ECONtribute
MARKETS & PUBLIC POLICY

ECONtribute
Discussion Paper No. 132

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December 2021 www.econtribute.de

UNIVERSITÄT BONN Universität zu Köln

Funding by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany´s Excellence Strategy – EXC 2126/1– 390838866 is gratefully acknowledged.

The Revelation Incentive for Issue Engagement in Campaigns

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Last updated: October 2021

Abstract

How do parties choose issues to emphasize in campaigns, and when does electoral competition force parties to address issues important to voters? Empirical studies have found that although parties focus disproportionately on favourable issues in campaigns, they also spend much of the 'short campaign' addressing the same issues – and especially if these are salient issues. We write a model of multiparty competition with endogenous issue salience, where, in equilibrium, parties behave in line with these patterns. In our model, parties' issue emphases have two effects: influencing voter priorities, and also informing voters about their issue positions. Thus, parties trade off two incentives when choosing issues to emphasize: increasing the importance of favorable issues ('the salience incentive'), and revealing their positions on salient issues to sympathetic voters ('the revelation incentive'). The relative strength of these two incentives determines how far elections constrain parties to respond to voters' initial issue priorities.

JEL Codes: D72, D83

*We are grateful to audiences at SPSA 2015, MPSA 2015, the 2015 UCLA-COMPASS Graduate Student conference, APSA 2015, NICEP 2017, ECPR 2020, the LSE, UB-IPErG, the URDPS Comparative Politics Workshop and the URDPS Women's Working Group, for helpful comments. An earlier version of this paper was circulated under the title 'The Clarity Incentive for Issue Engagement in Campaigns.' Support from the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy - EXC 2126/1 - 390838866 is gratefully acknowledged.

1 Introduction

Which issues do parties choose to talk about in campaigns and why? Does electoral competition force parties to address the issues that voters consider important? To help answer these questions, this paper presents a formal theory of issue selection by parties, which provides a unified explanation for five well-documented empirical features of party behavior in campaigns. First, political parties discuss multiple issues during election campaigns. Second, political parties disproportionately emphasize issues on which they are 'advantaged' relative to their opponents – issues on which a party's policies are more popular with most voters, or issues which they are more trusted to handle by most voters. Third, parties do nevertheless address issues on which they are disadvantaged with most voters as well. Fourth, parties spend much of their campaigns discussing the same issues as each other ('issue engagement'), and fifth, this is especially the case when these are issues important to voters. We provide a formal model of multiparty competition where several parties choose how much to emphasize multiple issues and where, in equilibrium, parties behave in accordance with these patterns.

Our model starts from the premise that the extent to which a party emphasizes an issue has at least two effects: it may influence the importance, or salience, of an issue for voters, but it also influences voters' certainty regarding the party's policies on the issue. Thus, party emphasis decisions involve a trade-off between two competing incentives. The first is the more frequently studied 'salience incentive', which is the incentive to emphasize an issue on which a party's policies are relatively popular in order to increase the proportion of voters who consider the issue important. The second, which we term the 'revelation incentive', is the incentive to emphasize an already salient issue to increase the proportion of voters who are aware of the party's policies on the issue. Doing so benefits the party electorally because voters are less inclined to support a party if they do not know its policies on a salient issue. Therefore, even if a party's position on an issue is unpopular with the majority of voters, the party still has an incentive to emphasize that issue to reveal its policies to the minority of sympathetic voters for whom the issue is important. Consequently, parties will emphasize the same issue as one another if this issue is highly salient.

The five empirical patterns noted above have been variously documented in both two-party and multi-party systems, by studies from the vast literature on what has variously been described as 'heresthetics', 'issue competition', 'saliency theory' or 'issue ownership theory'. Early studies in this literature (Budge and Farlie 1983; Riker 1993; Petrocik 1996) proposed that parties disproportionately focus on issues on which they are advantaged, in an effort to increase the salience of these issues to voters and thereby to alter the dimensions on which they are evaluated. To date, empirical researchers have amassed considerable evidence from a wide range of countries supporting this general pattern (Green and Hobolt 2008; Green-Pedersen and Mortensen 2010; Vavreck 2009).[1]

Nevertheless, the empirical literature has also found that parties typically campaign on multiple issues during campaigns, and this frequently includes issues on which they are disadvantaged relative to their opponents among most voters. This has been documented in national election campaigns in the US (Sides 2006), as well as in the the United Kingdom and Austria (Green and Hobolt 2008; Meyer and Wagner 2016). For instance, Sides (2006) finds that, during the 1998 midterm elections, Republicans and Democrats spent a similar amount of advertising time on Social Security, the environment, jobs and Medicare, even though many more voters trusted the Democrats on all four issues. Similarly, Wagner and Meyer (2014) find in 17 countries that parties devote, on average, only twice as much time to owned (i.e. advantaged) issues as non-owned issues in election manifestos.

As a result, parties actually spend much time addressing the same issues as each

1. Relatedly, a large empirical and experimental literature on the importance of "priming effects" argues that political advertising has a significant effect on voters' issue priorities (Iyengar and Kinder 1987; Krosnick and Kinder 1990).

other. For instance, when analysing presidential campaigns in the U.S., Sigelman and Buell (2004) found that all candidates spoke on the same issue, on average, a staggering 75.3% of the time. However, this is especially the case for issues which are already salient to voters (Sides 2006; Green and Hobolt 2008; Klüver and Sagarzazu 2016) – a strategy described by Ansolabehere and Iyengar (1994) as 'riding the wave'. In keeping with this observation, Seeberg (2020) finds that parties in Denmark are significantly more likely to focus on their owned issues early in the election cycle, as they try to shape the political agenda in their favor. Even so, as the election draws closer, and as further movements in voter priorities become less likely, parties shift their focus to the issues dominating the political agenda instead.

Extant formal models of issue selection by parties during campaigns provide support for the empirical tendency of parties to focus more on advantaged issues, but generally do not match the other empirical patterns documented above. Most of this formal literature has concluded that parties will typically campaign only on their most favorable issue in equilibrium to increase its salience, and two parties will never campaign on the same issue if each is advantaged on a different issue. For example, in Dragu and Fan (2016), parties never advertise the same policy issue in equilibrium. Meanwhile, in Aragonês, Castanheira, and Giani (2015), while two parties may 'invest' in the quality of their proposals on the same issue, parties only campaign on issues where they (weakly) come to hold a comparative advantage. Some studies have found multiple parties campaigning on the same issue in equilibrium – but only when these parties share ownership of the issue (Ascencio and Gibilisco 2015), or when one party is majority preferred on all issues, but its comparative advantage on any one issue is not too large (Amorós and Puy 2013).

Dragu and Fan (2016) propose that one way to reconcile this literature with the empirical fact that parties often campaign on the same issues is to interpret parties emphasizing different issues in a model as emphasizing different aspects of the same issue in the data. This interpretation is consistent with empirical findings that, when 'trespassing' on issues owned by other parties, parties do seek to frame the issues in ways favorable to them, perhaps by emphasizing different aspects of the issue (Sides 2006, p. 426). Nevertheless, while this interpretation allows the literature to account for two parties emphasizing the same issue, it does not provide an explanation for why this should be more common for salient issues, or why parties should emphasize multiple issues. To our knowledge, Denter (2020) presents the only other model of party competition with endogenous issue salience which can simultaneously account for all five stylized facts mentioned above.

By incorporating the 'revelation' incentive into a model of party strategy with endogenous issue salience, we propose a unified explanation for why parties tend to disproportionately focus on issues that favor them, while also spending much of their campaigns discussing the same issues as each other (even if unfavorable) – and especially when these issues are particularly salient to voters. In our model, multiple parties take distinct policy positions on multiple issues and strategically choose which issues to emphasize in order to maximize their vote share. Parties trade off two competing incentives when deciding how much to emphasize each issue. First, as in prior literature, emphasizing an issue increases the proportion of voters who consider the issue important, which is advantageous for a party if its position on the issue is relatively popular (the 'salience incentive'). Second, emphasizing an issue also increases the proportion of voters who are aware of the party's position on the issue. Even if a party's position is only popular with a minority of voters, placing some emphasis on the issue is electorally beneficial, as those voters will be less inclined to support the party if they do not know its position on an issue salient to them (the 'revelation incentive'). We show that, under some restrictions on the parameters, the revelation incentive is sufficiently powerful that all parties choose to campaign on all issues in equilibrium. Nevertheless, parties tend to emphasize more salient issues relatively more and also emphasize issues on which they have a comparative advantage relatively more. If one issue is much more salient than all others, then the resulting strong 'revelation incentive' leads all parties to primarily talk about the issue regardless of their positions on the issue. Similarly, if voter priorities are not very flexible – e.g. late in the electoral cycle (Seeberg 2020) – then the revelation incentive will dominate parties' calculations, and parties will primarily focus on the issues already important to voters.

The existence of a 'revelation incentive' is consistent with a sizable literature arguing that the more uncertain a voter is about candidate positions, the less likely she is to support the candidate (e.g. Bartels (1986), Alvarez (1998), and Ezrow, Homola, and Tavits (2014)). However, our argument that individuals are less inclined to vote for a party if uncertain of its position on a salient issue jars with recent research that, instead, stresses the electoral benefits of positional ambiguity (Tomz and Houweling 2009; Somer-Topcu 2015; Bräuninger and Giger 2018). We argue that our findings are consistent with this literature because the effects of not speaking, or speaking less, about an issue are distinct from those of presenting a less precise stance on an issue.[2] In Section 3, we extend our model to include the effects of positional ambiguity on voter decisions, allowing parties to choose a level of precision of messages as well as a level of emphasis on each issue. This generates an additional trade-off for parties: parties do face a 'revelation incentive' to communicate precise positions on issues important to many voters, but also face an additional 'projection incentive' to communicate slightly different positions to different voters. We establish that, if able to, parties will want to communicate slightly imprecise positions during campaigns. Nevertheless, we find that parties' emphasis decisions show the same qualitative patterns as our baseline model, and so the imprecise campaigns model can also account for the same empirical patterns of party behavior.

The results of our model contrast with much of the formal theoretical literature on

2. Our distinction between these two sources of voter uncertainty about parties' latent policy positions resembles the distinction between 'non-positions' and 'positional inconsistency' identified by Nyhuis and Stoetzer (2021).

party campaigns, which generally predicts that parties will not campaign on the same issue when each is advantaged on a different issue. To our knowledge, the only exceptions are Denter (2020), Egorov (2015) and Demange and Van der Straeten (2020). The model of issue selection in Denter (2020) is also able to match the five empirical features of party behavior in campaigns that we have identified. In his model, when choosing how much to campaign on an issue, parties face a trade-off between 'priming' voters to prioritize issues on which they are comparatively advantaged and persuading voters of their quality on issues where they are not already advantaged. The first incentive considered by Denter is exactly our 'salience incentive'. The trade-off studied by Denter is doubtless an important component of parties' emphasis decisions in campaigns. Nevertheless, we think that this trade-off cannot explain issue engagement on all issues, as studies have found voter preferences on some positional issues to be relatively 'crystallized' (Tesler 2015) – and so harder to shift by persuasion, especially over the length of an election campaign. Similarly, Seeberg (2017) finds parties' issue reputations to be stable and longstanding on a number of issues across 17 countries.

Other studies of party campaigns that relate closely ours are Egorov (2015) and Demange and Van der Straeten (2020). In both studies, campaigns are informative, which generates a very similar incentive for issue engagement to our 'revelation incentive'. In Egorov (2015), parties choose which of two issues to campaign on and may choose to campaign on the same issue if the loss of voter information from campaigning on different issues is large. In Demange and Van der Straeten (2020), parties are able to inform voters (or not) regarding their issue positions by communicating more or less precise information in their campaigns. As such, parties have an incentive to campaign more precisely on issues where their issue positions are more popular. However, neither of these papers allows for endogenous issue salience. Furthermore, in Egorov (2015) assumes issues are equally salient, and in Demange and Van der Straeten (2020) salience does not affect party campaign strategy. As such, neither model accounts for why issue engagement is more common on salient issues.

An additional contribution of this study is the tractability of our framework, which may prove useful for future models of campaign strategy. To our knowledge, this is the first formal model of party competition with endogenous issue salience where an arbitrary number of parties are able to choose a continuous level of emphasis on an arbitrary number of issues. The specific information structure we adopt leads the model to be extremely tractable even in this case. Moreover, although we only consider parties' emphasis decisions on positional issues, our model is also straightforwardly extended to a case with one or more non-positional, or valence, issues, as discussed on page 18.

The remainder of the paper proceeds as follows. In Section 2, we formally model the implications of the 'revelation incentive' for parties' emphasis strategies. Section 3 explores the extension to the baseline model where parties can additionally choose to send precise or imprecise messages to voters on issues they emphasize. Section 4 concludes. The supplementary appendix provides proofs for all propositions, and discusses extensions of the basic model.

2 A Model of Party Emphasis Decisions

Voters may be less likely to support a party if uncertain about its position on an issue, and particularly if that issue is electorally salient. Given this, we suggest that parties possess an incentive to address even unfavorable issues in their campaigns in order to reveal their positions on these issues. In this section, we formally explore the implications of this 'revelation incentive' for party strategy using a model of electoral competition with two vote-maximising parties and two issues. We describe party and voter behavior in turn, before discussing their joint implications for the equilibrium party emphasis strategies.

2.1 Parties

There are $J \geqslant 2$ parties (indexed by $j = 1, ..., J$) which compete for votes over $K \geqslant 2$ issues (indexed by $k = 1, ..., K$). At the start of play, nature chooses a distinct policy position for each party on each issue so that no two parties have the same position on any issue. At this stage we make no further assumptions about how these issue positions are chosen by nature. The resulting issue positions for each party j on each issue k is denoted θ_j^k. We also use θ to refer to the $J \times K$ dimensional vector of all parties' issue positions $(\theta_1^1, ..., \theta_j^1, ..., \theta_1^K, ..., \theta_J^K)$. We assume that $\theta \in \Theta$, where $\Theta = (\underline{\theta}, \overline{\theta})^{JK} \subset \mathbb{R}^{JK}$. Each party observes its own position alongside those of its rivals.

Each party campaigns in order to maximize its vote share. Although party positions are set by nature, each party is able to choose how much to emphasize each issue in its election campaign.[3] e_j^k denotes the relative emphasis of party j on issue k in its campaign. We assume that each party's choices must satisfy $e_j^k \geqslant 0$, for each k, and $\sum_{k=1}^K e_j^k = 1$. For each party j, a strategy $s_j \in S_j$ is a function mapping the parties' positions to j's emphasis on each issue. That is, s_j is a function $s_j : \Theta \to [0, 1]^K$. s denotes a strategy profile $(s_1, ..., s_J)$ and $S = \times_{j=1}^J S_j$ denotes the set of all permissible strategy profiles.

As we discuss in Sections 2.3 and 2.4, the extent to which a party emphasizes each issue has two effects: it influences the salience of issues for voters, and also influences the probability with which voters observe parties' positions on each issue.

2.2 Voters

There is a continuum of voters. Each voter i has an ideal point on $x_i^k \in (\underline{\theta}, \overline{\theta})$ on each issue k. Voter ideal points are distributed according to the joint cdf F and pdf f. That

3. The rationale for this assumption is that party platforms are considerably less flexible than the issues on which they choose to campaign.

is, for any $y \in \Theta$:

$$F(y) = \text{Prob}(x_i^1 \leqslant x^1, ..., x_i^k \leqslant x^k) \equiv \int_{x \leqslant y} f(x)dx.$$

where $dx = dx^1 \cdot ..., dx^k$ and $x \leqslant y$ denotes $x^k \leqslant y^k, \forall k$.

We use F^k and f^k to denote the cdfs and pdfs of the marginal distributions of F with respect to issue k. We assume that F is twice continuously differentiable with respect to its arguments.

In addition to differing from one another in their ideal points, voters also vary on how much they care about one issue rather than another. For each issue k, we assume that an exogenous fraction $\overline{\pi}_k \in (0, 1)$ strongly care about issue k. We refer to these as "issue-k-focused voters". We assume that $\sum_{k=1}^K \overline{\pi}_k < 1$. Fraction $1 - \sum_{k=1}^K \overline{\pi}_k$ of voters are 'impressionable'. Impressionable voters do not strongly care about a particular issue at the start of campaigning. Instead, which issue these voters consider more important will depend upon the campaign. The vector $\overline{\pi} = (\overline{\pi}^1, ..., \overline{\pi}_k)$ is exogenous and commonly known to parties and voters. The value of $\overline{\pi}_k$ can be interpreted as depending upon all the many factors that might affect the salience of issue k to voters before the campaign begins.

This division of voters into two types substantially enhances the tractability of the model but is an abstraction from reality. A real world voter is likely a mixture of these types, since she may care about multiple issues and be somewhat, but not entirely, impressionable. thus, we may interpret $\overline{\pi}_k$ and $1 - \sum_{k=1}^K \overline{\pi}_k$ as, respectively, the average degree to which voters initially care about issue k, and the average impressionability of voters.

2.3 Voter Information

Voters prefer to vote for parties whose policy positions are closer to their ideal points. However, voters do not observe all parties' positions on all issues. In particular, whether a voter i observes parties' positions on an issue depends on whether the voter witnesses parties' campaigns on the issue. This in turn depends upon two things: first, how far the parties emphasize the issue in their campaigns and, second, whether a voter is focused on some issue k or impressionable.

Consider an issue-k-focused voter, for some $k \in \{1, ..., K\}$. Each k-focused voter witnesses party j's campaign on issue k with probability given by $\eta(e_j^k)$, where $\eta : [0, 1] \rightarrow [0, \overline{\eta}]$ is function which continuous on $[0, 1]$ and twice continuously differentiable on the interior, whose derivatives satisfy $\eta'(e) > 0$ and $\eta''(e) < 0$ for $e \in (0, 1)$. Furthermore, we assume that $\eta(0) = 0$, $\eta(1) = \overline{\eta} \leqslant \frac{1}{J}$, $\eta'(1) = 0$ and $\lim_{x \rightarrow 0} \eta'(x) = \infty$. Therefore, the more party j emphasizes issue k, the more each k-focused voter is likely to witness its campaign on issue k. Since k-focused voters are focused on issue k, they are assumed to have zero probability of witnessing parties' campaigns on any other issue. Voters are assumed to have too little time or interest to follow more than one party's campaign on one issue. Therefore, each issue-k-focused voter witnesses exactly one party's campaign on issue k with probability equal to $\sum_{j=1}^{J} \eta(e_j^k)$ and does not witness any party campaign on any issue otherwise.

Impressionable voters, by contrast, do not initially care about one issue more than another. As such, an impressionable voter i may witness a party's campaign on any issue. The impressionable voter i witnesses party j's campaign on issue k with probability $\frac{\eta(e_j^k)}{K}$. Like other voters, impressionable voters witness at most one party's campaign on one issue. Therefore, each impressionable voter witnesses exactly one party's campaign on one issue with probability equal to $\sum_{k=1}^{K} \sum_{j=1}^{J} \frac{\eta(e_j^k)}{K}$ and does not witness any party's campaign on any issue otherwise.

Like issue-k focused voters, impressionable voters ultimately come to care most about one issue. Impressionable voters who witness a party's campaign on some issue k are assumed to come to care most about that issue. Impressionable voters who do not witness a party's campaign end up caring about each issue $k = 1, ..., K$ with probability $\frac{1}{K}$.

Whether or not a voter witnesses a party's campaign also matters because it affects the probability that a voter observes party positions on an issue. Voters only have a chance of observing party positions on the issue that they care most about – since they do not care as much about other issues, they ultimately do not pay much attention to them. Thus, for instance, issue k-focused voters only may observe positions on issue k.[4]

If a voter does not witness any party campaign, then she observes all parties' positions on the issue k she cares most about with probability γ_0, and no party's position on that issue k with probability $1 - \gamma_0$. On the other hand, if she does witness some party j's campaign on issue k, then she observes all parties' positions on issue k with probability γ_1, and only party j's position on issue k (and no other parties' positions) with probability $1 - \gamma_1$. $\gamma_0 \in [0, 1)$ and $\gamma_1 \in [0, 1)$ are exogenous parameters. Furthermore, we assume that $\frac{J-1}{J}(1 - \gamma_0) > \gamma_1 - \gamma_0 \geqslant 0$, that is, witnessing one party's campaign on issue k makes a voter more likely to observe other parties' positions on that issue than if she had not observed any campaign – but not by too much.[5] Note that a consequence of these assumptions is that every voter either observes only one party's position on only one issue, or that voter observes all parties' positions on (only) one issue, or that voter observes no parties' positions on any issue. This limited range of possible cases substantially increases

4. The sharp distinctions we draw between issue 1 focused voters, issue 2 focused voters etc. and impressionable voters are rather extreme compared to reality, as are the distinctions between witnessing a party's campaign compared to observing its issue positions. In reality, many voters are impressionable to some degree and focused on one or other issue to some degree. However, we found the modeling framework considered here to be much more tractable than alternatives.

5. It is necessary to assume that $\frac{J-1}{J}(1 - \gamma_0) > \gamma_1 - \gamma_0$ because, otherwise, a party might prefer not to campaign at all in order to avoid revealing other parties' platforms to voters. Since real-world parties do campaign, we consider $\frac{J-1}{J}(1 - \gamma_0) > \gamma_1 - \gamma_0$ to represent the more relevant case.

the tractability of the model.[6]

We assume that a law of large numbers holds, so that, for instance, the total proportion of issue-k-focused voters that see party j's campaign on issue k is equal to $\eta(e_j^k)$.

Let $\rho_j^{F,k}$ denote the proportion of all voters who are issue k-focused and who observe only party j's position on issue k. Let $\rho_j^{I,k}$ denote the proportion of all voters who are impressionable and who observe only party j's position on issue k. Let $\rho_A^{F,k}$ and $\rho_A^{I,k}$ denote, respectively, the proportion of k-focused and proportion of impressionable voters that observe all parties' positions on issue k. Finally, let ρ_0 denote the proportion of voters that observe no party's position on any issue. Finally, let $\rho_C^{I,k}$ denote the proportion of voters who are impressionable and ultimately come to care about issue k. Then, our assumptions above imply that, for each $j = 1, ..., J$ and $k = 1, ..., .K$:

$$\rho_j^{F,k} = \overline{\pi}_k \eta(e_j^k)(1 - \gamma_1) \tag{1}$$

$$\rho_j^{I,k} = \left(\frac{1 - \sum_{n=1}^K \overline{\pi}_n}{K}\right) \eta(e_j^k)(1 - \gamma_1) \tag{2}$$

$$\rho_A^{F,k} = \overline{\pi}_k \gamma_1 \sum_{j=1}^J \eta(e_j^k) + \overline{\pi}_k \gamma_0 \left(1 - \sum_{j=1}^J \eta(e_j^k)\right) \tag{3}$$

$$\rho_A^{I,k} = \left(\frac{1 - \sum_{n=1}^K \overline{\pi}_n}{K}\right) \gamma_1 \sum_{j=1}^J \eta(e_j^k) + \left(\frac{1 - \sum_{n=1}^K \overline{\pi}_n}{K}\right) \left(1 - \sum_{m=1}^K \sum_{j=1}^J \frac{\eta(e_j^m)}{K}\right) \gamma_0 \tag{4}$$

$$\rho_0 = (1 - \gamma_0) \left(1 - \sum_{m=1}^K \sum_{j=1}^J \left(\overline{\pi}_k + \frac{1 - \sum_{n=1}^K \overline{\pi}_n}{K}\right) \eta(e_j^m)\right) \tag{5}$$

$$\rho_C^{I,k} = \left(\frac{1 - \sum_{n=1}^K \overline{\pi}_n}{K}\right) \sum_{j=1}^J \eta(e_j^k) + \left(\frac{1 - \sum_{n=1}^K \overline{\pi}_n}{K}\right) \left(1 - \sum_{m=1}^K \sum_{j=1}^J \frac{\eta(e_j^m)}{K}\right) \tag{6}$$

For convenience, we will use η_j^k to denote $\eta(e_j^k)$.

We assume that whether a voter is focused on some issue k or impressionable is

6. We conjecture that the main qualitative results of the model still hold, at the cost of greater notational complexity, if the assumptions are generalized to allow voters to observe e.g. several but not all party positions on an issue k.

independent of the voter's ideal point all issues. Furthermore, whether a voter observes a party's campaign or position on an issue is also independent of the voter's ideal point. Therefore, the proportion of all voters who have ideal point $x_i^k \leqslant x^k$ on some issue k, and observe only party j's position on that issue, is equal to $(\rho_j^{F,k} + \rho_j^{I,k})F^k(x^k)$.

2.4 Salience and Revelation Effects of Campaigns

This formal framework implies that campaigns may affect the salience of issues for voters, which we term the 'salience effect' of campaigns, and campaigns may also influence the probability with which voters observe parties' positions on issues salient to them, which we term the 'revelation' effect of campaigns. In this section we show how the strength of these effects can be quantified in our model.

Fraction $\overline{\pi}_k$ captures how many voters consider issue k important before election campaigning even begins. We therefore refer to $\overline{\pi}_k$ as the pre-campaign salience of issue k. Let π_k denote the *post*-campaign salience of issue k. That is, π_k represents the proportion of k-focused voters and impressionable voters who care about issue k after voters have observed (or not observed) party positions. Then, π_k is given by:

$$\pi_k = \overline{\pi}_k + \rho_C^{I,k} \tag{7}$$

Using equation (6) above, we can see that an increase in party j's emphasis on issue k increases the post-campaign salience of the issue, since:

$$\frac{\partial \pi_k}{\partial e_j^k} = \frac{\partial \rho_C^{I,k}}{\partial e_j^k} = \left(\frac{1 - \sum_{n=1}^{K} \overline{\pi}_n}{K}\right)\left(1 - \frac{1}{K}\right)\eta'(e_j^k) \geqslant 0.$$

This effect arises because, if party j campaigns more on an issue k, this increases the proportion of impressionable voters who observe its campaign and come to care about this issue, and therefore decreases the proportion who come to care about other issues (since all voters ultimately care about only one issue). Since campaigns only affect the issues that impressionable voters care about, it is natural that $\frac{\partial \pi_k}{\partial e_j^k}$ is larger when the fraction of impressionable voters, $1 - \sum_{n=1}^{K} \overline{\pi}_n$, is higher.

However, in addition to affecting the salience of issues, party campaigns also affect the fraction of voters that observe party positions, as discussed in the previous section. Using the definitions of the previous section, the probability that a randomly chosen voter i observes (at least) party j's position on issue k is given by:

$$\text{Prob}(i \text{ observes } j\text{'s position on } k) = \rho_j^{F,k} + \rho_j^{I,k} + \rho_A^{F,k} + \rho_A^{I,k}.$$

Using equations (1)-(4) and combining with (2.4), we find that this depends on e_j^k according to:

$$\frac{\partial}{\partial e_j^k}(\rho_j^{F,k} + \rho_j^{I,k} + \rho_A^{F,k} + \rho_A^{I,k}) = \underbrace{(1-\gamma_0)\left(\overline{\pi}_k + \frac{1-\sum_n \overline{\pi}_n}{K}\right)\eta'(e_j^k)}_{\text{revelation effect}} + \underbrace{\gamma_0 \frac{\partial \pi_k}{\partial e_j^k}}_{\text{salience effect}} . \quad (8)$$

The first term on the right hand side is the revelation effect of campaigns – campaigns on issue k directly increase the proportion of voters who observe party positions on this issue, aside from any effects on issue salience. The revelation effect is stronger when the prior salience of the issue, $\overline{\pi}_k$ is higher, since more voters are likely to witness a campaign on a more salient issue. The revelation effect diminishes as γ_0 approaches 1, since, with γ_0 close to 1, all voters will observe party positions on an issue they care about, regardless of whether they witness a campaign.

The second term on the right hand side is the salience effect of campaigns. As a party campaigns more on an issue, the salience increases. This directly increases the proportion of voters who observe party positions on the issue, since fraction γ_0 of voters observe party positions on the issue they care about, regardless of whether they witness a campaign.

2.5 Vote Choice

Voters gain utility from voting for parties whose positions are close to their ideal points. As noted above, each voter observes parties' positions on at most one issue. We assume that a voter who observes parties' positions on no issue has no basis for judging which party is closer to the voter's ideal point, and so votes for each party with probability $\frac{1}{J}$. A voter who observes one or more party positions on an issue k makes their vote choice based on this issue alone, since they cannot judge which party is closer to their ideal point on any other issue, and in any case they do not care as much about any other issue, as explained in Section 2.4.

Suppose that a voter i observes one or more party positions on issue k (only). Then voter i's utility from voting for party j is given by $U(|x_i^k - \theta_j^k|)$ where $U : \mathbf{R}_+ \to \mathbf{R}$ is a strictly decreasing function.

If a voter observes all parties' positions on an issue k, then the voter votes for the party whose position gives the voter the highest utility. Let $\psi_j^k \in [0, 1]$ denote the proportion of the voters who observe all parties' positions on issue k, who choose to vote for party j. Then, ψ_j^k is given by:

$$
\begin{aligned}
\psi_j^k &= \int_{\infty}^{-\infty} \mathbf{1}\{U(|x_i^k - \theta_j^k|) > \max_{m \neq j} U(|x_i^k - \theta_m^k|)\} f^k(x_i^k) \ \partial x_i^k \\
&\equiv \int_{\infty}^{-\infty} \mathbf{1}\{|x_i^k - \theta_j^k| < \max_{m \neq j} |x_i^k - \theta_m^k|\} f^k(x_i^k) \ \partial x_i^k
\end{aligned} \tag{9}
$$

where $\mathbf{1}\{\cdot\}$ denotes the indicator function.[7]

7. Since we assume that the cdf F is continuous, we can define ψ_j^k without considering the vote choice of voters whose ideal points are equidistant between two parties, since the measure of these voters is zero.

It remains to determine the behavior of voters who observe only one party's position on an issue. Our baseline assumption is that voters are ambiguity averse in the sense of (Gilboa and Schmeidler 1989) and cannot know parties' positions for certain unless they observe them in the campaign. As such, we assume that each voter chooses to support the party that maximizes her utility in the worst case scenario that is consistent with what she has observed. In particular, if a voter does not observe a party's position on the issue she cares about, then the voter 'fears the worst': that the party could be extremely distant from the voter in policy terms. Therefore, if a voter observes party j's position on an issue k, which she cares about, but not other parties' positions, then the voter will vote for party j, since party j's observed position is closer to her than some extremely distant position which she fears another party could hold. That is, a voter always chooses to vote for 'the devil they know' rather than for a party whose position is unknown on the issue that the voter considers important.[8]

In Appendix C, we also present results for the model with two parties when the assumption that voters are ambiguity averse is replaced with the alternative assumption that voters are expected utility maximizers. That is, they vote for the party that maximizes their expected utility, based on their posterior beliefs about party's positions, which are assumed to be Bayesian rational. The case of ambiguity averse voters is considerably more tractable than the case where voters are expected utility maximising. As such, we are only able to obtain numerical solutions in the latter case. Nevertheless, our numerical results presented in Appendix C indicate that equilibrium party emphasis decisions are identical across the two cases for the parameter values we consider, except when party positions are relatively extreme.

Recall that a strategy s_j is a function mapping the parties' positions to j's emphasis

8. Our ambiguity aversion assumption can be formalized by assuming voters hold a set of all possible priors over party positions in Θ and behave in a maximin manner consistent with (Gilboa and Schmeidler 1989). If a voter does not observe a party's position, they will therefore act according to the worst possible prior, which puts probability 1 on the party holding one of the most extreme positions in the set Θ. For the sake of brevity, we omit this formalization here.

on each issue. Let $V_j(\theta, s)$ denote the total vote share of party $j \in \{1, 2, ..., J\}$, given that parties hold positions given by θ and given the parties' strategies s. Focusing here on the case of ambiguity averse voters, our assumptions above imply that $V_j(\theta, s)$ is given by:

$$V_j(\theta, s) = \frac{\rho_0}{J} + \sum_{k=1}^{K} \rho_A^{kF} \psi_j^k + \rho_A^{kI} \psi_j^k + \rho_j^{kF} + \rho_j^{kI} \tag{10}$$

where $\rho_0, \rho_A^{F,k}, \rho_A^{I,k}, \rho_j^{F,k}$ and $\rho_j^{I,k}$ are given by equations (1)-(5) and ψ_j^k is given by equation (9), and where each party's issue emphases e_j^k are understood to depend on s and θ.

Valence Issues While we have set up the model to focus on positional issues, extending it to consider valence issues is straightforward. Suppose that issue k is the valence issue of leader competence. Then we may assume that each party j's leader competence is given by $\theta_j^k \in [\underline{\theta}, \overline{\theta}]$, and furthermore that all voters i have the ideal point $x_i^k = \overline{\theta}$ on issue k. That is, all voters agree that a higher level of leader competence is desirable for a party. Then, $\psi_j^k = 1$ for the party j with the highest leader competence, and the model otherwise goes through unchanged.

2.6 Equilibrium Party Strategies

Focusing on the case of ambiguity averse voters, we define an equilibrium in this model as a strategy profile $s \in S$ such that each party's strategy maximizes its vote share for each θ, given the strategies of the other parties. That is, $s \in S$ constitutes an equilibrium if for each $\theta \in \Theta$, and for each $j \in \{1, ..., J\}$, there is no $\tilde{s}_j \in S_j$ satisfying $V(\theta, s_1, ..., \tilde{s}_j, ..., s_J) > V(\theta, s_1, ..., s_j, ..., s_J)$.[9]

9. Given the vote share function (10) and policy position of each party, this corresponds to a subgame perfect Nash equilibrium in pure strategies between the parties – each party maximizes its vote share given the other parties' strategies for each θ chosen by nature. At the same time, the behavior of voters cannot be viewed as part of a subgame perfect Nash equilibrium, since voters are ambiguity averse and so are not acting to maximize expected utility.

We solve for party j's equilibrium strategy by fixing θ and solving for party j's vote maximising emphasis choices $\{e_j^1, ..., e_j^K\}$ given θ and given $\{e_m^1, ..., e_m^K\}_{m \neq k}$. To build intuition, we first heuristically derive an interior solution to party j's optimization problem, i.e. a solution in which each $e_j^k \in (0, 1)$.

The first order condition for party j's choice of e_j^k is:

$$\frac{\partial V_j}{\partial e_j^k} = \lambda_j$$

where $\lambda_j \geqslant 0$ is the Lagrange multiplier on the constraint $\sum_{k=1}^K e_j^n \leqslant 1$.

Substituting equations (1)-(5) into equation (10), and simplifying, we obtain that

$$V_j = \text{terms that don't depend on j's strategy} + \sum_{k=1}^{K} q_j^k \eta(e_j^k), \tag{11}$$

and so $\frac{\partial V_j}{\partial e_j^k} = \eta'(e_k^j) q_j^k$, where

$$q_j^k = q_{j,r}^k + q_{j,s}^k, \tag{12}$$

$$q_{j,r}^k = \left(\overline{\pi}_k + \frac{1 - \sum_{n=1}^K \overline{\pi}_n}{K} \right) \left[(1 - \gamma_0) \left(1 - \frac{1}{J} \right) - (\gamma_1 - \gamma_0)(1 - \psi_j^k) \right], \tag{13}$$

$$q_{j,s}^k = \gamma_0 \left(\frac{1 - \sum_{n=1}^K \overline{\pi}_n}{K} \right) \left(\psi_j^k - \frac{\sum_{n=1}^K \psi_j^n}{K} \right). \tag{14}$$

Therefore, we can write the first order condition as:

$$\eta'(e_k^j) q_j^k = \lambda_j \tag{15}$$

Since $\eta'(e_j^k) > 0$ for $e_j^k \in (0, 1)$, it follows that the first order condition can only be satisfied in the interior if $q_{j,r}^k + q_{j,s}^k > 0$ for each k. Then $\lambda_j > 0$ and so complementary slackness implies $\sum_{n=1}^K e_j^n = 1$. Adding up the first order conditions across different issues

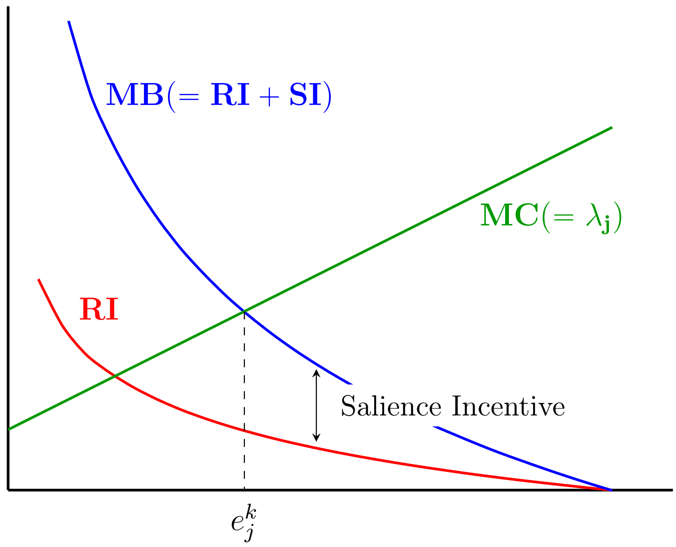
m implies that λ_j must satisfy:

$$\sum_{m \neq k: q_j^m > 0} \eta'^{-1}\left(\frac{\lambda_j}{q_j^m}\right) = 1 - e_j^k, \tag{16}$$

where $\eta'^{-1}(\cdot)$ denotes the inverse of $\eta'(\cdot)$. Given this characterization of λ_j, the optimal choice of e_j^k is uniquely pinned down by the first order condition, since $\eta''(\cdot) < 0$. The left hand side of the first order condition is the marginal benefit to the party of emphasizing issue k. λ_j is the marginal opportunity cost of emphasizing k – emphasizing k means the party has less time to devote to other issues. Implicitly differentiating equation (16) with respect to e_j^k reveals that λ_j is an increasing function of e_j^k.

The marginal benefit of emphasizing issue k is proportional to $q_{j,r}^k + q_{j,s}^k$. These terms correspond to the revelation and salience effects of campaigns discussed on page 15. The term $q_{j,r}^k \eta'(e_j^k)$ is the revelation incentive to emphasize issue k. This incentive is the key novel incentive in our model relative to much of the prior literature. The revelation incentive to emphasize an issue arises because emphasizing an issue increases the proportion of voters for whom the party's position is revealed. Since voters are ambiguity averse, they are more likely to vote for a party if they know its position, so emphasizing an issue tend to increase a party's vote share all else equal. When $\gamma_1 = \gamma_0$, this term is proportional to the revelation effect discussed on page 15. When $\gamma_1 > \gamma_0$, $q_{j,r}^k$ has the additional term $-(\gamma_1 - \gamma_0)(1 - \psi_j^k)$, which arises because j emphasizing an issue increases the likelihood of voters observing other parties' positions on the issue, which acts to reduce j's vote share. Our parameter restrictions on γ_0 and γ_1 on page 12 imply that $q_{j,r}^k > 0$ for all $\psi_j^k \in [0, 1]$. That is, regardless of a party's position on an issue, it has a positive revelation incentive to emphasize the issue. This is because it is always the case that some voters will support a party if they see its position, and no voters will support a party if they do not see its position, so parties always have some incentive to reveal their position to as many voters as possible.

Figure 1: Optimal choice of e_j^k

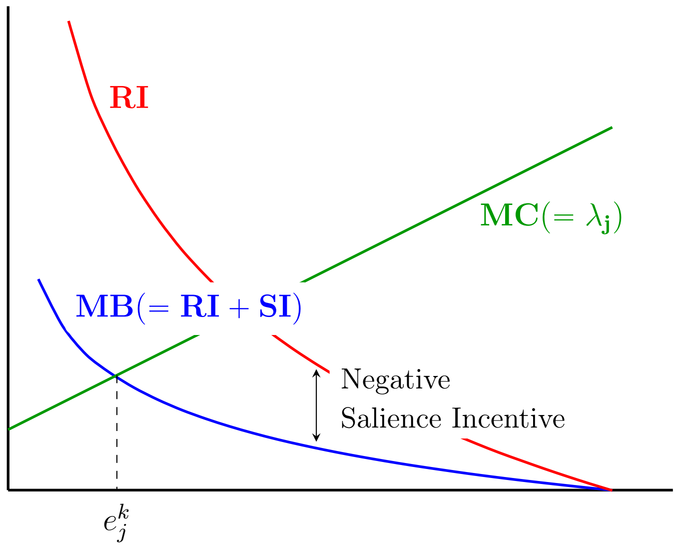


The term $q_{j,s}^k \eta'(e_j^k)$ is the salience incentive to emphasize issue k: emphasizing issue k increases the salience of that issue and decreases the salience of other issues. This term is proportional to the salience effect on page 15. It has the same sign as $\psi_j^k - \frac{\sum_{n=1}^K \psi_j^n}{K}$, which represents whether or not party j has a comparative advantage on issue k – i.e. whether it is relatively more popular on issue k. The salience incentive is positive (negative) if party j has a comparative advantage (disadvantage) on issue k, since party j's vote share is higher when the issues it is advantaged on become more salient. The salience incentive is also stronger, relative to the revelation incentive, when a higher fraction of voters are impressionable.

The optimal choice of the party is shown graphically in Figure 1. The MB curve shows the marginal benefit of emphasizing the issue, and the MC curve shows the marginal cost. The marginal benefit is composed of the revelation and salience incentives. The RI curve shows the revelation incentive. Optimal e_j^k is the intersection of the MB and MC curves. Figure 2 repeats the same diagram for the case where the salience incentive is negative.

Note that the definitions of $q_{j,r}^k$ and $q_{j,s}^k$ imply that these do not depend on other

Figure 2: Choice of e_j^k when salience incentive is negative



parties' decisions. Then, party j's first order condition has a unique solution regardless of other parties' decisions, and so each party j has a unique dominant strategy. It follows that there exists a unique equilibrium in the model. The following proposition, proven in the appendix, makes this argument formal and shows that a corner solution $e_j^k = 0$ arises if $q_{j,r}^k + q_{j,s}^k < 0$, since in that case that marginal benefit from emphasizing the issue is negative.

Proposition 1. *There exists a unique equilibrium of the model for all parameter values. In the equilibrium, party j's emphasis e_j^k on issue k, for given $\theta \in \Theta$, satisfies $e_j^k = 0$ if $q_{j,s}^k + q_{j,r}^k \leqslant 0$. If $q_{j,s}^k + q_{j,r}^k > 0$ then e_j^k is the unique solution to* (15) *and the characterization of $\lambda_j > 0$ in* (16).

2.7 Properties of the Equilibrium

Using Proposition 1, we now show that that the model has a number of novel implications for party emphasis strategies, which differ from the results of much of the formal literature.[10] First, we establish conditions under which the revelation incentive is sufficiently strong for all parties to emphasize all issues in equilibrium. Conversely, we show that when the revelation incentive is sufficiently weak, all parties will 'talk past each other' and exclusively emphasize different issues, in accordance with much of the previous formal literature. Next, we derive comparative statics for how the model equilibrium depends upon the values of the parameters. We show that all parties tend to emphasize an issue k more if the number of k-focused voters increases and the number of voters focused on the other issue decreases – in other words, if the initial relative salience of issue k is higher. Equally, we show a party tends to emphasize an issue relatively more when its position on the issue is relatively more popular. Finally, we show that, if the fraction of issue-k-focused voters is sufficiently close to one, for some k, then all parties may choose to primarily emphasize issue k in their campaigns regardless of how popular their positions are on the issue. Together, these properties of the model equilibrium can account for the findings on party strategy discussed on page 1: while parties do tend to campaign disproportionately on issues that favor them, they may often find themselves campaigning on the same issues, particularly when these issues are highly salient.

We now derive these formal properties of the equilibrium in turn. First, we to derive conditions under which the revelation incentive is sufficiently strong for all parties to emphasize all issues in equilibrium. From Proposition 1 it is immediate that this will be the case if and only if $q^k_{j,r} + q^k_{j,s} > 0$ for all $k = 1, ..., K$ and $j = 1, ..., J$. Furthermore, since $q^k_j > 0$ always, a sufficient condition for this is that $|q^k_{j,s}| < q^k_{j,r}$, that is, that the revelation incentive dominates the salience incentive. On the other hand, if $|q^k_{j,s}| > q^k_{j,r}$ for all k and j, then the salience incentive dominates, and parties will only place positive emphasis on issues on which they have a comparative advantage, since $q^k_{j,s} + q^j_r < 0$ for other issues.

10. That is, differ from the results of, for instance, **Ascencio2014**; Austen-Smith (1993), Simon (2002), Amorós and Puy (2013), Aragonês, Castanheira, and Giani (2015), Egorov (2015), and Dragu and Fan (2016).

Manipulation of equations (13)-(14) for $q^k_{j,r}$ and $q^k_{j,s}$ reveals that these two cases apply under the following conditions:

Proposition 2. *If* $(1-\gamma_0)\left(\frac{J-1}{J}\right) > \gamma_1$ *then* $e^k_j > 0$ *for all* $k = 1, ..., K$ *and* $j = 1, ..., J$ *in equilibrium. Conversely, if,*

$$\gamma_0 > \frac{1}{1+\left(\frac{J}{J-1}\right)\left(\frac{1-\sum_{n=1}^{k}\overline{\pi}_n}{K}\right)\min_k \min_j \left|\psi^k_j - \frac{\sum_{n=1}^{K}\psi^n_j}{K}\right|} \tag{17}$$

then $e^k_j > 0$ *in equilibrium if and only if* $\psi^k_j > \frac{\sum_{n=1}^{K}\psi^n_j}{K}$.

Proposition 2 establishes that, provided γ_0 and γ_1 are sufficiently small, all parties will choose to emphasize all issues to some degree in equilibrium. This is true even if, for instance, Party 1's position on issue 1 is more popular than Party 2's and Party 2's position on issue 2 is more popular than Party 1's. This contrasts with the results of most models in the literature, which do not predict that all parties emphasize all issues when they are advantaged on different issues. The reason that all parties emphasize all issues in our model when γ_0 and γ_1 are sufficiently low is that low values of γ_0 and γ_1 imply that a party's campaign is very informative about its own position and not so informative about its opponents' positions. This implies a strong revelation incentive as emphasizing an issue increases a party's vote share a lot by revealing the party's position to voters. Since the revelation incentive for a party to emphasize an issue is positive regardless of the party's position on the issue, this provides an incentive for all parties to emphasize all issues. Furthermore, since the η function is strictly concave and $\eta'(1) = 0$, emphasizing an issue beyond a certain point hardly increases the fraction of voters that observe a party's position on an issue, and so the marginal gain to a party from emphasizing an issue a very large amount is relatively smaller. The consequence of this is that, for low γ_0 and γ_1, the powerful revelation incentive ensures that parties will tend to prefer to emphasize all issues to some degree, rather than just exclusively emphasizing one issue.

On the other hand, Proposition 2 also shows that, when γ_0 is sufficiently high, party j chooses $e_j^k = 1$ if and only if $\psi_j^k > \frac{\sum_{n=1}^{K} \psi_j^n}{K}$. Intuitively, if γ_0 is high, the revelation incentive is weak because voters generally know parties' positions on issues regardless of whether or not they witness campaigns. In that case, the salience incentive is dominant. Similar to results of the prior literature, the salience incentive encourages parties to focus on the issues on which they are advantaged and to ignore other issues. In that case, parties will tend to 'talk past each other' – they talk about different issues, as each party focuses on the issues on which it is relatively more popular.

We now show how parties emphasis strategies change in the model when the model parameter values and party positions change. Based on the representation of the choice of e_j^k in Figure 1, it follows that e_j^k will increase if the MB curve rises (which occurs if $q_{j,s}^k + q_{j,r}^k$ rises) or if the MC curve falls, i.e. λ_j falls. Applying the implicit function theorem to (16) reveals that λ_j falls if $q_{r,m}^k + q_{s,m}^k$ falls for some other issue $m \neq k$. As such, the comparative static results for the choice of e_j^k can be straightforwardly derived by differenciating $q_{j,r}^k$ and $q_{j,s}^k$ with respect to the parameters. They are as follows:

Proposition 3. *Let $e_j^{\star k}(\{\overline{\pi}_n\}_{n=1}^K, \{\psi_j^n\}_{j=1,n=1}^{J,K}, \gamma_0, \gamma_1)$ denote the equilibrium emphasis e_j^k for some $k \in \{1, ..., K\}$ and $j \in \{1, .., J\}$ for given values of $\{\overline{\pi}_n\}_{n=1}^K, \{\psi_j^n\}_{j=1,n=1}^{J,K}, \gamma_0,$ and γ_1. Suppose that $e_j^k > 0$ and let $m \neq k$ denote some other issue in $\{1, ..., K\}$. Then, e_j^k satisfies the following comparative statics:*

$$\frac{\partial e_j^{\star k}}{\partial \psi_j^k} > 0 \tag{18}$$

$$\frac{\partial e_j^{\star k}}{\partial \psi_j^m} < 0 \tag{19}$$

$$\frac{\partial e_j^{\star k}}{\partial \overline{\pi}_k} - \frac{\partial e_j^k}{\partial \overline{\pi}_m} > 0 \tag{20}$$

The three comparative statics contained in Proposition 3 are intuitive. The first result (18) arises because, when ψ_j^k is higher, party j's position on issue k is relatively more popular. This encourages party j to increase its emphasis on issue k for two reasons: first, in order to reveal its more popular position to voters, and second, to increase the proportion of impressionable voters who care about issue k. The second result (19) states that when a party's position on some issue $m \neq k$ is more popular, emphasis on k decreases, since it becomes relatively more valuable to emphasize m. Finally, (20) states that when the pre-campaign salience of issue k is higher and the pre-campaign salience of some other issue m is correspondingly lower —parties emphasize issue k more. This is because when voters primarily care about issue k, parties can gain more votes by revealing their positions on issue k than on the other issue. Consequently, parties increase their emphasis on issue k.

Finally, we show that if the initial salience of an issue k is sufficiently high, then the revelation incentive to emphasize this issue is large. In that case, all parties will choose to primarily campaign on this issue regardless of the positions they hold on the issue. Thus, the equilibrium may involve all parties talking mainly about the same issue if it is highly salient, even if some parties have very unpopular positions on the issue.

Proposition 4. *Fix γ_0, γ_1. For any $z \in (0,1)$, there exists a $\pi^\star(\gamma_0, \gamma_1) \in (0,1)$ such that, for any $k \in \{1, ..., K\}$, if $\overline{\pi}_k > \pi^\star(\gamma_0, \gamma_1)$ then in equilibrium all parties $j \in \{1, ..., J\}$ will choose $e_j^k > z$ for all $\theta \in \Theta$.*

Propositions 2–4 demonstrate some of the qualitative properties of the equilibrium. Appendix C provides additional numerical results for the case when voters maximize expected utility, instead of being ambiguity averse.

3 Campaigns with Imprecise Messaging

Thus far, we have assumed that voters are ambiguity averse and so less likely to support a party if they do not know its position on the issue most important to them.[11] If this accurately characterizes voter behavior, one might also expect parties, when emphasizing an issue, to be extremely precise in their campaign messages, communicating very specific policy proposals in order to minimize voter uncertainty about their positions. However, this is clearly at odds with many real-world campaigns as well as much research on party position-taking, as parties are known to frequently use imprecise language or to tailor their messaging to different audiences – even on issues central to their campaigns. Indeed, many studies have demonstrated that this approach may even be electorally beneficial for parties (Tomz and Houweling 2009; Rovny 2012; Somer-Topcu 2015).[12]

To consider such issues, we extend our model to incorporate the possibility that parties may be able to send more or less precise messages in their campaigns. We examine whether and when they might choose to send imprecise messages, and how this possibility affects their emphasis strategies in a context with ambiguity averse voters and endogenous issue salience. We find that our key qualitative results for party emphasis strategy from our baseline model remain unchanged in this imprecise campaigns model. For reasons of space, we only sketch the imprecise campaigns model here and outline its implications. The full details of the imprecise campaigns model and results are given in Appendix B.

In the imprecise campaigns model, we allow parties to have two dimensions of choice on each issue: party j can choose its emphasis on each issue, given by $\{e_j^k\}_{k=1}^K$, and can also choose the precision of its messaging on each issue, which we denote by $\{P_j^k\}_{k=1}^K$, where $P_j^k \in [0, 1]$ for each j and k. If $P_j^k = 1$, the party communicates a very precise position on issue k, whereas if $P_j^k = 0$, the party is maximally vague about its position

11. In Appendix C, we instead assume that voters maximize expected utility and are risk averse.

12. Much of this literature refers to this phenomenon as parties taking ‘ambiguous positions’. We instead use the term “imprecise messaging” to refer to this behavior, to avoid confusion with the theoretically distinct concept of ambiguity aversion, which is assumed throughout in the model.

on issue k. Precision and emphasis are distinct choices – a high value of e_j^k could coincide with a high or low value of P_j^k. For instance, a party may campaign very actively on an issue while remaining very vague about its position on that issue (high e_j^k, low P_j^k). Likewise, it is possible for a party to make almost no reference to an issue on its campaign, despite stating a precise position on the issue in its manifesto (low e_j^k, high P_j^k).

In the imprecise campaigns model, we assume that the choice of P_j^k involves a trade-off. First, if parties' campaign messages are less precise, this increases the likelihood that voters will remain completely uncertain about the party's position on the issue important to them, which is electorally costly as voters are ambiguity averse. As such, there is also a revelation incentive for parties to communicate precise positions on issues that they campaign on: imprecise messages are less likely to reveal a party's issue position to voters. However, as is well-documented, there are also electoral benefits associated with imprecision: by communicating imprecisely, parties can mislead voters about their true position; they are also able to communicate slightly different positions to different voters. Consistent with empirical evidence that voters often optimistically perceive 'broadly appealing' parties as ideologically proximate to themselves (Tomz and Houweling 2009; Somer-Topcu 2015), we suggest that sending imprecise messages may allow parties to attract and retain ideologically distinct voters who misperceive the party's policy stances. This enables the party to appeal to voters who would be repelled if they were made aware of the party's true position. We call this the 'projection incentive': by sending imprecise campaign messages, a party can project different positions to voters from the position it actually holds.

In Appendix B, we show that the trade-off between the revelation incentive and projection incentive leads parties to choose $P_j^k \in (0, 1)$ on any issue on which they choose $e_j^k > 0$, provided that the distribution F of voter preferences has full support. Moreover, we show that all our results for equilibrium party emphasis strategies from Propositions

1-4 from our baseline model continue to hold in the imprecise campaigns model provided γ_0 and γ_1 are not too high. As such, the main qualitative results for party emphasis strategy from our main model are robust to allowing parties to be imprecise in their messaging.

4 Conclusion

The existing literature has established five general patterns of party emphasis strategy: parties discuss multiple issues during election campaigns; parties disproportionately emphasize issues on which they are 'advantaged'; parties also discuss issues on which they are disadvantaged; parties frequently campaign on the same issues as each other, especially when these issues are salient.

To account for these patterns, we present a formal model which allows for multiple parties and multiple issues. The assumptions we make about voters' information structure (that each voter only sees party positions on at most one issue) produce an extremely tractable framework in which we can consider multiple competing incentives, and still analytically solve for parties' equilibrium behavior.

Our formal model accounts for the empirical patterns above by assuming that parties face a trade-off between a salience incentive to increase the salience of issues on which they are advantaged, and a revelation incentive to inform voters of their positions on salient issues. The consequence of this trade-off is that, while parties do emphasize advantaged issues more, all else equal, parties also emphasize salient issues relatively more. If an issue is salient enough, then all parties will campaign on this issue regardless of who is advantaged on the issue. Our findings are robust to the possibility that parties may be able to communicate imprecisely about their position on issues where their true position is unpopular, and contrast with much of the formal theoretic literature, which finds that parties should never campaign on issues unfavorable to them. The 'revelation incentive' in our model therefore provides an explanation hitherto missing from the formal literature for why parties often emphasize unfavorable issues, and also why multiple parties often campaign on the same issues when these issues are particularly salient to voters.

Our model also speaks to the question of how and when elections can force parties to respond to voters' priorities in their campaigns, versus when parties are able to shape the electoral agenda in their favor instead. This paper suggests that conditions that strengthen the revelation incentive vis-á-vis the salience incentive are key to voters' ability to use elections to hold politicians' accountable on issues important to them. This primarily rests on whether voter priorities are hard for parties to alter in the space of a campaign, and the degree to which campaigns can inform voters about parties' positions.

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A Proofs of Propositions

For convenience, in the results below, we define $\tilde{\pi}_k$ as: $\tilde{\pi}_k := \overline{\pi}_k + \frac{1-\sum_{m=1}^{K}\overline{\pi}_m}{K}$.

For the proofs, we rely heavily on the following three lemmas, which we state and prove first.

Lemma 1. *For all parameter values, $\tilde{\pi}_k$, $q^k_{j,r}$, $q^k_{j,s}$ and q^k_j satisfy:*

$$0 < \tilde{\pi}_k < 1, \tag{A.1}$$

$$\tilde{\pi}_k \left[1-\gamma_0\right] \frac{J-1}{J} \geqslant q^k_{j,r} \geqslant \tilde{\pi}_k \left[1-\gamma_1 - \frac{1-\gamma_0}{J}\right] > 0, \tag{A.2}$$

$$\tilde{\pi}_k(1-\overline{\pi}_K)\gamma_0 > |q^k_{j,s}| > \tilde{\pi}_k\gamma_0 \left(\tilde{\pi}_k - \overline{\pi}_k\right) \min_k \min_j \left|\psi^k_j - \frac{\sum_{n=1}^{K}\psi^n_j}{K}\right|, \tag{A.3}$$

$$\tilde{\pi}_k \left[\frac{1-\frac{1-\gamma_0}{J}+\gamma_1}{\gamma_0}\right] > q^k_j > \tilde{\pi}_k \left[1-\gamma_1 - \frac{1-\gamma_0}{J} - (1-\overline{\pi}_k)\gamma_0\right]. \tag{A.4}$$

Proof. For (A.1) note that $\tilde{\pi}_k > \overline{\pi}_k > 0$ and $\tilde{\pi}_k = \overline{\pi}_k + \left(\frac{1-\sum_{n=1}^{K}\overline{\pi}_n}{K}\right) < \overline{\pi}_K + 1 - \sum_{n=1}^{K}\overline{\pi}_n < 1$.

For (A.2), note that $1 \geqslant \psi^k_j \geqslant 0$ and $1 \geqslant \gamma_1 \geqslant \gamma_0 \geqslant 0$, so that $\gamma_1 - \gamma_0 \geqslant (\gamma_1-\gamma_0)\psi^k_j \geqslant 0$ and substituting the latter inequality to eliminate the $(\gamma_1-\gamma_0)\psi^k_j$ term in (13).

For (A.3), note first that

$$\frac{1}{K\tilde{\pi}_k}\left(1-\sum_{n=1}^{K}\overline{\pi}_n\right) = \frac{\overline{\pi}_k - \tilde{\pi}_k}{\tilde{\pi}_k} < 1 - \overline{\pi}_k \tag{A.5}$$

where the equality above follows from the definition of $\tilde{\pi}_k$ and the strict inequality follows since $\tilde{\pi}_k < 1$. Substituting (A.5) into (14) and using that each $\psi^k_j \in (0,1)$, we obtain that $\tilde{\pi}_k(1-\overline{\pi}_K)\gamma_0 > |q^k_{j,s}|$. For the rest of (A.3), note that it is immediate from (14) and the definition of $\tilde{\pi}_k$ that:

$$|q^k_{j,s}| = \gamma_0(\tilde{\pi}_k - \overline{\pi}_k)\left|\psi^k_j - \frac{\sum_{n=1}^{K}\psi^n_j}{K}\right| \geqslant \gamma_0(\tilde{\pi}_k - \overline{\pi}_k)\min_j \min_k \left|\psi^k_j - \frac{\sum_{n=1}^{K}\psi^n_j}{K}\right|$$

Then, the rest of (A.3) follows since $\tilde{\pi}_k < 1$.

(A.4) follows from the fact that $q_j^k = q_{j,r}^k + q_{j,s}^k$ and so $q_{j,r}^k + |q_{j,s}^k| \geqslant q_j^k \geqslant q_{j,r}^k - |q_{j,s}^k|$ and then substituting in (A.2) and (A.3) and using that $(1-\overline{\pi}_k)\gamma_0 < \gamma_0 + \gamma_1$ and $\gamma_0 < 1$. $\square$

Lemma 2. *q_j^k and q_j^m for any $m \neq n \neq k$ satisfy the following comparative statics as ψ_j^k, $\overline{\pi}_k$ and $\overline{\pi}_n$ vary:* $\frac{\partial q_j^k}{\partial \psi_j^k} > 0$, $\frac{\partial q_j^m}{\partial \psi_j^k} < 0$,, $\frac{\partial q_j^k}{\partial \overline{\pi}_k} - \frac{\partial q_j^k}{\partial \overline{\pi}_n} \geqslant 0$, *and* $\frac{\partial q_j^m}{\partial \overline{\pi}_k} - \frac{\partial q_j^m}{\partial \overline{\pi}_n} = 0$.

Proof. These comparative statics follow immediately from differentiating equations (12), (13) and (14) and using $\gamma_1 \leqslant \gamma_0 \leqslant 0$, $\sum_{n=1}^{K} \overline{\pi}_n < 1$, $\tilde{\pi}_k \in (0,1)$ and $q_{j,r}^k > 0$ – where the latter two were shown in Lemma 1 $\square$

Lemma 3. *An optimal strategy for party j must involve $e_j^k > 0$ if $q_j^k > 0$ and $e_j^k = 0$ otherwise.*

Proof. To show this, note first from equations (13) and (14) and Lemma (1) that $q_{j,r}^k > 0$ and $q_{j,s}^k > 0$ if $\psi_j^k > \frac{\sum_{n=1}^{K} \psi_j^n}{K}$. Since this must be true for at least one issue, it follows that $q_j^k > 0$ for at least one issue.

Second, since η is an increasing function, it follows from equation (11) that V_j is weakly decreasing in e_j^k if $q_j^k \leqslant 0$ and is strictly increasing in e_j^k if $q_j^k > 0$.

Then, it follows that, if $q_j^k \leqslant 0$ then there exists some $m \neq k$ such that $q_j^m > 0$, in which case V_j is decreasing in e_j^k and strictly increasing in e_j^m. Consequently, if $e_j^k > 0$ then a party's vote share can always be increased by reducing e_j^k and increasing e_j^m. Therefore it follows that the optimal choice of e_j^k must be zero if $q_j^k \leqslant 0$.

Finally, if $q_j^m > 0$ it must be that $e_j^k > 0$. This is because $\lim_{x \to 0} \eta'(x) = \infty$, and $\eta'(x) < \infty$ for $x > 0$. Therefore, if $e_j^k = 0$ then equation (11) implies that vote share can be increased by a small increase in e_j^k, reducing by a small amount, if necessary, the emphasis on some other issue m for which $e_j^m > 0$ to ensure that $\sum_n e_j^n \leqslant 1$ holds. Then, an optimal strategy must involve $e_j^k > 0$ in that case. $\square$

A.1 Proof of Proposition 1

To show this, we show that, for all parameter values, each party has a unique optimal strategy given by the conditions of Proposition 1. Then, since these conditions do not directly involve other parties' strategies, this implies that each party has a unique dominant strategy, and so existence and uniqueness of equilibrium follows immediately.

First we show that each party j has an optimal strategy. To show this, note that the vote share function is continuous and the choice set $\{e_j^k\}_1^K \in [0,1]^K$ is compact, so existence of an optimal strategy follows from the Weierstrass theorem.

It remains to show that each party's optimal strategy is unique and satisfies the conditions of Proposition 1. Note that Lemma 3 implies that this optimal strategy must involve $e_j^k > 0$ when $q_j^k > 0$ and $e_j^k = 0$ otherwise.

This implies that we can simplify Party j's optimization problem. Define the set $\mathcal{I} := \left\{ k \in \{1, ..., K\} : q_j^k > 0 \right\}$. Then, Party j's problem is equivalent to choosing $e_j^k > 0$ for all $k \in \mathcal{I}$ to maximize V_j subject to the constraints that $\sum_{k \in \mathcal{I}} e_j^k \leqslant 1$, and that $e_j^m = 0$ for all $m \notin \mathcal{I}$.

Since V_j is continuously differentiable with respect to each $e_j^k \in \mathcal{I}$ given $e_j^k > 0$, and since the constraints are all linear, it follows that a necessary solution to this optimization problem must satisfy the Kuhn-Tucker conditions. Furthermore, equation (11) implies that V_j is strictly concave in $\{e_j^k\}_{k \in \mathcal{I}}$ and so there will be at most one solution Kuhn-Tucker conditions, which is also sufficient for an optimum. Finally, since we showed above that a solution to the optimization problem exists, it follows that there must be exactly one solution to the Kuhn-Tucker conditions, and this uniquely characterizes the optimal strategy.

To find the Kuhn-Tucker conditions, form the Lagrangian $\mathcal{L} = V_j + \lambda_j (1 - \sum_k e_j^k)$. Taking the first order conditions and rearranging gives equations (15) and (16). Since $q_j^k \eta'(e_j^k) > 0$, (15) implies $\lambda_j > 0$.

A.2 Proof of Proposition 2

First, note that Lemma 1 implies that, for each j and k, $q_j^k > \tilde{\pi}_k \left[1 - \gamma_1 - \frac{1-\gamma_0}{J} - \gamma_0\right]$, since $\overline{\pi}_k > 0$. Then, since $\tilde{\pi}_k > 0$, it follows that $q_j^k > 0$ for all k if $1 - \gamma_1 - \frac{1-\gamma_0}{J} - \gamma_0 > 0$. Rearranging this, it follows that, if $(1-\gamma_0)\frac{J-1}{J} > \gamma_1$, then $q_j^k > 0$ for all k and j, in which case Proposition 1 implies that $e_j^k > 0$ for all k and j.

It remains to show that parties only emphasize issues k for which $\psi_j^k > \frac{\sum_{n=1}^K \psi_j^n}{K}$ if (17) holds. For this, first we note that, if (17) holds, then $q_{j,r}^k - |q_{j,s}^k| < 0$ for all j and k. To show this, subtract (A.3) from (A.2) to obtain

$$q_{j,r}^k - |q_{j,s}^k| < \tilde{\pi}_k \left[1 - \gamma_0\right] \frac{J-1}{J} - \left(\tilde{\pi}_k \gamma_0 \left(\tilde{\pi}_k - \overline{\pi}_k\right) \min_k \min_j \left|\psi_j^k - \frac{\sum_{n=1}^K \psi_j^n}{K}\right|\right)$$

Rearranging this, we obtain that equation (17) implies that $\left(q_{j,r}^k - |q_{j,s}^k| < 0\right)$.

Now, note that, if $\psi_j^k \leqslant \frac{\sum_{n=1}^K \psi_j^n}{K}$ then $q_{j,s}^k \leqslant 0$ according to (14) and so $q_j^k = q_{j,r}^k - |q_{j,s}^k|$. Then, since (17) implies that $q_{j,r}^k - |q_{j,s}^k| < 0$, it follows that, in that case, $q_j^k < 0$ for all k for which $\psi_j^k \leqslant \frac{\sum_{n=1}^K \psi_j^n}{K}$. Proposition 1 then shows that parties put no emphasis on these issues in equilibrium.

A.3 Proof of Proposition 3

We claim, and will show below, that the λ_j^k that solves (16), given $e_j^k > 0$, is increasing in e_j^k and also increasing in each q_j^m, for $m \neq k$.

Suppose that this claim holds. Next, we show that a change in parameters or party positions that leads to a small (possibly zero) increase in q_j^k and a small (possibly zero) decrease in each q_j^m for $m \neq k$ leads to a small (possibly zero) increase in the optimal choice of e_j^k. To show this, note that it must hold if $e_j^k = 0$, since e_j^k cannot decrease in that case. If $e_j^k > 0$ (and therefore $q_j^k > 0$) then the first order condition is $q_j^k \eta'(e_j^k) - \lambda_j = 0$, and the left hand side of this is decreasing in e_j^k, since $\eta''(\cdot) < 0$ and λ_j is increasing in e_j^k.

Then, a small increase in q_j^k and a small decrease in q_j^m for each $m \neq k$ leads, for given e_j^k, to a decrease in λ_j and an increase $q_j^k \eta'(e_j^k) - \lambda_j$. Then, for the first order condition to continue to hold, e_j^k must increase.

Then, the results of the proposition all follow directly from Lemma 2. For instance, Lemma 2 shows that $\frac{\partial q_j^k}{\partial \psi_j^k} > 0$ and $\frac{\partial q_j^m}{\partial \psi_j^k} < 0$ for $m \neq k$. Then, a small increase in ψ_j^k leads to a small increase in q_j^k and a small decrease in q_j^m for $m \neq k$. By the argument above, this increases e_j^k.

It remains to prove the claim above that the λ_j that solves (16), given $e_j^k > 0$, is increasing in e_j^k and also increasing in each q_j^m, for $m \neq k$. Note that since $\eta'(\cdot)$ is strictly decreasing, it follows that $\eta'^{-1}(\cdot)$ is strictly decreasing. Furthermore, $\eta'^{-1}(x) \geqslant 0$ for $x \geqslant 0$, since $\eta' \geqslant 0$. Implicitly differentiating (16) and rearranging then reveals that λ_j is increasing in e_j^k and increasing in q_j^m if $q_j^m > 0$ and $m \neq k$. Finally, suppose that $q_j^m = 0$. Then, a small increase in q_j^m can only increase the left hand side of (16), since $\eta'^{-1}(x) \geqslant 0$. Since η'^{-1} is decreasing, such an increase in q_j^m then necessitates an increase in λ_j for (16) to continue to hold.

A.4 Proof of Proposition 4

The proof is constructive. We choose z, γ_0 and γ_1 and find the corresponding $\pi^\star(\gamma_0, \gamma_1)$.

Suppose, first, that, for each $m \neq k$, $q_j^m = \alpha q_j^k > 0$, where $\alpha = \frac{\eta'(z)}{\eta'\left(\frac{1-z}{K-1}\right)} > 0$, where the inequality follows from the fact that $\eta'(x) > 0$ for all $x \in (0,1)$.

We show that, in this case, the optimal strategy would set $e_j^k = z$. To show this, note that (16) implies that $(K-1)\eta'^{-1}\left(\frac{\lambda_j}{\alpha q_j^k}\right) = 1 - e_j^k$. Rearranging this and substituting in to (15) we obtain $q_j^k \eta'(e^k) = \alpha q_j^k \eta'\left(\frac{1-e_j^k}{K-1}\right)$. Comparing this with the expression above, we see that the solution is $e_j^k = 0$.

Now, during the proof of Proposition 3, it was shown that a decrease in q_j^m, for $m \neq k$, all else equal, increases the optimal choice e_j^k. Then, it follows that if, for all $m \neq k$,

$q_j^m \leqslant \alpha q_j^k$, then $e_j^k \geqslant z$.

Then, to complete the proof, we show that for any $\alpha > 0$, there exists $\pi^\star(\gamma_0, \gamma_1) \in (0,1)$ such that, if $\overline{\pi}_k \geqslant \pi^\star(\gamma_0, \gamma_1)$, then $q_j^k > 0$ and $\frac{\max_{m \neq k} q_j^m}{q_j^k} < \alpha$.

Now, (A.1) and (A.4) imply that $q_j^k > 0$ as long as:

$$1 - \frac{(1-\overline{\pi}_k)\gamma_0}{1 - \gamma_1 - \frac{1-\gamma_0}{J}} > 0, \tag{A.6}$$

where we use that our assumptions on γ_0, γ_1 imply that $1 - \gamma_1 - \frac{1-\gamma_0}{J} > 0$.

Furthermore, (A.4) implies that

$$\frac{\max_{m \neq k} q_j^m}{q_j^k} < \frac{(1-\tilde{\pi}^k)\left[1 - \frac{1-\gamma_0}{J} + \gamma_1\right]}{\gamma_0 \tilde{\pi}_k \left[1 - \gamma_1 - \frac{1-\gamma_0}{J} - (1-\overline{\pi}_k)\gamma_0\right]}$$

which rearranges to:

$$\frac{\max_{m \neq k} q_j^m}{q_j^k} < \left(\frac{1-\tilde{\pi}_k}{\tilde{\pi}_k}\right)\left(\frac{(1-\gamma_0)\frac{J-1}{J} + \gamma_0 + \gamma_1}{\gamma_0(1-\gamma_1-\frac{1-\gamma_0}{J})}\right)\left(\frac{1}{1 - \frac{(1-\overline{\pi}_k)\gamma_0}{1-\gamma_1-\frac{1-\gamma_0}{J}}}\right). \tag{A.7}$$

Now, we set $\overline{\pi}_k$ so that the following conditions hold:

$$\begin{aligned} 1 - \frac{(1-\overline{\pi}_k)\gamma_0}{1-\gamma_1-\frac{1-\gamma_0}{J}} &> \frac{1}{2}, \\ \left(\frac{1-\tilde{\pi}_k}{\tilde{\pi}_k}\right)\left(\frac{(1-\gamma_0)\frac{J-1}{J} + \gamma_0 + \gamma_1}{\gamma_0(1-\gamma_1-\frac{1-\gamma_0}{J})}\right) &< \frac{\alpha}{2} \end{aligned}$$

Then, (A.6) and (A.7) imply that, as long as these two conditions hold, we have that $q_j^k > 0$ and $\frac{\max_{m \neq k} q_j^m}{q_j^k} < \alpha$, as desired.

Rearranging the two conditions, and using that $\tilde{\pi}_k > \overline{\pi}_k$ by definition, we obtain that the two conditions hold if:

$$\overline{\pi}_k > \max\left\{1 - \frac{1}{2\gamma_0}\left(1 - \gamma_1 - \frac{1-\gamma_0}{J}\right); \frac{1}{1 + \frac{\alpha\gamma_0}{2}\left(\frac{1-\gamma_1-\frac{1-\gamma_0}{J}}{(1-\gamma_0)\frac{J-1}{J}+\gamma_0+\gamma_1}\right)}\right\} = \pi^\star(\gamma_0, \gamma_1) \in (0, 1).$$

B Campaigns with Imprecise Messages

As before, we assume that party positions are exogenous and given by $\theta \in \Theta \equiv (\underline{\theta}, \overline{\theta})^{JK}$, and that these positions represent the policies that parties would implement if elected. However, we now allow for the possibility that parties can send imprecise campaign messages in order to mislead voters about their true positions. Each party j now gets to make a choice of $\{e_j^k\}_{k=1}^K$ and also a choice of $\{P_j^k\}_{k=1}^K$. For each k, parties are free to choose any $P_j^k \in [0, 1]$.[13]

Voter ideal points are given according to the distribution F, as in the baseline model. For the model with imprecise campaign messages, we also assume that $f(x) > 0$ for all $x \in (\underline{\theta}, \overline{\theta})^{JK}$.

In this extension, the assumptions about voter information differ from the baseline model in two ways. First, we assume that, even if a voter witnesses a party's campaign, she may not comprehend it if the party's messages are too imprecise. Specifically, if a voter witnesses a campaign on an issue, she comprehends the party's campaign messages with probability $C(P_j^k)$, where $C : [0, 1] \to [\underline{C}, \overline{C}] \subset (0, 1)$ is a twice continuously differentiable function satisfying $C'(1) = 0$, $C'(P_j^k) > 0$ and $C''(P_j^k) < 0$ for all $P_j^k \in [0, 1)$. If a voter does not comprehend a campaign, it is as if she did not witness the campaign in which case, as before, we assume that the voter observes a position for all parties with probability γ_0 and a position for no party with probability $1 - \gamma_0$. If a voter does comprehend a campaign, then, also as before, she observes a position for that party with

13. Parties do not face a budget constraint when choosing $\{P_j^k\}_{k=1}^K$. (that is, there is no constraint along the lines of $\sum_k P_j^k = 1$), as it is assumed that precise messages are no more costly in resources or time to send than imprecise messages.

probability 1 and a position for the other parties with probability γ_1.

The second way the assumptions about voter information differ from the baseline model is that, even if a voter observes a position for a party, she might unknowingly observe the wrong position for that party. In particular, we assume that if a voter witnesses and comprehends party j's campaign, then, as mentioned above, she observes a position for party j with probability 1. However, we now assume that the position she observes is party j's true position on issue k with probability $1 - \mathcal{M}(P_j^k)$, and a misleading 'projected' position given by $\Omega(\theta_j^k, x_j^k)$ with probability $\mathcal{M}(P_j^k)$, where x_j^k is the voter's position, and Ω and $\mathcal{M}$ are functions which we now define – Ω determines the (misleading) projected position that a voter might see, and $\mathcal{M}$ determines the probability that the voter might see a projected position.

We assume that $\mathcal{M} : [0,1] \to [\underline{\mathcal{M}}, \overline{\mathcal{M}}] \subset (0,1)$ is a twice continuously differentiable function satisfying $\mathcal{M}'(0) = 0$, and $\mathcal{M}'(P_j^k) < 0$, $\mathcal{M}''(P_j^k) < 0$, for $P_j^k \in (0,1]$. This captures the idea that, the more imprecise the party's campaign messages, the more likely voters are to see a projected position rather than the party's true position. Voters do not know whether they have observed the party's true position or a projected position.

We assume that $\Omega : (\underline{\theta}, \overline{\theta})^2 \to (\underline{\theta}, \overline{\theta})$ is a continuously differentiable function that satisfies the following properties for each $x \in (\underline{\theta}, \overline{\theta})$: $\Omega(x,x) = x$; $\lim_{y \to \underline{\theta}} \Omega(y,x) = \underline{\theta}$; $\lim_{y \to \overline{\theta}} \Omega(y,x) = \overline{\theta}$, $\frac{\partial}{\partial y}\Omega(y,x) > 0$, and $\frac{\partial}{\partial x}\Omega(y,x) \in (0,1)$. It is straightforward to show that these assumptions imply that $\Omega(\theta_j^k, x_j^k)$ will always be between θ_j^k and x_j^k. Thus, a party is able to project a position somewhere in between its true position and the voter's position.

If a voter does not witness or does not comprehend party j's campaign (either because she witnessed and comprehended a different party's campaign or she witnessed or comprehended no campaign), but the voter does observe a position for party j, we assume that, with probability $1 - \underline{\mathcal{M}}$, the position she observes is party j's true position, and, with probability, $\underline{\mathcal{M}}$ the position she observes is the projected position $\Omega(\theta_j^k, x_j^k)$.

In the case of the imprecise messages model, we restrict attention to the case where $(1-\gamma_0)\left(\frac{J-1}{J}\right) > \gamma_1$ and $\gamma_0\overline{C} < \underline{C}$. Almost all results hold without these conditions, but they simplify the proofs.

Apart from these differences, all other assumptions are unchanged from the baseline model. That is, voters are ambiguity averse, and parties choose their levels of issue emphasis and message precision in order to maximize their vote share.

B.1 Vote Choice

Voter decisions in this imprecise messages model are the same as in the baseline model, except that voters may see parties' projected positions rather than their true positions. A voter who sees a position $\hat{\theta}_j^k$ by a party j will consider the possibility that this is the party's projected rather than true position, and will therefore consider what the party j's true position must be, if j's projected position is $\hat{\theta}_j^k$. Therefore, define $\hat{\Omega}(\hat{\theta}_j^k, x_i^k)$ as the true position on issue k that party j must have if the projected position seen by voter i is $\hat{\theta}_j^k$. That is, if, for some (θ_j^k, x_i^k), $\Omega(\theta_j^k, x_i^k) = \hat{\theta}_j^k$, then $\hat{\Omega}(\hat{\theta}_j^k, x_i^k) = \theta_j^k$. Our assumptions on the function Ω in the previous section imply that $\hat{\Omega} : (\underline{\theta}, \overline{\theta})^2 \to (\underline{\theta}, \overline{\theta})$ is a continuously differentiable function, and that $|\hat{\Omega}(y, x) - x| > |y - x|$.[14] .

If a voter i sees the party position $\hat{\theta}_j^k$, then the voter does not know if the true position is $\hat{\theta}_j^k$ or $\hat{\Omega}(\hat{\theta}_j^k, x_i^k)$. Since voters are ambiguity averse and $|\hat{\Omega}(\hat{\theta}_j^k, x_i^k) - x_i^k| > |\hat{\theta}_j^k - x_i^k|$, the voter who sees $\hat{\theta}_j^k$ will always act on the assumption that the Party's true position is $\hat{\Omega}(\hat{\theta}_j^k, x_i^k)$, since this is the worst case scenario. Therefore a voter i who see positions for all parties on issue k will vote for the party j for which $|\hat{\Omega}(\hat{\theta}_j^k, x_i^k) - x_i^k|$ is smallest.

14. To show this, choose any $x \in (\underline{\theta}, \overline{\theta})$ and let $h(\theta)$ denote $\Omega(\theta, x)$. Our assumptions on Ω immediately imply that $h : (\underline{\theta}, \overline{\theta}) \to (\underline{\theta}, \overline{\theta})$ is continuously differentiable and strictly monotone and therefore invertible. The inverse $h^{-1}(\theta)$ is, by definition the same as $\hat{\Omega}(\theta, x)$, so $\hat{\Omega}(\theta, x)$ must be, for each x, real valued and continuously differentiable in θ. The argument that $\hat{\Omega}$ is continuously differentiable in x is similar. That $|\hat{\Omega}(y, x) - x| > |y - x|$ follows from the fact that $\Omega(y, x)$ always lies between y and x.

As before, if a voter sees no position for a party on the issue she cares about, then she considers the worst case scenario that the party's distance from her is $\sup_{\theta\in\Theta} |\theta - x_i^k|$. Since this is always greater than $\hat{\Omega}(\theta_j^k, x_i^k)$, for any θ_j^k, it follows that if a voter sees a (possibly projected) position for only one party, then she always votes for that party.

Finally, as in the baseline model, when voters see no party's position on an issue, they vote for each party with probability $\frac{1}{J}$. It follows from this discussion that the vote share of party j is given by the following expression:

$$\begin{aligned} V_j = \frac{\rho_0}{J} + \sum_{k=1}^{K} \Bigg[& \rho_{A,0}^{kF}\psi_j^k + \rho_{A,0}^{kI}\psi_j^k + \rho_j^{kF} + \rho_j^{kI} \\ & + \sum_{m=1}^{J} \left((\rho_{A,P_m}^{kF} + \rho_{A,P_m}^{kI})\psi_{j,P_m}^k + (\rho_{A,NP_m}^{kF} + \rho_{A,NP_m}^{kI})\psi_{j,NP_m}^k \right) \Bigg]. \end{aligned} \tag{B.1}$$

Here, ρ_0 is the proportion of voters that see no positions on any issue, $\rho_j^{F,k}$ and $\rho_j^{I,k}$ are the proportions of k-focused and impressionable voters respectively who only see a position for party j on issue k. $\rho_{A,0}^{KF}$ and $\rho_{I,0}^{KI}$ are the proportions of voters who are, respectively, k-focused and impressionable and who witness no parties' campaigns, but observe a (possibly projected) position for each party – it is a projected position for a party with probability $\underline{\mathcal{M}}$). ψ_j^k is now defined as the proportion of such voters, who witness no campaigns but see (possibly projected) party positions, who vote for party j. $\rho_{A,P_m}^{k,F}$ and $\rho_{A,P_m}^{k,I}$ are the proportions of voters who are, k-focused and impressionable and who witness party m's campaign, and observe a projected position for party m and a (possibly projected) position for each other party. ψ_{j,P_m}^k is the proportion of such voters who vote for party j. Finally, $\rho_{A,NP_m}^{k,F}$ and $\rho_{A,NP_m}^{k,I}$ are the proportions of voters who are, k-focused and impressionable and who witness party m's campaign, and observe the true position of party m and a (possibly projected) position for each other party. ψ_{j,NP_m}^k is the proportion of such voters who vote for party j.

Our assumptions imply that the formulae for the ρ terms in the vote share function are as follows:

$$\rho_0 = 1 - \sum_{k=1}^{K} \left[\rho_{A,0}^{kF} + \rho_{A,0}^{kI} + \sum_{j=1}^{J} \left(\rho_j^{kF} + \rho_j^{kI} + \rho_{A,P_j}^{kF} + \rho_{A,P_j}^{kI} + \rho_{A,NP_j}^{kF} + \rho_{A,NP_j}^{kI} \right) \right] \tag{B.2}$$

$$\rho_j^{kF} = \overline{\pi}_k \eta_j^k C(P_j^k)(1 - \gamma_1) \tag{B.3}$$

$$\rho_j^{kI} = \left(1 - \sum_{k=1}^{K} \overline{\pi}_k \right) \frac{\eta_j^k C(P_j^k)(1 - \gamma_1)}{K} \tag{B.4}$$

$$\rho_{A,P_j}^{kF} = \overline{\pi}_k \eta_j^k C(P_j^k) \gamma_1 \mathcal{M}(P_j^k) \tag{B.5}$$

$$\rho_{A,P_j}^{kI} = \left(1 - \sum_{k=1}^{K} \overline{\pi}_k \right) \frac{\eta_j^k C(P_j^k) \gamma_1 \mathcal{M}(P_j^k)}{K} \tag{B.6}$$

$$\rho_{A,NP_j}^{kF} = \overline{\pi}_k \eta_j^k C(P_j^k) \gamma_1 (1 - \mathcal{M}(P_j^k)) \tag{B.7}$$

$$\rho_{A,NP_j}^{kI} = \left(1 - \sum_{k=1}^{K} \overline{\pi}_k \right) \frac{\eta_j^k C(P_j^k) \gamma_1 (1 - \mathcal{M}(P_j^k))}{K} \tag{B.8}$$

$$\rho_{A,0}^{kF} = \gamma_0 \overline{\pi}_k \left(1 - \sum_{j=1}^{J} \eta_j^k C(P_j^k) \right) \tag{B.9}$$

$$\rho_{A,0}^{kI} = \frac{\gamma_0}{K} \left(1 - \sum_{k=1}^{K} \overline{\pi}_k \right) \left(1 - \sum_{m=1}^{K} \sum_{j=1}^{J} \frac{\eta_j^m C(P_j^m)}{K} \right). \tag{B.10}$$

We now provide a formula for the ψ terms in the vote share function. To this end, let $\mathcal{B}$ denote the power set of $\{1, 2, ...J\}$ and let $B \in \mathcal{B}$ denote a member of this set. Let $\psi_{j,B}^k$ denote the vote share of party j if all the parties in B show a projected position, and the parties not in B do not. Let $|B|$ denote the cardinality of B.

Then, our assumptions imply that, for any $j, m \in \{1, ..., J\}$ and $B \in \mathcal{B}$:

$$\psi^k_{j,B} = \mathbf{1}\Big\{j \in B\Big\}...$$
$$\times \int_{\underline{\theta}}^{\overline{\theta}} \left[\mathbf{1}\Big\{|\theta^k_j - x| \leqslant \min_{m \in B} |\theta^k_m - x|\Big\}\mathbf{1}\Big\{|\theta^k_j - x| \leqslant \min_{m \notin B} |\hat{\Omega}(\theta^k_m, x) - x|\Big\}\right] f^k(x^k_i) \ \partial x^k_i$$
$$+ \mathbf{1}\Big\{j \notin B\Big\} \int_{\underline{\theta}}^{\overline{\theta}} \left[\mathbf{1}\Big\{|\hat{\Omega}(\theta^k_j, x) - x| \leqslant \min_{m \in B} |\theta^k_m - x|\Big\}...\right.$$
$$\left.\times \mathbf{1}\Big\{|\hat{\Omega}(\theta^k_j, x) - x| \leqslant \min_{m \notin B} |\hat{\Omega}(\theta^k_m, x) - x|\Big\}\right] f^k(x^k_i) \ \partial x^k_i,$$

$$\psi^k_{j,P_m} = \sum_{b \in \mathcal{B}} \mathbf{1}\{m \in b\}\underline{\mathcal{M}}^{|b|-1}(1 - \underline{\mathcal{M}}^{J-|b|})\psi^k_{j,b},$$
$$\psi^k_{j,NP_m} = \sum_{b \in \lfloor} \mathbf{1}\{m \notin b\}\underline{\mathcal{M}}^{|b|-1}(1 - \underline{\mathcal{M}}^{J-|b|})\psi^k_{j,b},$$
$$\psi^k_{j,0} = \underline{\mathcal{M}}\psi^k_{j,P_m} + (1 - \underline{\mathcal{M}})\psi^k_{j,NP_m}.$$

B.2 Equilibrium Party Strategies

We now show, in Propositions 5-6 below, that all results from the baseline model carry through almost unchanged to the imprecise messages model.

The following two lemmas are useful in the proofs of these propositions:

Lemma 4. *For all parameter values, and any $j \in \{1, ..., J\}$ and $k \in \{1, ..., K\}$, it holds that $\psi^k_{j,P_j} > \psi^k_{j,NP}$.*

Proof. To show this, we claim that, for a set $\mathcal{B}$ with $j \notin \mathcal{B}$, $\psi_{j,\{j \cup \mathcal{B}\}} > \psi_{j,\mathcal{B}}$. Given this, that $\psi^k_{j,P_j} > \psi^k_{j,NP}$ then follows from the definitions of ψ^k_{j,P_j} and $\psi^k_{j,NP}$. We prove this claim for the set $\mathcal{B} = \{1, ..., j-1, j+1, ...J\}$. The argument for other $\mathcal{B}$ is similar. Given the definition of $\psi_{j,B}$, and the continuity and full support of F, the result follows if the following two conditions hold.

(i) $\forall x \in (\underline{\theta}, \overline{\theta})$, $\big(|\theta^k_j - x| \leqslant \min_{m \neq j} |\theta^k_m - x|\big) \Rightarrow \Big(|\hat{\Omega}(\theta^k_j, x) - x| \leqslant \min_{\neq j} |\theta^k_m - x|\Big)$.

(ii) $\exists x \in (\underline{\theta}, \overline{\theta})$ s.t. $|\hat{\Omega}(\theta_j^k, x) - x| > \min_{m \neq j} |\theta_m^k - x|$ and $|\theta_j^k - x| \leqslant \min_{m \neq j} |\theta_m^k - x|$.

Condition (i) follows immediately since $|\hat{\Omega}(\theta_j^k, x) - x| > |\theta_j^k - x|$. To show (ii), consider a party m, such that there is no party r for which θ_j^r is in the convex hull of θ_j^k and θ_j^m (i.e. there is no r that stands between m and j on issue k). Consider a voter i, such that x_i^k is the midpoint of θ_m^k and θ_j^k on k. For this voter, it follows that $|\hat{\Omega}(\theta_j^k, x) - x| > \min_{m \neq j} |\theta_m^k - x|$ and $|\theta_j^k - x| \leqslant \min_{m \neq j} |\theta_m^k - x|$. □

The next lemma defines q_j^k for the model with imprecise messages. This has an additional term $q_{j,p}^k$ which represents a 'projection incentive' for parties to emphasize an issue to project a false position. However, q_j^k still satisfies similar properties to before, as shown in the lemma. In the imprecise messages model, the comparative statics of q_j^k with respect to changes in ψ_j^k is slightly complicated by the fact that the relevant measure of the popularity of party j's position is variously ψ_{j,P_j}^k, ψ_j^k or ψ_{j,NP_j}^k, depending on whether voters observe true or projected party positions. Therefore, to study comparative statics, we assume that $\psi_{j,P_j}^k = \psi_j^k + \varphi_j^k$ for some $\varphi_j^k > 0$ (which implies that $\psi_j^k = \psi_{j,NP_j}^k + \frac{\mathcal{M}\varphi_j^k}{1-\mathcal{M}}$). We study the effects on q_j^k of varying ψ_j^k while holding constant φ_j^k.

Lemma 5. *Fix φ_j^k and suppose that $\psi_{j,P_j}^k = \psi_j^k + \varphi_j^k$. Define q_j^k as:*

$$q_j^k := [q_{j,r}^k + q_{j,s}^k + q_{j,p}^k(\mathcal{M}(P_j^k) - \underline{\mathcal{M}})]\frac{C(P_j^k)}{\underline{C}}, \tag{B.11}$$

where $q_{j,r}^k$ and $q_{j,s}^k$ are defined as in (13) *and* (14)*, and $q_{j,p}^k$ satisfies:*

$$q_{j,p}^k := \tilde{\pi}_k \gamma_1 (\psi_{j,P_j}^k - \psi_{j,NP_j}^k) = \frac{\tilde{\pi}_k \gamma_1 \varphi_j^k}{1 - \mathcal{M}}$$

with $\tilde{\pi}_k$ defined as before. Then e_j^k, $\tilde{\pi}_k$, q_j^k, $q_{j,s}^k$ and $q_{j,r}^k$ satisfy the properties in Lemmas 1 and $q_j^k > 0$, $q_{j,p}^k > 0$ for all j and k.. If $\frac{\partial q_j^k}{\partial P_j^k} = 0$ the q_j^k also satisfies and 2.

Proof. That $\tilde{\pi}_k$, $q_{j,r}^k$ and $q_{j,s}^k$ continue to satisfy the properties of Lemma 1 is immediate, because these are defined as before so the argument in the proof of Lemma 1 goes through unchanged. Using that $q^k_{j,r} + |q^k_{j,s}| \geqslant q^k_j \geqslant q^k_{j,r} - |q^k_{j,s}|$ and then substituting in (A.2) and (A.3) and using that $(1-\overline{\pi})\gamma_0 < \gamma_0$ implies that:

$$\tilde{\pi}_k \left[1 - \frac{1-\gamma_0}{J}\right] > q^k_{j,r} + q^k_{j,s} > \tilde{\pi}_k \left[1 - \gamma_1 - \frac{1-\gamma_0}{J} - (1-\overline{\pi}_k)\gamma_0\right] \tag{B.12}$$

Now, Lemma 4, along with the fact that $\psi^k_{j,P_j} \in [0,1]$ and $\psi^k_{j,NP_j} \in [0,1]$ implies that $1 \geqslant \psi^k_{j,P_j} - \psi^k_{j,NP_j} > 0$. Then, the definition of $q^k_{j,p}$ above immediately implies that $\tilde{\pi}_k \geqslant q^k_{j,p} > 0$. Substituting this into (B.12), and using that $\frac{1}{\gamma_0} \geqslant \frac{C(P^k_j)}{\underline{C}} \geqslant 1$, we obtain (A.4). That $q^k_j > 0$. This follows from (A.4) and the fact that, in the imprecise messaging model, we assume that $1 - \gamma_1 - \frac{1-\gamma_0}{J} - \gamma_0 > 0$.

It remains to show that the newly defined q^k_j still satisfies Lemma 2. The argument of that lemma implies that those comparative static results hold for $q^k_{j,r} + q^k_{j,s}$, since this was q^k_j. Since $\frac{\partial q^k_j}{\partial P^k_j} = 0$, it remains only to show that $q^k_{j,p}$ satisfies the same comparative statics, in which case they hold for $q^k_j = q^k_{j,r} + q^k_{j,r} + q^k_{j,p}$. Using the definition of $q^k_{j,p}$ above and differentiating, holding constant φ^k_j, it follows immediately that $\frac{\partial q^k_{j,p}}{\partial \psi^k_j} = 0$, $\frac{\partial q^m_{j,p}}{\partial \psi^k_j} = 0$, $\frac{\partial q^k_{j,p}}{\partial \overline{\pi}_k} - \frac{\partial q^k_{j,p}}{\partial \overline{\pi}_n} = \frac{\partial q^k_{j,p}}{\partial \tilde{\pi}^k_j} = \frac{q^k_{j,p}}{\tilde{\pi}_k} \geqslant 0$ and $\frac{\partial q^m_{j,p}}{\partial \overline{\pi}_k} - \frac{\partial q^m_{j,p}}{\partial \overline{\pi}_n} = 0$. □

Now, we show that the equilibrium of the model looks similar to the baseline model, except with the new value of q^k_j.

Proposition 5. *There exists a unique equilibrium for all parameter values. The equilibrium choices of* $\{e^k_j\}^{J,K}_{j=1,k=1}$ *solve the first order condition* (15) *as in the baseline model, where* λ_j *and* q^k_j *satisfy* (16) *and*(B.11). *Equilibrium choices of* $\{P^k_j\}^{J,K}_{j=1,k=1}$ *satisfy* $P^k_j \in (0,1)$, $\forall k, j$ *and solve the first order conditions:*

$$\frac{\partial q^k_j}{\partial P^k_j} = 0. \tag{B.13}$$

Proof. Substitute (B.2)-(B.10) terms into (B.1) and simplify. We obtain that V_j satisfies

$$V_j = \text{terms that don't depend on j's strategy} + \sum_{k=1}^{K} \underline{C} q_j^k \eta(e_j^k), \tag{B.14}$$

which is almost the same as (11).

Then, we argue that each party has a unique optimal choice of $\{e_j^k\}_{k=1}^K$, for given party positions and given choices of $\{P_j^k\}_{k=1}^K$, and that these choices solve (15) and (16). For given choices of $\{P_j^k\}_{k=1}^K$, the values of $\{q_j^k\}$ are given, for each k The proof for this is essentially identical to the proofs of Lemma 3 and Proposition 1 – since the vote share function is almost identical to (11), the argument of Lemma 3 goes through virtually unchanged and, using this, the proof of Proposition 1 shows that each party has a unique optimal e_j^k unique optimal choice of $\{e_j^k\}_{k=1}^K$, for given party positions and given choices of $\{P_j^k\}_{k=1}^K$.

Then, to prove the Proposition, it remains to show that, for given party positions, each party has a unique optimal choice of $\{P_j^k\}_{j=1,k=1}^{J,K}$ that satisfy $P_j^k \in (0,1)$, $\forall k, j$ and solve (B.13).

To show that the unique optimal choices of $\{P_j^k\}_{j=1,k=1}^{J,K}$ solve (B.13), note that $q_j^k > 0$ for all j and k, as shown in Lemma 5. Then, equation (B.14) and (B.11) imply that V_j is continuously differentiable and jointly strictly concave in $\{e_j^k\}_{k=1}^K$ and $\{P_j^k\}_{j=1,k=1}^{J,K}$. Then, the Kuhn Tucker conditions are sufficient to characterize a unique optimal strategy. The argument of Proposition 1 implies that there exist $\{e_j^k\}_{k=1}^K$ that solve the Kuhn Tucker conditions, which are given by the solution to (15) and (16). It is immediate that, for $P_j^k \in (0,1)$, the Kuhn Tucker first order condition for P_j^k is (B.13). Then, it remains only to show that there exists, for each k and j, a value of $P_j^k \in (0,1)$ that solves this condition.

To show this, differentiate (B.11) with respect to e_j^k and substitute into (B.13). We obtain:

$$C'(P_j^k)(q_{j,r}^k + q_{j,s}^k + q_{j,p}^k(\mathcal{M}(P_j^k)) - \mathcal{M}_0) + C(P_j^k)\mathcal{M}'(P_j^k)q_{j,p}^k = 0 \tag{B.15}$$

It remains to show that (B.15) has a solution $P_j^k \in (0,1)$. We show that the left hand side of (B.15) is strictly decreasing in P_j^k, that it is positive at $P_j^k = 0$ and that it is negative at $P_j^k = 1$. Then, by the intermediate value theorem there exists a solution $P_j^k \in (0,1)$.

First we show that the left hand side of (B.15) is strictly decreasing in P_j^k. The derivative of the left hand side with respect to P_j^k is $C''(P_j^k)q_j^k + 2C'(P_j^k)\mathcal{M}'(P_j^k)q_{j,p}^k + C(P_j^k)\mathcal{M}''(P_j^k)q_{j,p}^k$. This is negative for all $P_j^k \in (0,1)$, since $q_j^k > 0$, $q_{j,p}^k > 0$, $C'' < 0$, ,$C' > 0$, $\mathcal{M}' > 0$, and $\mathcal{M}'' < 0$. To show that the left hand side of (B.15) is positive at $P_j^k = 0$, note that $q_{j,r}^k + q_{j,s}^k + q_{j,p}^k(\mathcal{M}(P_j^k)) - \mathcal{M}_0 = q_j^k > 0$, $C'(0) > 0$, and $\mathcal{M}'(0) = 0$. To show that the left hand side of (B.15) is negative at $P_j^k = 1$, note that $C'(1) = 0$, $C(1) > 0$, $q_{j,p}^k > 0$ and $\mathcal{M}'(1) < 0$. $\square$

We now establish that our qualitative predictions from the baseline model generalize to the imprecise messages model. As in Lemma 5, when studying comparative statics, we assume $\psi_{j,P_j}^k = \psi_j^k + \varphi_j^k$ and study the effects of varying ψ_j^k while holding constant φ_j^k.

Proposition 6. *Fix φ_j^k and suppose that $\psi_{j,P_j}^k = \psi_j^k + \varphi_j^k$. Then the results of Propositions 2,3 and 4 continue to hold in the imprecise messages model.*

Proof. The arguments of the proofs of 3 and 4 go through unchanged, since the first order condition is the same as before, and q_j^k still satisfies the properties of Lemma 1. This follows from Lemma 5, since (B.13) is satisfied in equilibrium.

The argument of the proof of 2 goes through unchanged except that, since we now assume $(1-\gamma_0)\left(\frac{J-1}{J}\right) > \gamma_1$, it follows from simple rearrangement, using $\psi_j^k \in [0,1]$ and $\gamma_1 \gtrdot \gamma_0$, that condition (17) cannot ever be satisfied, so it is unnecessary to show that parties place zero emphasis on low ψ_j^k issues in that case. $\square$

C If Voters Maximize Expected Utility

We now discuss the assumptions of the model with voters that maximize expected utility (instead of being ambiguity averse). This is completely identical to the baseline model discussed in the main text with two exceptions. The first exception is that we specify that nature chooses each party's position on each issue k at the start of play according to the cumulative distribution function G, so that, for $\theta, \tilde{\theta} \in \Theta$, $\text{Prob}(\theta \leqslant \tilde{\theta}) = G(\tilde{\theta})$. We assume that G is symmetrical across parties, so that $G(\theta_1, \theta_2, ...) = G(\theta_2, \theta_1, ...)$. The function G is common knowledge across parties and voters.

The second exception is that we assume that voters are expected utility maximising rather than ambiguity averse. Our assumptions about what issue k-voters and impressionable voters observe are identical to the baseline model. Then, a voter who observes only party j's position on issue k votes for party j if and only if:

$$U(|x_i^k - \theta_j^k|) \geqslant \int_{\{\tilde{\theta} \in \Theta : \tilde{\theta}_j^k = \theta_j^k\}} \max_{m \neq j} U(|x_i^k - \theta_m^k|) d\mu_i(\tilde{\theta}|\theta_j^k),$$

where

$$\mu_i(\tilde{\theta}|\theta_j^k) = \text{Prob}(\theta \leqslant \tilde{\theta} | \text{Voter } i \text{ observes only } \theta_j^k). \tag{C.1}$$

To characterize μ_i, consider an issue k focused voter and apply Bayes's rule to equation (C.1), to obtain:

$$\mu_i(\hat{\theta}|\theta_j^k) = \frac{\int_{\{\tilde{\theta} \in \Theta \,:\, \tilde{\theta}_j^k = \theta_j^k, \tilde{\theta} \leqslant \hat{\theta}\}} \rho_j^{F,k}(\tilde{\theta}) dG(\tilde{\theta})}{\int_{\{\tilde{\theta} \in \Theta \,:\, \tilde{\theta}_j^k = \theta_j^k\}} \rho_j^{F,k}(\tilde{\theta}) dG(\tilde{\theta})} \equiv \frac{\int_{\{\tilde{\theta} \in \Theta \,:\, \tilde{\theta}_j^k = \theta_j^k, \tilde{\theta} \leqslant \hat{\theta}\}} \rho_j^{I,k}(\tilde{\theta}) dG(\tilde{\theta})}{\int_{\{\tilde{\theta} \in \Theta \,:\, \tilde{\theta}_j^k = \theta_j^k\}} \rho_j^{I,k}(\tilde{\theta}) dG(\tilde{\theta})}, \tag{C.2}$$

where $\rho_j^{F,k}(\tilde{\theta}), \rho_j^{I,k}(\tilde{\theta})$ denotes the equilibrium value of $\rho_j^{F,k}, \rho_j^{I,k}$ given positions $\tilde{\theta}$, and the equivalence follows by substituting in equations (1) and (2) from Section 2.3. Since equation (C.2) applies equally to any voter i who observes only one party's position, it follows that $\mu_i(\tilde{\theta}|\theta_j^k)$ is the same for all i and so we henceforth omit the i subscript.

For each j and k, we let ϕ_j^k denote the proportion of the voters who only observed party j's position on issue k that choose to vote for party j. Unlike under ambiguity aversion, $\phi_j^k \in (0,1)$ will be typical. ϕ_j^l is given by:

$$\phi_j^X = \int_{x\in\Theta} \mathbf{1}\left\{U(|x_i^k - \theta_j^k|) \geqslant \int_{\{\tilde{\theta}\in\Theta:\tilde{\theta}_j^k=\theta_j^k\}} \max_{m\neq j} U(|x_i^k - \theta_m^k|)d\mu_i(\tilde{\theta}|\theta_j^k)\right\} f_X(x_i)\partial x_i \quad \text{(C.3)}$$

Voters who observe all parties' positions behave in exactly the same way as in the baseline model. Also as before, we assume that voters who observe no party's position vote for each party with probability $\frac{1}{J}$. This maximizes the expected utility of such voters, since their expected utility of voting for each party is equal.

Let $V_j(\theta, s)$ denote party j's vote share given positions θ and party strategies. Our assumptions imply that, in the case of expected utility maxmising voters, $V_j(\theta, s)$ is given by:

$$V_j(\theta, s) = \frac{\rho_0}{2} + \sum_{K\in\{X,Y\}} (\rho_A^{F,k}\psi_j^k + \rho_A^{I,k}\psi_j^k + \rho_j^{F,k}\phi_j^k + \rho_j^{I,k}\phi_j^k), \quad \text{(C.4)}$$

where the ρ and ψ coefficients take the same values as in the baseline model.

In this model, we define an equilibrium as a strategy profile s for the parties, a voter belief function μ and values of $\{\phi_j^k\}_{j=1,k=1}^{J,K}$, for each $\theta \in \Theta$, such that:[15]

1. Each ϕ_j^k is consistent with equation (C.3), given $\mu(\cdot|\cdot)$.
2. $\mu(\cdot|\cdot)$ is consistent with equation (C.2) given parties' emphasis strategies.
3. Each party's strategy maximizes its vote share V_j, given by (C.4), given the strategy of the other party, and given the values of $\{\phi_j^k\}_{j=1,k=1}^{J,K}$.

15. The definition of equilibrium employed here is exactly the definition of a Perfect Bayesian Equilibrium of the game where nature chooses party positions, parties choose emphasis and then voters vote, except that we restrict attention to Perfect Bayesian Equilibria in which indifferent voters vote for each party with probability $\frac{1}{J}$.

C.1 Numerical Simulations

We are unable to derive analytical results for the model with expected utility maximizing voters. Here we show a few numerical simulations to indicate that the results are identical to the baseline model with ambiguity averse voters, provided that parties are not too extreme. Further numerical results are available upon request.

For the results below, we adopt the following parametrization. We assume that $J = K = 2$ and that voter ideal points are uniformly distributed on the square $[-1, 1]^2$, so that $F(x_i^1, x_1^2) = \frac{(x_i^1+1)(x_i^2+1)}{4}$. We assume, for the expected utility case, that both parties' positions are uniformly distributed on the square $[-2, 2]^2$.

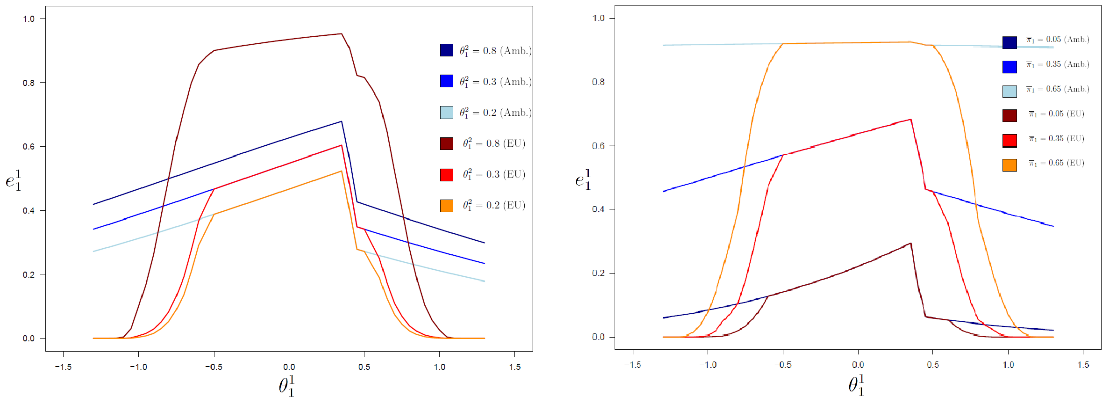
We assume that the function η takes the form $\eta(e) = 0.3(1 - (1 - e)^{1.3})$. We set $\gamma_0 = \gamma_1 = 0.5$, $\overline{\pi}_2 = 0.3$ and $U(x) = -x^2$. Note that this parametrization implies that voters are risk averse (concave U) and have high uncertainty about parties' positions. These assumptions ensure that the expected utility case behaves reasonably similarly to the ambiguity aversion case.

In Figure 3, we show the predictions of the expected utility and ambiguity aversion models for Party 1's emphasis on issue 1 For the purposes of all the figures, we set $\theta_1^2 = \theta_2^2 = 0.4$. In the left panel, we fix $\overline{\pi}_1 = 0.3$ and vary θ_1^1 (on the x axis) and θ_1^2 (in the legend). In the right panel, we fix $\theta_1^2 = -0.4$ and vary θ_1^1 (on the x axis) and $\overline{\pi}_1$ (in the legend).

Inspection of Figure 3 indicates that the model with expected utility maximising voters implies identical equilibrium behaviour to the model with ambiguity averse voters when party positions are not too extreme. When parties take more extreme positions, the model with ambiguity aversion and the model with expected utility maximising voters make different predictions. The expected utility model implies that each party chooses to emphasize only one issue in its campaigns in this case. To understand the intuition for these results, Figure 4 plots the equilibrium value of ϕ_1^1 for different positions θ_1^1 of Party

Figure 3: e_1^1 as θ_1^1, θ_2^1 AND $\overline{\pi}_1$ vary, with EU and Ambiguity Averse Voters

$\overline{\pi}_1 = 0.3$, Varying θ_1^1, θ_2^1 $\qquad$ $\theta_2^1 = 0.4$, varying $\overline{\pi}_1, \theta_1^1$.



1, given $\theta_1^2 = -0.4$, $\overline{\pi}_1 = 0.3$ and the same other parameter values as above. When θ_1^1 is close to zero, we find that $\phi_1^1 = 1$. In that case, voter behavior is identical in the model with ambiguity aversion and the model with expected utility maximizing voters and so equilibrium party strategies are the same. When θ_1^1 is more extreme, $\phi_1^1 < 0.5$, in which case voters are always less likely to vote for a party if they see its position and so parties have no revelation incentive. Then, party strategies are driven by the salience incentive and parties only emphasize issues where they have a comparative advantage.

Figure 4: ϕ_1^1 as θ_1^1 varies