x_2$) this should not be the case as some voters should strictly prefer one party over the other. This means that whatever decision a voter makes in equilibrium, it is going to be "wrong" for a half of all pooling types. Thus, mistaken voting is likely to occur, and the government policy is also different from the one under full disclosure.

Formally, the equilibrium strategies that induce nondisclosure in any (compact) set of types $\Phi \times \Phi$ are described by Proposition 3.[25]

Proposition 3 *Under non-comparative political campaigning, for any compact subset* $\Phi \subseteq [0, 1]$ *there exists an equilibrium where*

- *parties 1 and 2 of any type* (x_1, x_2) *with* $x_1, x_2 \in \Phi$ *make the same statement* $S^* = \Phi$;
- *parties 1 and 2 of any other type* (x_1, x_2) (*such that* $x_i \notin \Phi$ *for at least one of the positions*) *fully disclose their position by making a precise statement* $S_i^* = \{x_i\}$, $i \in \{1, 2\}$.

Note that in striking contrast to the case of comparative political campaigning, here nondisclosure can be an equilibrium even if the payoff to one of the parties of a pooling type is actually lower than its full disclosure payoff. The reason is that when no comparative campaigning is used, a party can never guarantee itself the full revelation payoff by unilaterally revealing its own position. For example, voters may interpret a deviation to full disclosure as not only revealing the position of the deviating party itself but also as signalling the relative position of the adversary. A non-favorable signal—that a deviating party is at least as far from the median voter as its adversary (and so even less popular than under nondisclosure)—can "punish" the deviation and sustain a large set of nondisclosure equilibria, even where parties' payoffs are below the full disclosure level.

One may argue that the out-of-equilibrium beliefs used to sustain these nondisclosure equilibria are special. Note however that standard refinements such as the Intuitive Criterion (Cho and Kreps 1987) or D1 (Cho and Sobel 1990) do not rule them out. These refinements are based on the idea that different types have different costs of sending a particular signal, creating different incentives to deviate. Thus, they rely on payoff differences across different types. As in our model the payoffs of the political parties depend only on voter beliefs about their positions (types) rather than on their actual positions and it is unnatural to impose exogenous cost differences across locations in a model with horizontal differentiation, these refinements do not rule out any of the equilibria we have described.

The results of our equilibrium analysis in this and previous section demonstrate a possibility of a very broad range of nondisclosure outcomes with inefficient voters' choices when no comparative campaigning is used, and generic efficiency of all equilibria when campaigning is comparative. This emphasizes the role of parties' ability to disclose the position of the adversary and implies that while ambiguity of non-comparative political statements can often distort voter choices, comparative statements, even if they are vague, are almost never misleading. Thus, we obtain that in addition to the grain of truth condition, the comparative nature of political campaigns is key for "correct" voting. In this sense both conditions together are (generically) necessary and sufficient for all equilibria to be ex-post efficient.

[25] The same strategies constitute an equilibrium in presidential elections (majority rule), with zero-one payoffs. Hence, also in this case, many nondisclosure equilibria are ex-post inefficient and result in the implemented policy being different from the one under full disclosure.

6 Extensions

In this section we consider two extensions of our baseline model. The first extension allows for a strategic choice of positions by parties, while the second addresses the case where parties can choose whether or not to engage in comparative campaigning.

6.1 Strategic choice of political positions

The approach we have followed so far,—where political positions of parties are exogenously drawn from some probability distribution,—is common in the literature on political disclosure (Schipper and Woo 2016; Polborn and Yi 2006; Demange and Van der Straeten 2017). On the other hand, under full information regarding political positions, there is a large literature, with the median voter theorem at its core, studying the positional strategies of parties (Black 1948; Downs 1957). In this section, we combine these literatures and consider a strategic game wherein parties first simultaneously choose their political positions and then statements regarding these positions. As before, we focus on the case where all statements satisfy the grain of truth condition.

We show that the role of comparative campaigning for equilibrium disclosure outcomes and efficiency remains crucial in the setting where positions are chosen strategically. When parties make comparative statements, full disclosure is the unique equilibrium outcome, and therefore, voter choices are the same as under full information. By contrast, when comparative statements are not used, a continuum of equilibrium nondisclosure outcomes exists, where voters' choices are often different from those under full information. The first of these results can be stated as follows:[26]

Proposition 4 *Under comparative political campaigning all equilibria are such that both political parties choose the median voter position 0.5, and for any pair of parties' political statements, voters infer parties' true positions and make the same choices as under full disclosure.*

The logic behind this proposition is very similar to the logic behind the well-known median voter theorem. The proof (provided in the "Appendix") relies on the observation that any party can deviate not only by changing its disclosure statement but also by changing its actual position, and that each party can disclose not only its own true position but also the position of the adversary.

This is no longer true in case when comparative campaigning is not used. If each party can reveal only its own position, the argument behind Proposition 4 does not go through, and a large range of nondisclosure equilibria emerges. In fact, by analogy with the case of non-comparative campaigning in Sect. 5, we find that for any set $\Phi \subseteq [0, 1]$ such that $0.5 \in \Phi$, there exists an equilibrium with nondisclosure in $\Phi \times \Phi$. Thus, voters often make choices that are different from those under full disclosure.[27]

Proposition 5 *Under non-comparative political campaigning, for any subset* $\Phi \subseteq [0, 1]$ *such that* $0.5 \in \Phi$ *there exists an equilibrium wherein both political parties choose a position in* Φ *and make the same statement* $S^* = \Phi$.

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[26] The same proposition holds true in case of presidential elections (majority rule), where the payoffs are zero-one.

[27] The same equilibria exist in case of presidential elections.

The proof of Proposition 5 is straightforward. Given the symmetry of parties' statements, the payoff of every party in the described candidate equilibrium is 0.5. If one of the parties deviates by choosing either a different statement or a different position *and* a different statement, then voters may form beliefs that the deviating party has some position consistent with its deviating statement, while the other party's position is that of the median voter. Given such beliefs, the deviating party turns out to be less (or equally) popular than its adversary, which makes the deviation unprofitable.

This equilibrium proof employs the fact that once a party has deviated, beliefs about the position of its adversary are undetermined and can be chosen such that the deviation is not optimal. If voters believe, however, that a deviating statement does not convey any information regarding the position of the adversary, despite the fact that the deviating party knows that position, then the only equilibrium which satisfies this restriction on the out-of-equilibrium beliefs is the one that confirms the median voter theorem. Note that this restriction on beliefs is similar to the notion of passive beliefs (see, e.g., McAfee and Schwartz 1994), requiring that receivers of statements justify a player's deviation by considering theories that are as close as possible to the equilibrium theory of play. From this perspective, the difference between comparative and non-comparative campaigning is still remarkable, as with comparative campaigning, nondisclosure is not an equilibrium *irrespective* of voters' beliefs, while without comparative campaigning nondisclosure stops being an equilibrium only given certain restrictions on voters' beliefs.

6.2 Choice of campaigning style

Another extension of our model is to analyze the game where parties do not choose only how much information to disclose, but also decide whether or not to engage in comparative campaigning. To be more precise, suppose that, first, at stage 0 parties independently draw their positions from a non-atomic density function $f(x)$.[28] Then, at stage 1 they choose the type of statement to make: comparative or non-comparative. After that the game continues as before: at stage 2 parties make statements consistent with the grain of truth condition, and at stage 3 voters observe the statements and make their voting decisions.

In this case, it is easy to show that even though multiple equilibria exist, featuring both comparative and non-comparative statements with full and partial disclosure,[29] the efficiency properties of all these equilibria are the same: in a generic set of parties' types, each equilibrium is ex-post efficient.[30] As we demonstrate below, the mere ability of both parties to make comparative statements is crucial for this result. Thus, in line with our earlier findings, as soon as both parties are able to make comparative statements and the grain of truth condition holds, any possible ambiguity of political statements will not confuse voters.

[28] If positions are chosen strategically, nothing much changes. We state this at the end of the section.

[29] Some examples of equilibria include the situation where both parties of each type choose non-comparative statements and then fully disclose own position, or where both parties make comparative statements, or where one party makes non-comparative and the other comparative statement and then both or only the second party disclose the positions precisely.

[30] Under presidential elections only the resultant policy, that is, the winning candidate, is always determined "correctly", while the actual voters' choices might be different from those under full disclosure. The equilibrium example in footnote 21 (Sect. 4) applies here, too.

Proposition 6 *In the game where prior to information disclosure parties choose whether or not to engage in comparative campaigning, generically, all equilibria are ex-post efficient.*

The proof is very simple and relies on the same argument as the one we used to show the generic “correctness” of voters’ choices under comparative campaigning (see Sect. 4). Whatever the equilibrium strategies of the two parties are, the fact that (a) the sum of parties’ payoffs is always equal to one, and (b) each party is free to make a comparative statement and reveal both parties’ positions precisely, implies that all equilibria—with or without comparative campaigning and with or without full disclosure—must be payoff equivalent to the full-disclosure equilibrium. Then, by the same logic as before, we obtain that given nondisclosure in a generic set of types, voters with probability one are able to make the same choices as under full information. Moreover, if the positions themselves also are not exogenous, but chosen strategically, then ex-post efficiency obtains in equilibrium for *all* pairs of parties’ positions.

7 Discussion and conclusions

This paper has examined the incentives of political parties to reveal their true, intended policy to uninformed voters during parliamentary elections. These incentives are studied both in a setting where the positions of political parties are exogenously given and where they are strategically chosen. Our primary interest lies in understanding whether the ambiguity of political statements, commonly observed during political campaigns, confuses voters and leads to “wrong” choices or whether under some conditions voters can still deduce which of the parties represents their interests best.

We find that two conditions, or aspects of political culture, are generically necessary and sufficient for “undistorted” voting: the grain of truth condition and comparative campaigning. If politicians make comparative statements that, even if vague, contain the true positions, then the generic equilibrium outcome is such that all voters are able with probability one to detect their most preferred party and make correct decisions. In this sense, comparative campaigning allows voters to maximize their ex-post utility from voting, given the revealed intended policies and, thus, leads to efficient outcomes. By contrast, when statements are pure cheap talk and/or the politicians are not able to discuss the intended policies of their adversaries, a large variety of equilibria exist, where voters’ choices are likely to be misguided. Moreover, only with comparative campaigning any equilibrium is such that voters’ support for each party and, hence, the resultant government policy are the same as under full information. Thus, the paper demonstrates the importance of being able to reveal not only own but also the adversary’s position in democratic elections and shows that ambiguity of at least “minimally truthful” political statements is not a problem as long as comparative campaigning is in place.

Under presidential elections, where the candidate gaining the largest vote share wins and the other looses, the results are the same as under parliamentary elections when political positions are chosen strategically. If positions are exogenous, then the same conclusions as before apply to the resultant policy, i.e., the winning candidate, but not to choices made by individual voters. Namely, the winning candidate is determined correctly in any equilibrium with comparative political campaigning but not without comparative campaigning, while individual voter choices can be distorted irrespective of whether political campaigning is comparative or not. To see why this is the case, note that under comparative campaigning, the candidate whose true position is closer to the median voter and who, therefore, wins the election under full disclosure, will pool with other types only if he also wins under nondisclosure. However, the indifferent voter given the equilibrium nondisclosure statements might be different from the indifferent voter for many actual pooling types, so that voters' choices are likely to be distorted.

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Appendix

Proof of nondisclosure equilibrium depicted on Fig. 2, Sect. 4 We show that the described strategy profile is an equilibrium in two steps. First, under the grain of truth condition no type can imitate the strategy of another type. Second, no type of a party has an incentive to deviate. To see that note that for a party of any type the nondisclosure equilibrium payoff is exactly the same as its full revelation payoff and is the same as the full revelation payoff of any other type making the same equilibrium statement. On the 45° line this payoff is equal to 0.5 for both parties, and on any downward-sloping segment the payoffs of the parties are uniquely determined by $\widehat{\lambda} = \frac{x_1+x_2}{2}$, which is the same for any (x_1, x_2) on the given segment. This second observation implies that a simple set of voter out-of-equilibrium beliefs rules out incentives for deviation. For example, suppose that after a deviating statement voters are certain that the true type is a particular type in the intersection of the deviating statement and the equilibrium nondisclosure statement of the other party. As this type is one of the equilibrium pooling types to which a given deviating type belongs, the resulting deviation payoff of the party is exactly equal to its equilibrium payoff. □

An example of equilibrium under comparative campaigning where pooling in a non-generic set of types is likely to misguide voters Consider a strategy profile where all types on the downward-sloping diagonal of the $[0, 1] \times [0, 1]$ square pool and all the other types fully reveal both positions. All pooling types (x_1, x_2) are such that $x_1 = 1 - x_2$, that is, positions of the two parties are symmetric around 0.5, and half of all types have $x_1 < x_2$ (above the 45° line), while the opposite is true for the other half (below the 45° line). This means that given the nondisclosure statement, all voters are indifferent between the two parties, and parties' associated payoff is 0.5. Note that the full disclosure payoff of both parties (of any actual pooling type) is also 0.5, as then the indifferent voter is located exactly in the middle of the unit interval.

It is easy to see that the proposed strategy profile is an equilibrium. First, no type can imitate the strategy of another type under the grain of truth condition. Second, by fully revealing both positions, a party of any pooling type obtains the same payoff as in the proposed equilibrium. Therefore, if after a deviating statement, voters believe that the true type is one of the types on the downward-sloping diagonal (which belongs to the intersection of the deviating statement and the equilibrium statement of the other party), then a deviation is not gainful.

The described strategies can easily lead to inefficient choices for some or all voters. Indeed, as a half of all pooling types have $x_1 < x_2$ and a half $x_1 > x_2$ (each option having the same probability given the nondisclosure statement), whatever choice each voter makes in equilibrium, it is equally likely to be wrong or right. That is, voters mistakenly choose the *least* preferred party with probability 0.5. □

Proof of Proposition 2 Consider a set of types $\Phi \subseteq [0,1] \times [0,1]$ such that Φ is *not* a subset of types on the upward- and downward-sloping diagonals.[31] In the following we show that for *any* such set, as soon as there exists an equilibrium in which all types in Φ pool with each other, their nondisclosure does not mislead voters with probability one. That is, for a measure-one set of types in Φ, voters' equilibrium choices are the same as under full disclosure. This will then suggest that the only types in the $[0,1] \times [0,1]$ square that (a) may have incentives to pool with other types and (b) by pooling lead to a positive probability of "wrong" voters' choices are all located on either of the two diagonals. Therefore, there does not exist an equilibrium wherein the set of types that (a) do not fully disclose and (b) make a statement inducing inefficient voters' choices has a positive measure.

So, suppose that there exists an equilibrium in which all types in set Φ pool. Pooling requires the existence of at least two different types in Φ. Let us denote them by (x_1, x_2) and (y_1, y_2). Moreover, since Φ is not a subset of the upward- and downward-sloping diagonals, there exists at least one type in Φ—say (y_1, y_2)— that does not belong to either of the diagonals, so that $y_1 \neq y_2$ and $y_1 \neq 1 - y_2$.

Note that the payoff of each party of any type in Φ is equal to the payoff of this party in the full disclosure equilibrium. This follows from the fact that the sum of paries' payoffs is equal to one in any equilibrium, and each party knows and can fully reveal both positions. Indeed, if one of the parties obtained a payoff that is lower than under full disclosure, then it would have an incentive to deviate by revealing both positions precisely.

Now, given this and given that parties' payoffs are uniquely determined by $\widehat{\lambda}$ (whenever it is well-defined) and by whether the party is (perceived as) left or right, it must be that for any type in Φ where parties' relative positions with respect to each other are the same as their relative *perceived* positions, the indifferent voter is the same as under a given equilibrium pooling statement. Moreover, as the value of $\widehat{\lambda}$ under the equilibrium pooling statement is *uniquely* defined for all types in Φ, the probability measure of all other types in Φ—where the positions of parties are reversed *and* the indifferent voter is equal to $1 - \widehat{\lambda}$,—must be zero in Φ. Thus, we obtain that for any type in a measure-one set of Φ (i) the position of the indifferent voter is the same under a given equilibrium pooling statement and under full disclosure, and (ii) parties' relative positions with respect to each other are the same as their relative *perceived* positions (owing to the equilibrium pooling statement). The two conditions imply that with probability one nondisclosure by types in Φ does not mislead voters and the equilibrium is ex-post efficient.

It remains to consider the case where the indifferent voter is not well-defined, as this is the only case in which the above argument does not go through. Below we show that since our set of pooling types Φ includes (y_1, y_2), where parties' positions are neither equal nor symmetric around 0.5, this situation is not an equilibrium. This would then contradict the definition of set Φ, and thereby, conclude the proof.

Consider two possibilities in turn: first, where the indifferent voter is not well-defined for the equilibrium pooling statement, and then, where the indifferent voter is not well-defined when one of the pooling types in Φ fully discloses. Suppose the former is true.

[31] Recall that $x_1 = x_2$ along the upward-sloping diagonal, and $x_1 = 1 - x_2$ along the downward-sloping diagonal.

Then the equilibrium payoff to a party of any type in Φ is either 0.5 (when all voters are indifferent between the two parties) or zero or one (if no voter is indifferent). In either case, it is easy to see that one of the parties of type (y_1, y_2) would strictly benefit from deviating to full disclosure. Now, suppose that the latter is true: the indifferent voter is not well-defined when one of the pooling types in Φ fully discloses. This can occur only when the positions of the two parties of that type are equal, so that all voters are indifferent between parties 1 and 2. Then the full revelation payoff of both parties of this type is 0.5 and given the equality of the full revelation payoff and equilibrium nondisclosure payoff, the equilibrium nondisclosure payoff of this—and of any other type in Φ—is also equal to 0.5. But this implies that the party of type (y_1, y_2) whose location is closer to 0.5 can benefit from deviating to full disclosure. Hence, the situation where the indifferent voter is not well-defined—either for the equilibrium pooling statement or for one of the pooling types in Φ—is not an equilibrium.

Thus, we obtain that for any set of pooling types Φ, the corresponding nondisclosure equilibrium is ex-post efficient. □

Proof of Proposition 3 First, notice that no type of a party can or has incentives to imitate the strategy of another type. Even if the grain of truth condition allows a party to make an equilibrium statement of another type, this imitation will be detected by voters as their beliefs about the type are formed based on statements of *both* parties and the other party still makes an equilibrium statement. For example, if $x_1 \in \Phi$, but $x_2 \notin \Phi$, party 1 could imitate a type with both positions in Φ by making a statement $S^* = \Phi$. However, since party 2 reveals its own position precisely and this position lies outside Φ, voters, who know the equilibrium strategies, deduce that party 1 has deviated. Similarly, a party of a type with both positions in Φ can fully disclose its own position imitating the equilibrium statement of a type where the position of that party (but not the position of the adversary) is in Φ. But given that the statement of the other party is Φ, voters deduce that both parties have positions in Φ and it is the first party that deviated. Finally, a party of a type with at least one of the positions outside Φ can imitate the strategy of another such type—if this party's position is the same for both types. But given that the other party fully reveals its position, the imitating party cannot succeed in pretending to be of the other type.

Next, we construct a system of voter out-of-equilibrium beliefs such that given these beliefs, no deviation is profitable. Suppose that after observing $S_i = \Phi$ and $S_j \neq \Phi$ voters assign probability one to such positions in $S_i \bigcap S_j$ where party j is at least as far from 0.5 as her adversary, that is, where $|x_j - 0.5| \geq |x_i - 0.5|$.[32] And if voters observe $S_i = \{x_i\}$ and $S_j \neq \{x_j\}$, then they assign probability one to party j being located at such $y \in S_j$ where the distance from party j to 0.5 is the largest among all locations in S_j, that is, where the full revelation payoff of party j, given position x_i of the adversary, is minimized.

Given such out-of-equilibrium beliefs, no type of a party has an incentive to deviate from the proposed equilibrium strategy. Clearly a party of type (x_1, x_2) such that $x_1 \in \Phi$ and $x_2 \in \Phi$ has no incentives to deviate since its equilibrium payoff, given the symmetry of the statements, is 0.5, while any deviation payoff is lower or equal than 0.5. A party of type (x_1, x_2) such that either x_1 or x_2 or both positions do not belong to Φ has no incentives to deviate either. If party j deviates to some admissible statement $S_j \neq \{x_j\}$, then the subsequent choice of voters will be as if the true position of party j is y for sure, and thus the deviation payoff of party j is equal to its full revelation payoff based on its own position

[32] $S_i \bigcap S_j \neq \emptyset$ owing to the grain of truth condition.

being y and the position of the adversary being x_i. As $x_j \in S_j$, too, this payoff does not exceed the party's full revelation payoff based on the true positions. □

Proof of Proposition 4 Consider a strategy profile where at least one of the parties chooses a position different from 0.5 and parties make statements that either fully disclose both positions or don't. Then irrespective of the payoffs associated with this strategy, at least one of the parties can deviate and earn a strictly larger share of votes. To do that, a party can simply move its position ε-close (and in the direction of the median voter) to the position of the adversary for arbitrary small ε and then reveal both parties' positions precisely. We then obtain the median voter result: the only pair of positions for which the described deviation does not guarantee a higher payoff for either party is (0.5, 0.5). Knowing this, voters can deduce (and believe) that, even if the equilibrium statements are fuzzy, both parties are located at 0.5, so that indeed, neither party can benefit from deviation. □

Proof of Proposition 6 Note that for any equilibrium strategies of the two parties, the following holds: (i) the sum of parties' payoffs is equal to one, and (ii) each party is free to make a comparative statement and reveal both parties' positions precisely. This means that all equilibria, with or without comparative political campaigning, must be payoff equivalent to the full-disclosure equilibrium, as otherwise one of the parties of some type would have an incentive to deviate and fully disclose both positions. Then, given that and given the monotonic functional dependence of parties' payoffs on the position of the indifferent voter, we obtain that in any nondisclosure equilibrium, the position of the indifferent voter for any or almost any nondisclosing type must be the same as under the equilibrium nondisclosure statement. Furthermore, the relative positions of parties with respect to each other must be the same as their relative *perceived* positions (implied by the nondisclosing statements). This logic does not apply only when the indifferent voter is not well-defined, which in equilibrium can occur only if parties' positions are either the same or exactly symmetric around the median voter. This was shown in the proof of Proposition 2. Thus, owing to the same argument as in that proof, generically, any equilibrium is ex-post efficient. □

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