Appendices

A Proof of Proposition 1

First, we show that, for $e_j^K < 1$, $\frac{\partial \hat{\rho}_j^K}{\partial e_j^K} > 0$.

Substituting equation (6) into equation (8) we have:

$$\hat{\rho}_j^K = \frac{\rho_j^{KF} + \rho_j^{KI} + \rho_B^{KF} + \rho_B^{KI}}{\overline{\pi}_K + \rho_B^{KI} + \sum_{i=1}^{2} \rho_i^{KI}}$$

Differentiating using the product rule:

$$\frac{\partial \hat{\rho}_j^K}{\partial e_j^K} = \left(\frac{1}{\pi_K^2}\right)\left(\frac{\partial \rho_j^{KF}}{\partial e_j^K} + \frac{\partial \rho_j^{KI}}{\partial e_j^K} + \frac{\partial \rho_B^{KF}}{\partial e_j^K} + \frac{\partial \rho_B^{KI}}{\partial e_j^K}\right)(\overline{\pi}_K + \rho_B^{KI} + \sum_{i=1}^{2} \rho_i^{KI})$$

$$- \left(\frac{1}{\pi_K^2}\right)(\rho_j^{KF} + \rho_j^{KI} + \rho_B^{KF} + \rho_B^{KI})\left(\frac{\partial \rho_B^{KI}}{\partial e_j^K} + \frac{\partial \rho_j^{KI}}{\partial e_j^K} + \frac{\partial \rho_{\neg j}^{KI}}{\partial e_j^K}\right)$$

which can be rewritten as:

$$\frac{\partial \hat{\rho}_j^K}{\partial e_j^K} = \left(\frac{1}{\pi_K}\right)\left(\frac{\partial \rho_j^{KF}}{\partial e_j^K} + \frac{\partial \rho_j^{KI}}{\partial e_j^K} + \frac{\partial \rho_B^{KF}}{\partial e_j^K} + \frac{\partial \rho_B^{KI}}{\partial e_j^K}\right)$$

$$- \left(\frac{1}{\pi_K}\right)\hat{\rho}_j^K\left(\frac{\partial \rho_B^{KI}}{\partial e_j^K} + \frac{\partial \rho_j^{KI}}{\partial e_j^K} + \frac{\partial \rho_{\neg j}^{KI}}{\partial e_j^K}\right) \tag{A.1}$$

or,

$$\frac{\partial \hat{\rho}_j^K}{\partial e_j^K} = \left(\frac{1}{\pi_K}\right)\left(\frac{\partial \rho_j^{KF}}{\partial e_j^K} + \frac{\partial \rho_B^{KF}}{\partial e_j^K}\right) + \left(\frac{1}{\pi_K}\right)\left(\frac{\partial \rho_B^{KI}}{\partial e_j^K} + \frac{\partial \rho_j^{KI}}{\partial e_j^K}\right)(1 - \hat{\rho}_j^K)$$
$$- \left(\frac{1}{\pi_K}\right)\hat{\rho}_j^K \frac{\partial \rho_{\neg j}^{KI}}{\partial e_j^K} \tag{A.2}$$

or

$$\frac{\partial \hat{\rho}_j^K}{\partial e_j^K} = \left(\frac{1}{\pi_K}\right)\left(\frac{\partial \rho_j^{KF}}{\partial e_j^K} + \frac{\partial \rho_B^{KF}}{\partial e_j^K}\right) + \left(\frac{1}{\pi_K}\right)\left(\frac{\partial \rho_B^{KI}}{\partial e_j^K} + \frac{\partial \rho_j^{KI}}{\partial e_j^K}\right)(1 - \hat{\rho}_j^K) \tag{A.3}$$

where the last step uses that $\frac{\partial \rho_{\neg j}^{KI}}{\partial e_j^K} = 0$, from equation (2).

Using equations (1)-(5), this can be written:

$$\frac{\partial \hat{\rho}_j^K}{\partial e_j^K} = \left(\frac{\overline{\pi}_K \eta'(e_j^K)(1-\gamma_0)}{\pi_K}\right) + \left(\frac{1-\overline{\pi}_X-\overline{\pi}_Y}{2\pi_K}\right)\left(1-\frac{\gamma_0}{2}\right)(1-\hat{\rho}_j^K)\eta'(e_j^K) \tag{A.4}$$

Note that $\pi_K \geq \overline{\pi}_K$, from equation (6), since ρ_B^{KI} and ρ_j^{KI} are non-negative. Then, that $\frac{\partial \hat{\rho}_j^K}{\partial e_j^K} > 0$ if $e_j^K < 1$ then follows immediately, since $\eta'(e_j^K) > 0$ and $\hat{\rho}_j^K \in [0,1]$.

To show that $\frac{\partial \hat{\rho}_j^K}{\partial e_j^K} \leq \frac{\eta'(e_j^K)(1-\gamma_0)}{\overline{\pi}}$, we first show that $\hat{\rho}_j^K \geq \gamma_0$.

To this end, note that, since, $\gamma_1 \geq \gamma_0$, it is immediate from equation (3) that

$$\rho_B^{KF} \geq \gamma_0 \overline{\pi}_K \tag{A.5}$$

Furthermore, equations (2) and (4) imply that:

$$\begin{aligned}
\gamma_0(\rho_B^{KI} + \rho_{\neg j}^{KI}) &= \gamma_0(1-\overline{\pi}_X-\overline{\pi}_Y)\left(\frac{\gamma_1(\eta(e_1^K)+\eta(e_2^K))}{2} + (\frac{\eta(e_j^K)(1-\gamma_1)}{2}\right) \\
&\leq \gamma_0(1-\overline{\pi}_X-\overline{\pi}_Y)\left(\frac{\eta(e_1^K)+\eta(e_2^K)}{2}\right) \\
&\leq (1-\overline{\pi}_X-\overline{\pi}_Y)\left(\frac{\gamma_1(\eta(e_1^K)+\eta(e_2^K))}{2}\right) \\
\gamma_0(\rho_B^{KI} + \rho_{\neg j}^{KI}) &\leq \rho_B^{KI} \qquad \text{(A.6)}
\end{aligned}$$

Therefore, using (8) and substituting (A.5) and (A.6), we have that:

$$\begin{aligned}
\hat{\rho}_j^K &= \frac{\rho_j^{KF} + \rho_j^{KI} + \rho_B^{KF} + \rho_B^{KI}}{\overline{\pi}_K + \rho_B^{KI} + \sum_{j=1}^2 \rho_j^{KI}} \\
&\geq \frac{\rho_j^{KI} + \rho_B^{KF} + \rho_B^{KI}}{\overline{\pi}_K + \rho_B^{KI} + \sum_{j=1}^2 \rho_j^{KI}} \\
&\geq \frac{\rho_j^{KI} + \rho_B^{KF} + \gamma_0(\rho_B^{KI} + \rho_{\neg j}^{KI})}{\overline{\pi}_K + \rho_B^{KI} + \sum_{j=1}^2 \rho_j^{KI}} \\
&\geq \frac{\rho_j^{KI} + \gamma_0\overline{\pi}_K + \gamma_0(\rho_B^{KI} + \rho_{\neg j}^{KI})}{\overline{\pi}_K + \rho_B^{KI} + \sum_{j=1}^2 \rho_j^{KI}} \\
&\geq \frac{\gamma_0\rho_j^{KI} + \gamma_0\overline{\pi}_K + \gamma_0(\rho_B^{KI} + \rho_{\neg j}^{KI})}{\overline{\pi}_K + \rho_B^{KI} + \sum_{j=1}^2 \rho_j^{KI}} \\
&\geq \gamma_0
\end{aligned}$$

Therefore, it follows that $\hat{\rho}_j^K \geq \gamma_0$. Note also that $\pi_K \geq \overline{\pi}_K$. Substituting these two inequalities into equation (A.4) yields:

$$\begin{aligned}
\frac{\partial \hat{\rho}_j^K}{\partial e_j^K} &= \left(\frac{\overline{\pi}_K \eta'(e_j^K)(1-\gamma_0)}{\pi_K}\right) + \left(\frac{1-\overline{\pi}_X-\overline{\pi}_Y}{2\pi_K}\right)\left(1-\frac{\gamma_0}{2}\right)(1-\hat{\rho}_j^K)\eta'(e_j^K) \\
&\leq \left(\frac{\overline{\pi}_K \eta'(e_j^K)(1-\gamma_0)}{\pi_K}\right) + \left(\frac{1-\overline{\pi}_X-\overline{\pi}_Y}{2\pi_K}\right)(1-\hat{\rho}_j^K)\eta'(e_j^K) \\
&\leq \left(\frac{\overline{\pi}_K \eta'(e_j^K)(1-\gamma_0)}{\pi_K}\right) + \left(\frac{1-\overline{\pi}_X-\overline{\pi}_Y}{2\pi_K}\right)(1-\gamma_0)\eta'(e_j^K) \\
&\leq \left(\frac{\overline{\pi}_K \eta'(e_j^K)(1-\gamma_0)}{\overline{\pi}_K}\right) + \left(\frac{1-\overline{\pi}_X-\overline{\pi}_Y}{2\overline{\pi}_K}\right)(1-\gamma_0)\eta'(e_j^K) \\
&\leq \left(\frac{2\overline{\pi}_K \eta'(e_j^K)(1-\gamma_0)}{2\overline{\pi}_K}\right) + \left(\frac{1-\overline{\pi}_K}{2\overline{\pi}_K}\right)(1-\gamma_0)\eta'(e_j^K) \\
&= \left(\frac{1+\overline{\pi}_K}{2}\right)\left(\frac{1}{\overline{\pi}_K}\right)(1-\gamma_0)\eta'(e_j^K) \\
&\leq \frac{(1-\gamma_0)\eta'(e_j^K)}{\overline{\pi}_K}
\end{aligned}$$

which was the desired result. □

B Proof of Lemma 1

Consider any $K \in \{X, Y\}$. First, we show that $q^K + q^{\neg K} > 0$. Note that

$$\begin{aligned} 1 - \gamma_0 - 2(1 - \psi_j^K)(\gamma_1 - \gamma_0) &\geq 1 - \gamma_0 - 2(\gamma_1 - \gamma_0) \\ &= 2\left(\frac{1 + \gamma_0}{2} - \gamma_1\right) \\ \therefore\ 1 - \gamma_0 - 2(1 - \psi_j^K)(\gamma_1 - \gamma_0) &> 0 \end{aligned} \tag{B.1}$$

where the first line follows from $\psi_j^K \leq 1$ and $\gamma_1 \geq 0$ and the third line follows from $\gamma_1 < \frac{1+\gamma_0}{2}$. Furthermore, since $\overline{\pi}_X \in (0, 1), \overline{\pi}_Y \in (0, 1 - \overline{\pi}_X)$, it follows that

$$1 + \overline{\pi}_K + 1 - \overline{\pi}_{\neg K} > 1 - \overline{\pi}_K + 1 - \overline{\pi}_{\neg K} > 0 \tag{B.2}$$

Substituting (B.1) and (B.2) into equation (14) reveals that

$$q^K > \gamma_0(\psi_j^K - \psi_j^{\neg K})\,(1 - \overline{\pi}_K - \overline{\pi}_{\neg K}) \tag{B.3}$$

Repeating exactly the same line of argument for issue not-K similarly reveals that

$$q^{\neg K} > \gamma_0(\psi_j^{\neg K} - \psi_j^K)\,(1 - \overline{\pi}_K - \overline{\pi}_{\neg K}) \tag{B.4}$$

Combining (B.3) and (B.4) reveals that

$$q^K + q^{\neg K} > \gamma_0(\psi_j^K - \psi_j^{\neg K} + \psi_j^{\neg K} - \psi_j^K)\,(1 - \overline{\pi}_K - \overline{\pi}_{\neg K}) = 0$$

It remains to show that there exists a unique solution $e^\star$ to (15). To prove this, note that equation (14) implies that $q^K \geq 0$, $q^{\neg K} \geq 0$. Recall that $\eta'(0) > 0$ and $\eta'(1) = 0$. Then, when $e^\star = 0$, the left hand side of equation (15) is equal to $q^K\eta'(0) \geq 0$. Similarly, when $e^\star = 1$, the left hand side of (15) is equal to $-q^{\neg K}\eta'(0) \leq 0$. Then, the existence and uniqueness of a solution $e^\star$ to equation (14) follows from the intermediate value theorem, provided that the left hand side of (14) is strictly decreasing in $e^\star$. We now show that this is the case.

To this end, we take the derivative of the left hand side of (14) with respect to $e^\star$, which is equal to $q^K\eta''(e^\star) + q^{\neg K}\eta''(1 - e^\star)$. Now, since $\eta''(e) < 0$ for any $e \in [0, 1)$, and $q^K \geq 0, q^{\neg K} \geq 0, q^K + q^{\neg K} > 0$, this implies that the left hand side of (14) is strictly decreasing in $e^\star$. □

C Proof of Propositon 2

As discussed in section 3.6, a necessary condition for an optimal strategy for Party j, given the strategy of party $\neg j$, is that, for each $\theta \in \Theta$, there must exist $\lambda_j \geq 0$ and $\mu_j \geq 0$ such that Party j's emphasis choices $e_j^X, e_j^Y \in [0,1]$ satisfy the following Kuhn-Tucker conditions:

$$\frac{\partial V_j}{\partial e_j^X} - \frac{\partial V_j}{\partial e_j^Y} + \lambda_j - \mu_j = 0 \tag{C.1}$$

$$\lambda_j e_j^X = 0 \tag{C.2}$$

$$\mu_j(1 - e_j^X) = 0 \tag{C.3}$$

Furthermore, the emphasis choices e_j^K must satisfy the constraint

$$e_j^X + e_j^Y = 1 \tag{C.4}$$

To prove proposition 2, we first show that, for each $\theta \in \Theta$, there is exactly one solution to the Kuhn-Tucker conditions (C.1)-(C.4), namely where each e_j^K, for $K \in \{X, Y\}$ is equal to the unique $e^\star$ that solves equation (15). To show this, it is sufficient to show that any solution to the Kuhn-Tucker conditions must also solve equation (15) and secondly to show that the $e^\star$ solving(15) itself solves the Kuhn-Tucker conditions.

First, we prove the former, that any solution to the Kuhn-Tucker conditions must have issue emphases that solves (15). We show the result for issue X. The argument for issue Y is virtually identical. Let $e_j^X, e_j^Y \in [0,1]$ be some choice of emphases which, along with some $\lambda_j \geq 0, \mu_j \geq 0$ solve (C.1)-(C.4) for some $\theta \in \Theta$. We now prove that e_j^X is equal to the $e^\star$ that solves (15) when $K = X$. We prove this result separately for the cases $e_j^X \in (0,1)$, $e_j^X = 0$ and $e_j^X = 1$.

Consider first the case $e_j^X \in (0,1)$, so that $\lambda_j = \mu_j = 0$ by the complementary slackness conditions. Note that equations (14) and (13) imply that, for $K \in \{X, Y\}$:

$$\frac{\partial V_j}{\partial e_j^K} = \frac{q^K \eta'(e_j^K)}{4} \text{ if } q^K > 0 \tag{C.5}$$

$$\frac{\partial V_j}{\partial e_j^K} \leq \frac{q^K \eta'(e_j^K)}{4} \text{ if } q^K = 0 \tag{C.6}$$

We know from Lemma 1 that either $q^X > 0$ or $q^Y > 0$. Therefore, equations (C.5) and (C.6) imply that either $\frac{\partial V_j}{\partial e_j^X} > 0$ or $\frac{\partial V_j}{\partial e_j^Y} > 0$ or both, since $e_j^X \in (0,1), e_j^Y \in (0,1)$ and therefore $\eta'(e_j^X) > 0$ and $\eta'(e_j^Y) > 0$. However, in that case, since $\lambda_j = \mu_j = 0$, the first order condition (C.1) cannot be satisfied unless $\frac{\partial V_j}{\partial e_j^X} > 0$ and $\frac{\partial V_j}{\partial e_j^Y} > 0$. Then, substituting equations (C.4), (C.5), and $\lambda_j = \mu_j = 0$ into the first order condition (C.1), we see that (C.1) is equivalent to (15) when $e_j^X = e^\star$. Then, (C.1) is satisfied only if e_j^X is equal to the $e^\star$ that solves (15).

Now, consider the case $e_j^X = 1$ and $e_j^Y = 0$, so that $\lambda_j = 0, \mu_j \geq 0$. Then, since $\eta'(1) = 0$ by assumption, equation (13) implies that $\frac{\partial V_j}{\partial e_j^X} = 0$. Then, given $\lambda_j = 0, \mu_j \geq 0$, the first order condition (C.1) can only be satisfied if $\frac{\partial V_j}{\partial e_j^Y} \leq 0$. Then, since $\eta'(e_j^Y) = \eta'(0) > 0$, equations (C.5) and (C.6) imply that $q^Y = 0$. Then, since $q^X \geq 0$ and $q^Y = 0$, it follows that $e^\star = 1 = e_j^X$ is a solution to equation (15).

Finally, consider the case $e_j^X = 0$ and $e_j^Y = 1$, so that $\lambda_j \geq 0, \mu_j = 0$. This case is almost identical to the previous case. Since $\eta'(1) = 0$, it follows that $\frac{\partial V_j}{\partial e_j^Y} = 0$. Then, (C.1) can only be satisfied if $\frac{\partial V_j}{\partial e_j^X} \leq 0$. Then, equations (C.5) and (C.6) imply that $q^X = 0$. This implies that $e^\star = 0 = e_j^X$ is a solution to equation (15).

We have shown that any solution e_j^X to the Kuhn-Tucker conditions must also solve (15). Now, we argue that setting $e_j^X = e^\star$, where $e^\star$ solves(15) when issue $K = X$, itself provides a solution to the Kuhn-Tucker conditions.

First, suppose that the solution $e^\star \in (0,1)$. Then, since $\eta'(e^\star) > 0$ and $\eta'(1 - e^\star)$ it must be the case that $q^X > 0$ and $q^Y > 0$ or the solution $e^\star$ would not satisfy (15). In that case, using equation (C.5), it is apparent that (15) is equivalent to the first order condition (C.1) when $e_j^X = e^\star$, and when $\lambda_j = \mu_j = 0$. This therefore satisfies the Kuhn-Tucker conditions.

Now, consider the case where (15) has the solution $e^\star = 1$, when issue $K = X$. We show that $e_j^X = 1$ is a solution to the Kuhn-Tucker conditions. Since $\eta'(1) = 0$, equation (15) implies that it must be the case that $q^Y = 0$, in which case equation (C.6) implies that $\frac{\partial V_j}{\partial e_j^Y} \leq 0$, when $e_j^Y = 0$. Since $\eta'(1) = 0$, it follows from (13) $\frac{\partial V_j}{\partial e_j^Y} = 0$ when $e_j^X = 1$. Then, setting $\lambda_j = 0$, $\mu_j = -\frac{\partial V_j}{\partial e_j^Y}$, and $e_j^X = 1$, $e_j^Y = 0$ satisfies the Kuhn-Tucker conditions.

The case where (15) has the solution $e^\star = 0$, when issue $K = X$ is almost identical to the previous case. It can be shown by a symmetrical argument that $q^X = 0$ and that the solution $e_j^X = 0$, $e_j^Y = 1$, $\lambda_j = -\frac{\partial V_j}{\partial e_j^X} \geq 0$, $\mu_j = 0$ satisfies the Kuhn-Tucker conditions. Then, it follows that, in general, setting $e_j^X = e^\star$, where $e^\star$ solves(15) when issue $K = X$, provides a solution to the Kuhn-Tucker conditions. By a symmetrical argument for issue Y, it follows that setting $e_j^Y = e^\star$, where $e^\star$ solves(15) when issue $K = Y$, provides a solution to the Kuhn-Tucker conditions.

It follows, then, that for each party and each $\theta \in \Theta$, the Kuhn-Tucker conditions (C.1)-(C.4) have exactly one solution, in which each e_j^K, for $K \in \{X, Y\}$ is equal to the unique $e^\star$ that solves equation (15). Now, for any $\theta \in \Theta$, and any emphasis choices

$e^X_{\neg j}, e^Y_{\neg j}$ by party $\neg j$, it must be the case that Party j has at least one best response e^X_j, e^Y_j, that maximises j's vote share given θ and $e^X_{\neg j}, e^Y_{\neg j}$. That a best response e^X_j, e^Y_j must exist follows from the Weierstrass theorem: Party j must choose its emphases e^X_j, e^Y_j from the compact set defined by $e^X_j \in [0,1]$, $e^Y_j = 1 - e^X_j$. Since j's vote share V_j is continuous in e^X_j, e^Y_j, it follows that a choice that maxmises vote share must exist. Since the Kuhn-Tucker conditions are necessary for an optimal emphasis choice for each party, it follows, for each $\theta \in \Theta$ and choice $e^X_{\neg j}, e^Y_{\neg j}$ by party $\neg j$, that Party j's best response to the emphasis choices of party $\neg j$ then it must be where each e^K_j, for $K \in \{X, Y\}$ is equal to the unique $e^\star$ that solves equation (15), given θ. Note that the emphasis choices of party $\neg j$ do not appear in equation (15), and do not influence q^K or $q^{\neg K}$. Therefore Party j's best response to the actions of party $\neg j$ exists, is unique and does not depend on the actions of party $\neg j$. Since this is true for both parties, it follows that there exists a unique equilibrium in which each party is best responding to the other, in which, for each $j \in \{1, 2\}$, for each $K \in \{X, Y\}$ and for each $\theta \in \Theta$, the emphasis e^K_j is equal to the unique $e^\star$ that solves equation (15). □

D Proof of Proposition 3

Equation (15) has the solution $e^{\star} \in (0,1)$ if $q^K > 0$, $q^{\neg K} > 0$ since the left hand side of (15) is strictly decreasing in $e^{\star}$, is strictly positive when $e^{\star} = 0$ and strictly negative when $e^{\star} = 1$. Equally, if $q^{\neg K} = 0$, then $q^K > 0$ and (15) has the solution $e^{\star} = 1$. Recall that $e_j^{\star K}(\overline{\pi}_X, \overline{\pi}_Y, \gamma_0, \gamma_1, \psi_j^X, \psi_j^Y)$ solves (15). Therefore, to prove the proposition, it suffices to show that $q^K > 0$, $q^{\neg K} > 0$ for $\gamma_0 \leq \gamma_1 < \frac{1}{2}$, and to show that, for given values of $\overline{\pi}_X, \overline{\pi}_Y, \psi_j^X, \psi_j^Y$, there exists a $\gamma^{\star} \in \left(\frac{1}{2}, 1\right)$ such that $\gamma_1 \geq \gamma_0 \geq \gamma^{\star}$ implies that $q^{\neg K} = 0$.

We first show that $q^K > 0$ for any $K \in \{X, Y\}$ provided $\gamma_0 \leq \gamma_1 < \frac{1}{2}$, which then establishes that $e_j^{\star K}(\overline{\pi}_X, \overline{\pi}_Y, \gamma_0, \gamma_1, \psi_j^X, \psi_j^Y) \in (0,1)$ in this case. To show this, note that ψ_j^K, $\psi_j^{\neg K} \in [0,1]$, for any $\theta \in \Theta$. Using this and that $\gamma_0 \leq \gamma_1 < \frac{1}{2}$, it follows that

$$1 - \gamma_0 - 2(1 - \psi_j^K)(\gamma_1 - \gamma_0) \geq 1 + \gamma_0 - 2\gamma_1$$
$$\gamma_0(\psi_j^K - \psi_j^{\neg K}) \geq -\gamma_0$$

Substituting these into equation (14) and using $\pi_K > 0$, we can infer that $q^K > 0$ provided that:

$$(1 - \overline{\pi}_K - \overline{\pi}_{\neg K})\,(1 + \gamma_0 - 2\gamma_1) - \gamma_0\,(1 - \overline{\pi}_K - \overline{\pi}_{\neg K}) > 0$$

It is immediate that this condition holds if $\gamma_0 \leq \gamma_1 < \frac{1}{2}$.

To complete the proof of the proposition, it remains to show that, for given values of $\overline{\pi}_X, \overline{\pi}_Y, \psi_j^X, \psi_j^Y$, there exists a $\gamma^{\star} \in \left(\frac{1}{2}, 1\right)$ such that $\gamma_1 \geq \gamma_0 \geq \gamma^{\star}$ implies that $q^{\neg K} = 0$. To show this, consider any $\gamma^{\star} \in (\frac{1}{2}, 1)$. If $\gamma_1 \geq \gamma_0 \geq \gamma^{\star}$ then it follows from equation (14) that $q^K > 0$ can only hold for some j, K if the following inequality is satisfied:

$$(1 + \overline{\pi}_K - \overline{\pi}_{\neg K})\,(1 - \gamma_0) + \gamma_0(\psi_j^K - \psi_j^{\neg K})\,(1 - \overline{\pi}_K - \overline{\pi}_{\neg K}) > 0 \tag{D.1}$$

Since the left hand side of (D.1) is decreasing in γ_0, it follows that this, in turn, can only be satisfied if the following inequality is satisfied:

$$(1 + \overline{\pi}_K - \overline{\pi}_{\neg K})\,(1 - \gamma^{\star}) + \gamma^{\star}(\psi_j^K - \psi_j^{\neg K})\,(1 - \overline{\pi}_K - \overline{\pi}_{\neg K}) > 0 \tag{D.2}$$

Suppose that $\psi_j^{\neg K} > \psi_j^K$. Then, the inequality (D.2) can be rearranged to:

$$\frac{1 + \overline{\pi}_K - \overline{\pi}_{\neg K}}{(\psi_j^{\neg K} - \psi_j^K)\,(1 - \overline{\pi}_K - \overline{\pi}_{\neg K}) + 1 + \overline{\pi}_K - \overline{\pi}_{\neg K}} > \gamma^{\star} \tag{D.3}$$

It follows that $q^K > 0$ cannot hold if $\gamma^{\star}$ is weakly greater than the left hand side of (D.3). Furthermore, note that the left hand side of (D.3) must be less than 1, since $\psi_j^{\neg K} - \psi_j^K > 0$. Therefore, if $\psi_j^{\neg K} - \psi_j^K > 0$ then there exists sufficiently high $\gamma^{\star} < 1$

such that, $\gamma_1 \geq \gamma_0 \geq \gamma^\star$ implies that Party j will choose $e_j^K = 0$. By symmetry, it follows that if $\psi_j^K > \psi_j^{\neg K} > 0$ then there is a $\gamma^\star < 1$ such that $\gamma_1 \geq \gamma_0 \geq \gamma^\star$ implies $e_j^{\neg K} = 0$, which implies $e_j^K = 1$.

□

E Proof of Proposition 4

By Proposition 2, $e_j^{\star K}$ is given by the $e^\star$ that solves (15). Applying the implicit function theorem to equation (15), we have that:

$$\frac{\partial e^\star}{\partial q^K} = \frac{-\eta'(e^\star)}{q^K \eta''(e^\star) + q^{\neg K}\eta''(1-e^\star)} > 0$$
$$\frac{\partial e^\star}{\partial q^{\neg K}} = \frac{\eta'(1-e^\star)}{q^K \eta''(e^\star) + q^{\neg K}\eta''(1-e^\star)} < 0$$

Then, all the desired comparative static results follow from the following inequalities:

$$\frac{\partial q^K}{\partial \psi_j^K} > 0 \tag{E.1}$$
$$\frac{\partial q^{\neg K}}{\partial \psi_j^K} < 0 \tag{E.2}$$
$$\frac{\partial q^K}{\partial \overline{\pi}_K} - \frac{\partial q^K}{\partial \overline{\pi}_{\neg K}} \geq 0 \tag{E.3}$$
$$\frac{\partial q^{\neg K}}{\partial \overline{\pi}_K} - \frac{\partial q^{\neg K}}{\partial \overline{\pi}_{\neg K}} \leq 0 \tag{E.4}$$
$$\left(\frac{\partial q^K}{\partial \overline{\pi}_K} + \frac{\partial q^K}{\partial \overline{\pi}_{\neg K}}\right)\left(\psi_j^K - \psi_j^{\neg K}\right) \leq 0 \tag{E.5}$$
$$\left(\frac{\partial q^{\neg K}}{\partial \overline{\pi}_K} + \frac{\partial q^{\neg K}}{\partial \overline{\pi}_{\neg K}}\right)\left(\psi_j^K - \psi_j^{\neg K}\right) \geq 0 \tag{E.6}$$

It remains only to show that the inequalities (E.1)-(E.6) are satisfied. Now, it was shown in the proof of Proposition 3 that $e^\star \in (0,1)$ if and only if $q^K > 0$ and $q^{\neg K} > 0$. Since we assumed that $e_j^{\star K} \in (0,1)$, we conclude, for the given values of $\overline{\pi}_X, \overline{\pi}_Y, \gamma_0, \gamma_1, \psi_j^X, \psi_j^Y$, that $q^K > 0$ and $q^{\neg K} > 0$. Then, the inequalities (E.1), (E.2), (E.5) and (E.6) all follow almost immediately from differentiating equation (14).

The inequalities (E.3) and (E.4) also follow immediately from differentiating (14) once we recall that it was shown in the proof of Lemma 1 that $1 - \gamma_0 - 2(1-\psi_j^K)(\gamma_1 - \gamma_0) > 0$. $\square$

F Proof of Proposition 5

Consider some $z \in (0,1)$. We seek to find $\pi^\star$ such that, for any K, if $\overline{\pi}_K > \pi^\star$ then in equilibrium both parties j will choose $e_j^K > z$ for all $\theta \in \Theta$.

Proposition 2 and Lemma 1 reveal that $e^\star(\overline{\pi}_X, \overline{\pi}_Y, \gamma_0, \gamma_1, \psi_,^X \psi_j^Y) = z$ if and only if

$$q^K \eta'(z) - q^{\neg K}\eta'(1-z) = 0$$

which is the same as:

$$\frac{q^K}{q^{\neg K}} = \frac{\eta'(1-z)}{\eta'(z)} \tag{F.1}$$

Now, it was shown in the proof of Proposition 4 that $\frac{\partial e^\star}{\partial q^K} > 0$ and $\frac{\partial e^\star}{\partial q^{\neg K}} < 0$. Then, combining this with equation (F.1), it follows that $e^\star(\overline{\pi}_X, \overline{\pi}_Y, \gamma_0, \gamma_1, \psi_,^X \psi_j^Y) > z$ if and only if:

$$\frac{q^K}{q^{\neg K}} > \frac{\eta'(1-z)}{\eta'(z)} \tag{F.2}$$

Define

$$\zeta = \frac{\eta'(1-z)}{\eta'(z)} > 0$$

Then, using Proposition 2 and equation (F.2), it follows that both parties will choose $e_j^K > z$ for any $\theta \in \Theta$, if, for all $\psi_j^X \in [0,1]$ and $\psi_j^Y \in [0,1]$, we have that $\frac{q^K}{q^{\neg K}} > \zeta$.

Therefore, to prove the result, it suffices to show that there exists $\pi^\star \in (0,1)$ such that, for any $K \in \{X, Y\}$, if $\overline{\pi}_K > \pi^\star$ then, for any $\psi_j^X \in [0,1]$ and $\psi_j^Y \in [0,1]$, we have that $\frac{q^K}{q^{\neg K}} > \zeta$.

We set:

$$\pi^\star = \max\left\{\frac{1}{2}; 1 - \frac{1-2\gamma_1}{2\zeta}\right\} \tag{F.3}$$

Since the proposition assumes that $\gamma_1 < \frac{1}{2}$, it follows that $\pi^\star$ is in the interval $[\frac{1}{2}, 1)$. Consider some $K \in \{X, Y\}$. We now show that if $\overline{\pi}_K > \pi^\star$ then $q^K > 1 - 2\gamma_1$ and $q^{\neg K} < \frac{1-2\gamma_1}{\zeta}$, and therefore that $\frac{q^K}{q^{\neg K}} > \zeta$.

To show that $q^K > 1 - 2\gamma_1$, equation (14) implies that it suffices to show that

$$\begin{aligned}(1 + \overline{\pi}_K - \overline{\pi}_{\neg K})\left(1 - \gamma_0 - 2(1-\psi_j^K)(\gamma_1 - \gamma_0)\right)\\ +\gamma_0(\psi_j^K - \psi_j^{\neg K})\left(1 - \overline{\pi}_K - \overline{\pi}_{\neg K}\right) > 1 - 2\gamma_1\end{aligned} \tag{F.4}$$

To show that this inequality holds when $\overline{\pi}_K > \pi^\star$, note that, for any $\psi_j^X \in [0,1]$ and

$\psi_j^Y \in [0,1]$:

$$
\begin{aligned}
&(1+\overline{\pi}_K-\overline{\pi}_{\neg K})\left(1-\gamma_0-2(1-\psi_j^K)(\gamma_1-\gamma_0)\right)+\gamma_0(\psi_j^K-\psi_j^{\neg K})\,(1-\overline{\pi}_K-\overline{\pi}_{\neg K})\\
\geq&(1+\overline{\pi}_K-\overline{\pi}_{\neg K})\,(1-\gamma_0-2(\gamma_1-\gamma_0))-\gamma_0\,(1-\overline{\pi}_K-\overline{\pi}_{\neg K})\\
\geq&(1+\overline{\pi}_K-\overline{\pi}_{\neg K})\,(1-\gamma_0-2(\gamma_1-\gamma_0))-\gamma_0\,(1+\overline{\pi}_K-\overline{\pi}_{\neg K})\\
=&(1+\overline{\pi}_K-\overline{\pi}_{\neg K})\,(1-2\gamma_1)\\
\geq&2\overline{\pi}_K\,(1-2\gamma_1)\\
>&2\pi^\star\,(1-2\gamma_1)\\
>&1-2\gamma_1
\end{aligned}
$$

It remains to show that $\overline{\pi}_K > \pi^\star$ implies $q^{\neg K} < \frac{1-2\gamma_1}{\zeta}$, for any $\psi_j^X \in [0,1]$ and $\psi_j^Y \in [0,1]$. Since $\zeta > 0$, equation (14) implies that it suffices to show that

$$
\begin{aligned}
(1+\overline{\pi}_{\neg K}-\overline{\pi}_K)\left(1-\gamma_0-2(1-\psi_j^{\neg K})(\gamma_1-\gamma_0)\right)&\\
+\gamma_0(\psi_j^{\neg K}-\psi_j^K)\,(1-\overline{\pi}_{\neg K}-\overline{\pi}_K)&<\frac{1-2\gamma_1}{\zeta}
\end{aligned}
\tag{F.5}
$$

To show that this holds, note that:

$$
\begin{aligned}
&(1+\overline{\pi}_{\neg K}-\overline{\pi}_K)\left(1-\gamma_0-2(1-\psi_j^{\neg K})(\gamma_1-\gamma_0)\right)+\gamma_0(\psi_j^{\neg K}-\psi_j^K)\,(1-\overline{\pi}_{\neg K}-\overline{\pi}_K)\\
<&(1+\overline{\pi}_{\neg K}-\overline{\pi}_K)\,(1-\gamma_0)+\gamma_0\,(1-\overline{\pi}_{\neg K}-\overline{\pi}_K)\\
<&(1+\overline{\pi}_{\neg K}-\overline{\pi}_K)\,(1-\gamma_0)+\gamma_0\,(1+\overline{\pi}_{\neg K}-\overline{\pi}_K)\\
=&1-\overline{\pi}_K+\overline{\pi}_{\neg K}\\
<&2(1-\overline{\pi}_K)\\
<&2(1-\pi^\star)\\
\leq&\frac{1-2\gamma_1}{\zeta}
\end{aligned}
$$

□

G Numerical Examples

To illustrate the implications of the model, we show numerical results for various parameter values. Here we show results for the model with ambiguity averse voters described above. In Appendix H we also outline and present numerical results for an extension of the model in which the assumption that voters are ambiguity averse is replaced by the assumption that voters maximise expected utility.

For the purpose of these numerical examples, we adopt the following baseline parametrisation of the model. We assume that voter ideal points (x_i, y_i) are uniformly distributed across the square $[-1,1]^2$, so that the cdf of voter ideal points, F, satisfies $F(x,y) = \frac{(x+1)(y+1)}{4}$, for $(x,y) \in [-1,1]^2$. We assume that the function η takes the form

$$\eta(e) = \alpha(1-(1-e)^{1+\tau}), \quad \text{for some constants } \alpha \in (0, \frac{1}{2}], \tau > 0. \tag{G.1}$$

As a baseline, we assume that:

$$\begin{aligned} \gamma_0 = \gamma_1 &= 0.5 \\ \overline{\pi}_X = \overline{\pi}_Y = \alpha = \tau &= 0.3 \end{aligned}$$

In several of the figures below we vary the values of these parameters. The parametrisation is only for illustrative purposes and so is relatively arbitrary. Nevertheless, we note that the choices above are not particularly extreme. $\gamma_0 = \gamma_1 = 0.5$ implies that a voter has probability 0.5 of observing a party's position if she does not witness the party's campaign. $\overline{\pi}_X = \overline{\pi}_Y = 0.3$ implies that roughly equal fractions of voters are issue X-focused, Y-focused and impressionable. $\alpha = 0.3$ implies that if both parties campaign solely on an issue then 60% of voters will witness at least one party's campaign on that issue, moreover party equilibrium strategies can be shown to be completely unaffected by the value of this parameter. $\tau = 0.3$ implies that the function $\eta(e)$ is (only) slightly concave.[25]

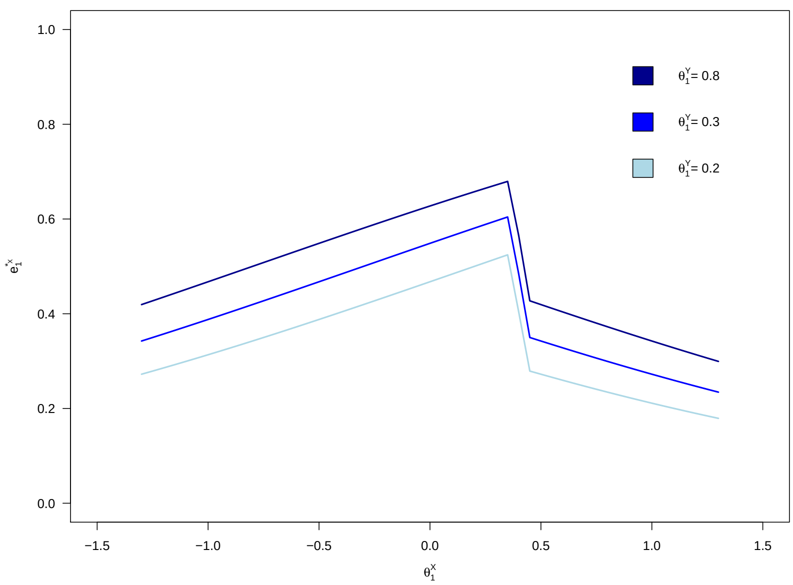
Using these parameter values, Figure 3 shows how Party 1's equilibrium emphasis on issue X depends on its positions on each issue. Recall that Party 1's optimal choice $e_1^{\star X}$ depends on ψ_1^X and ψ_1^Y and, therefore, on both parties' positions on both issues. In Figure 3, we fix Party 2's position on both issues X and Y at $0.4 = \theta_2^X = \theta_2^Y$. On the x-axis, we allow Party 1's position, θ_1^X, to vary over the interval $[-1.3, 1.3]$. The three

[25] In particular, the functional form (G.1) implies η is increasing and concave, with $\eta(0) = 1$ and $\eta(1) = \alpha$, and $\eta'(1) = 0$. With $\tau = 0.3$, $\eta'(0) = 1.3\alpha$ and $\eta'(0.8) = 0.8\alpha$, so $\eta(\cdot)$ is close to linear.

lines in the figure show $e_1^{\star X}$ when Party 1's position on issue Y is -0.8, -0.3 and 0.2.

Figure 3 reveals that Party 1 emphasises issue X more as its position moves rightwards, closer to the position of Party 2, until, at $\theta_1^X \simeq 0.39$ it is only slightly more centrist that Party 2 on this issue. Beyond this point, further shifts to the right reduce Party 1's emphasis on issue X. This pattern arises because Party 1's has a greater desire to increase the salience of issue X when it's position on this issue has greater potential to attract votes. Party 1's position on issue X has the greatest potential to win votes when the party is slightly closer to the median voter than Party 2 on this issue, since the majority of voters will prefer Party 1's position on issue X in this case. As a consequence, Party 1 emphasises issue X most when it is just to the left of Party 2 on this issue. Similarly, Figure 3 shows that Party 1 emphasises issue X less and emphasises issue Y more as its position on issue Y moves rightwards and closer to the position of Party 2. This is because Party 1's position on issue Y is most electorally advantageous when it is slightly closer to the median voter than Party 2 on this issue. Importantly, Figure 3 shows that Party 1 tends to choose $e_1^{\star X}$ between 0.2 and 0.65 at almost any position it could hold. This indicates that, at these parameter values, the clarity incentive is sufficiently powerful that Party 1 prefers to emphasise both issues to a significant degree, rather than focus overwhelmingly on one issue.

Figure 3: Party 1's Equilibrium Emphasis on Issue X as its Position Varies



Using the same parameter values, Figure 4 shows how Party 1's equilibrium emphasis on issue X changes as Party 2's position on issue Y changes. The x-axis shows Party

1's position on issue X as before. However, we fix Party 1's position on issue Y at -0.4 and fix Party 2's position on issue X at 0.4. The three lines in the figure instead show $e_1^{\star X}$ when Party 2's position on issue Y, θ_2^Y is -0.2, 0.3 and 0.8. The figure shows that when $\theta_2^Y = -0.2$, at which point Party 2 is slightly more centrist than Party 1 on issue Y, Party 1 chooses to emphasise issue X relatively more. This is because most voters who care about issue Y will prefer Party 2's position on this issue, leading Party 1 to wish to decrease the salience of issue Y, and increase the salience of issue X. However, the figure shows that if Party 2's position on issue Y moves rightwards, Party 1 tends to emphasise issue X less and emphasise issue Y more, since it is relatively easier for Party 1 to pick up votes on issue Y in this case.

Figure 4: Party 1's Emphasis on Issue X as Party 2's Position on Y Varies

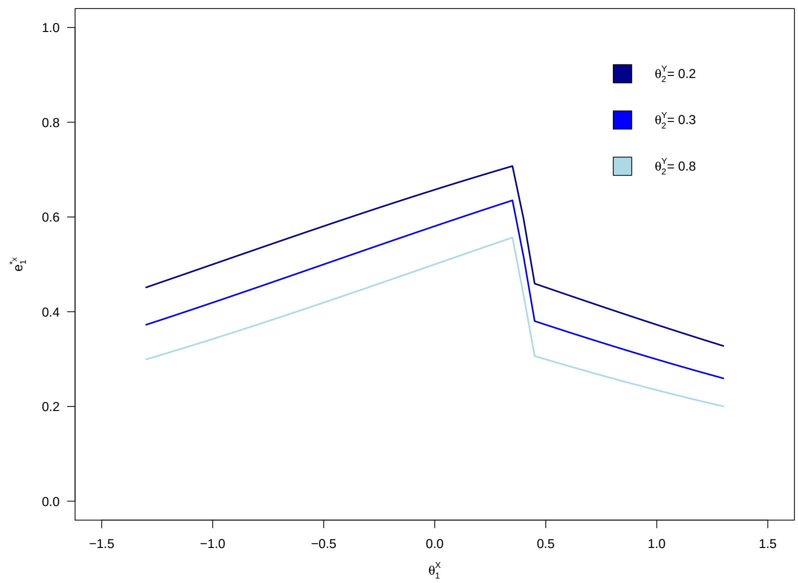
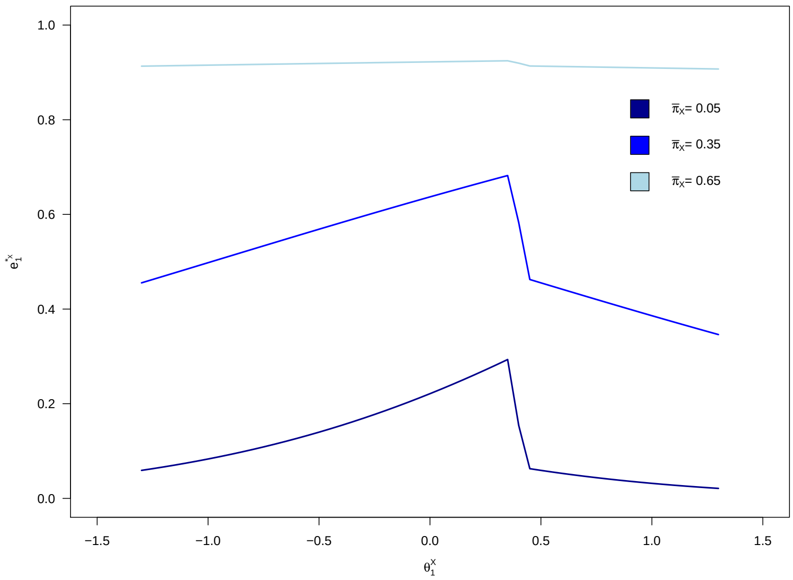


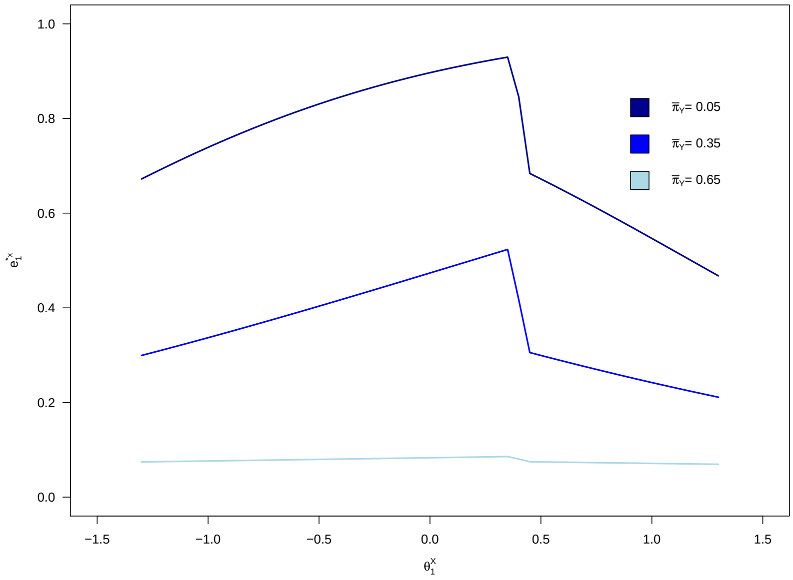
Figure 5 shows how Party 1's emphasis on issue X changes as the value of $\overline{\pi}_X$ changes, holding all other parameters constant at their baseline values. As with the previous figures, the x-axis shows Party 1's position on issue X. Party 1's position on issue Y is fixed at -0.4, and Party 2's position on each issue is fixed at 0.4. The figure shows that when $\overline{\pi}_X$ increases, Party 1's equilibrium emphasis on issue X increases. This is because the greater the number of X-focused voters, the more important it is for Party 1 to ensure that these voters observe its position on issue X, leading it to increase emphasis on X. When $\overline{\pi}_X$ reaches 0.65, we find that Party 1 tends to emphasise issue X almost exclusively, regardless of its position on the issue. This is consistent with Proposition 5 above. Figure 6 is similar to Figure 5, except that that Figure 6 shows how Party 1's emphasis on issue X changes as the value of $\overline{\pi}_Y$ changes. As $\overline{\pi}_Y$ increases, the number of Y-focused voters increase, making it more important for Party 1 to ensure that these voters observe its position on issue Y. Consequently, as $\overline{\pi}_Y$ increases, Party 1 increases its relative emphasis on issue Y and decreases its relative emphasis on issue X.

Figure 5: Party 1's Emphasis on Issue X as $\overline{\pi}_X$ Varies



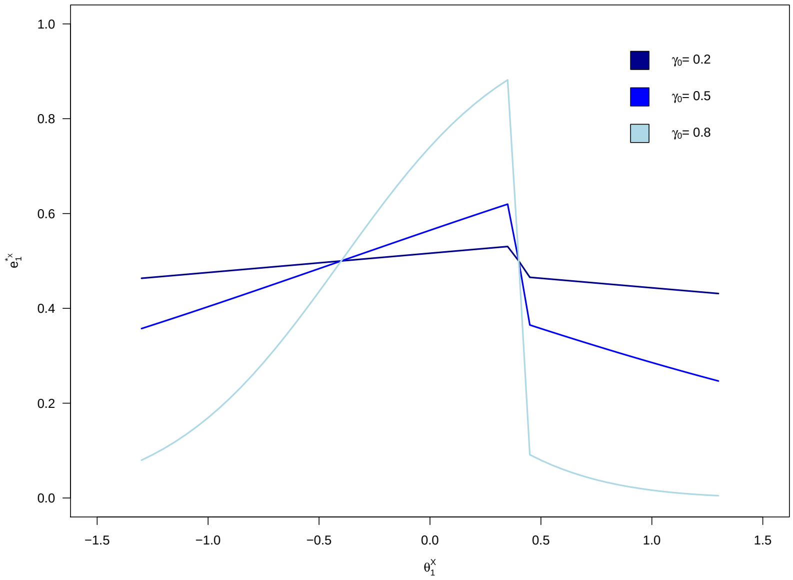
The final figure, Figure 7 shows how Party 1's emphasis on issue X changes as γ_0 and γ_1 change. Again, the x-axis shows Party 1's position on issue X, Party 1's position on issue Y is fixed at -0.4, and Party 2's position on each issue is fixed at 0.4. In the figure, we set $\gamma_1 = \gamma_0$, but allow γ_0 to vary, holding other parameters constant at their baseline values. The three lines show Party 1's optimal emphasis on X when γ_0 and γ_1 are both equal to 0.2, 0.5 and 0.8. Figure 7 shows that, when γ_0 and γ_1 are close to zero, Party 1 places close to 0.5 emphasis on issue X, regardless of its position. On the other hand, when γ_0 and γ_1 are closer to 1, Party 1 is increasingly inclined to place little emphasis on X when its position on X is extreme and to place a lot of emphasis on X when its position on X is close to the median voter. The reason for this is that the clarity incentive is weaker when γ_0 and γ_1 are larger, as explained in the discussion of Proposition 3. Therefore, when γ_0 and γ_1 are close to zero, the clarity incentive is very powerful. This incentive leads parties to emphasise both issues to a similar degree, to increase the chance that voters observe their positions. On the other hand, when γ_0 and γ_1 are closer to 1, voters are likely observe parties' positions regardless of what the parties do and so the clarity incentive is weak. Then, the main relevant incentive for the parties

Figure 6: Party 1's Emphasis on Issue X as $\overline{\pi}_Y$ Varies



is the salience effect of campaigns. The salience effect of campaigns encourages Party 1 to emphasise issue X if and only if its position on X is more electorally advantageous than its position on Y. Therefore, it emphasises issue X strongly when it is relatively near the median voter on this issue, but not otherwise.

Figure 7: Party 1's Emphasis on Issue X as γ_0, γ_1 Vary



H If Voters Maximise Expected Utility

We now discuss the assumptions of the model with voters that maximise expected utility. This is completely identical to the model discussed in the main text with one two exceptions. The first exception is that we specify that nature chooses the parties' positions at the start of play according to the cumulative distribution function G, so that

$$\text{Prob}(\theta_1^X \leq x_1, \theta_1^Y \leq y_1, \theta_2^X \leq x_2, \theta_2^Y \leq y_2) = G(x_1, x_2, y_1, y_2)$$

Furthermore, we assume that G is symmetrical across parties, so that, for any x_1, x_2, y_1, y_2:

$$G(x_1, x_2, y_1, y_2) = G(x_2, x_1, y_2, y_1)$$

The second exception is that we assume that voters are expected utility maximising rather than ambiguity averse. As before, some voters are issue X-focused, some are issue Y-focused and some are impressionable. Again, as before, the fraction of voters that are of each type, and who observe no, one or both parties' positions on an issue are given by the variables ρ_0, ρ_j^{KF}, ρ_j^{KI}, ρ_B^{KF} and ρ_B^{KI} which are defined by equations (1)-(5). However, since voters maximise expected utility, a voter who observes only Party j's position on issue X votes for Party j if and only if:

$$U(|x_i - \theta_j^X|) \geq \int_{\hat{\theta}_{\neg j}^X \in \Theta} U(|x_i - \hat{\theta}_{\neg j}^X|) d\mu_i(\hat{\theta}_{\neg j}^X | \theta_j^X)$$

where

$$\mu_i(\hat{\theta}_{\neg j}^X | \hat{\theta}_j^X) = \text{Prob}(\theta_{\neg j}^X \leq \hat{\theta}_{\neg j}^X | \text{Voter } i \text{ observes only } \theta_j^X = \hat{\theta}_j^X) \tag{H.1}$$

with an analogous expression for issue Y.

Our assumptions imply that, for each issue K, $\mu_i(\hat{\theta}_{\neg j}^K | \hat{\theta}_j^K)$ is the same for all voters i, given $\hat{\theta}_{\neg j}^K$ and $\hat{\theta}_j^K$. To demonstrate this, assume first that voter i is an issue-K-focused voter. Applying Bayes's rule to equation (H.1) reveals that $\mu_i(\hat{\theta}_{\neg j}^K | \hat{\theta}_j^K)$ is in this case equal to:

$$\mu_i(\hat{\theta}_{\neg j}^K | \hat{\theta}_j^K) = \frac{\int_{\{\theta \in \Theta : \theta_j^K = \hat{\theta}_j^K, \theta_{\neg j}^K \leq \hat{\theta}_{\neg j}^K\}} \rho_j^{KF}(\theta) dG(\theta)}{\int_{\{\theta \in \Theta : \theta_j^K = \hat{\theta}_j^K\}} \rho_j^{KF}(\theta) dG(\theta)} \tag{H.2}$$

Here, we write $\rho_j^{KF}(\theta)$ to denote the fact that ρ_j^{KF} depends on parties' emphases e_1^X, e_1^Y, e_2^X, e_2^Y, which in turn depend on parties' positions θ.

Now, suppose that voter i is an impressionable voter. Applying Bayes's rule to equation (H.1) reveals that $\mu_i(\hat{\theta}_{\neg j}^K | \hat{\theta}_j^K)$ is in this case equal to:

$$\mu_i(\hat{\theta}_{\neg j}^K | \hat{\theta}_j^K) = \frac{\int_{\{\theta \in \Theta : \theta_j^K = \hat{\theta}_j^K, \theta_{\neg j}^K \leq \hat{\theta}_{\neg j}^K\}} \rho_j^{KI}(\theta) dG(\theta)}{\int_{\{\theta \in \Theta : \theta_j^K = \hat{\theta}_j^K\}} \rho_j^{KI}(\theta) dG(\theta)} \tag{H.3}$$

From equations (1) and (2) in Section 3.3, it follows immediately that

$$\rho_j^{KI}(\theta) \equiv \left(\frac{1 - \overline{\pi}_X - \overline{\pi}_Y}{2\overline{\pi}_K} \right) \rho_j^{KF}(\theta)$$

As such, the right hand side of equation (H.3) is always equal to the right hand side of equation (H.2). Thus, it follows that $\mu_i(\hat{\theta}_{\neg j}^K | \hat{\theta}_j^K)$ is the same for all voters i, given $\hat{\theta}_{\neg j}^K$ and $\hat{\theta}_j^K$.

For each $j \in \{1, 2\}$ and $K \in \{X, Y\}$, 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. In the model in the main text, with ambiguity averse voters, it was effectively assumed that $\phi_j^K = 1$ since all voters who only observe Party j's position were assumed to vote for Party j. When voters maximise expected utility, this is no longer the case. Instead, ϕ_j^X

is given by:

$$\phi_j^X = \int_{-\infty}^{\infty} \mathbf{1}\left\{U(|x_i - \theta_j^X|) \geq \int_{\hat{\theta}_{\neg j}^X \in \Theta} U(|x_i - \hat{\theta}_{\neg j}^X|) d\mu(\hat{\theta}_{\neg j}^X | \theta_j^X)\right\} f_X(x_i) \partial x_i \tag{H.4}$$

with an analogous expression for issue Y. Here, we omit the i subscript in $\mu_i(\cdot|\cdot)$, since this is the same for all voters i.

This completes the description of voters who observe the position of only one party. Other voters behave in exactly the same way as in the model in the main text. Voters who observe both parties' positions on an issue maximise their expected utility by voting for the party whose position is closest to their own. Therefore the proportion of such voters that vote for a particular Party j is given by ψ_j^X and ψ_j^Y, which are described in equations (9) and (10) in the main text. As before, we assume that voters who observe neither party's position vote for each party with probability one half. This maximises the expected utility of such voters, since their expected utility of voting for each party is equal.[26]

As before, a party's strategy s is a mapping from party positions θ to issue emphases, and we 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:

$$V_j(\theta, s) = \frac{\rho_0}{2} + \sum_{K \in \{X,Y\}} (\rho_B^{KF} \psi_j^K + \rho_B^{KI} \psi_j^K + \rho_j^{KF} \phi_j^K + \rho_j^{KI} \phi_j^K) \tag{H.5}$$

which replaces the equation (11) used in the model with ambiguity averse voters.

In the model with expected utility maximising voters, we define an equilibrium as a strategy profile s for the parties, a voter belief function μ and a value of ϕ_j^K for each $K \in \{X, Y\}$, $j \in \{1, 2\}$ and for each $\theta \in \Theta$, such that:[27]

1. Each ϕ_j^K is consistent with equation (H.4) (and an analogous equation for issue Y),

[26]Naturally, one could assume that all such voters break their indifference in favour of one party, rather than by voting for each with probability one half. However, the case we consider here seems the natural one to focus on.

[27]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 one-half.

given μ.

2. μ is consistent with equation (H.2) given parties' emphasis strategies.

3. Each party's strategy maximises its vote share V_j, given by (H.5), given the strategy of the other party, and given the values of ϕ_j^K.

H.1 Numerical Examples

We were not able to obtain a complete analytical characterisation of the equilibrium when voters maximise expected utility. Instead, we present numerical results for various parameter values, as was done in Appendix G for the model with ambiguity averse voters. The model equilibrium appears to be unique for all the parameter values we have considered.

In general, we use the same baseline parameters as in Appendix G. As in Appendix G, we assume a uniform distribution of voters over the square $[-1, 1]^2$ and assume that η takes the functional form given in equation (G.1). Furthermore, we assume, as in Appendix G, that

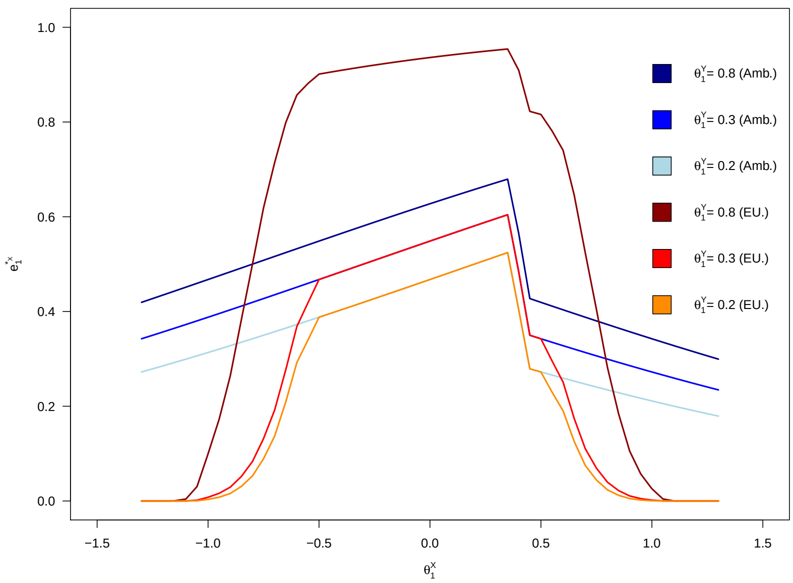
$$\begin{aligned} \gamma_0 = \gamma_1 &= 0.5 \\ \overline{\pi}_X = \overline{\pi}_Y = \alpha = \tau &= 0.3 \end{aligned}$$

When voters maximise expected utility, there are several more parameters that must be determined. It is necessary to fix the utility function of voters and the distribution G from which parties' positions are chosen by nature. We assume that the voter utility function satisfies $U(x) = -x^2$ and that the distribution G is uniform over the square $[-2, 2]^2$. These choices imply that voters have some risk aversion (in the sense that U is strictly concave) and that voters have quite a high degree of uncertainty, ex ante, about parties' positions. These assumptions are important for the clarity incentive to have much power in the model when voters maximise expected utility. If instead voters had no risk aversion, or were reasonably certain about the positions that parties would adopt ex ante, then many voters may choose to vote for a party even if they do not observe its position on an issue directly. In that case, the clarity incentive would be weak or non-existent.[28]

[28]As such, we find that if we set U to have very little curvature (e.g. $U(x) = |x|^1.1$) or if we reduce the variance of G (for instance, setting G to be uniform over the square $[-0.5, 0.5]^2$)- then parties choose to emphasise only one issue in equilibrium for virtually all party positions. That is, they set $e_j^K = 1$ for one issue and $e_j^{\neg K} = 0$ for the other

Starting from these baseline parameters, Figures 8-12 replicate Figures 3-7 from Appendix G but consider the case of expected utility maximising voters. For convenience, Figures 8-12 also include the case of amibiguity averse voters, for which the results are the same as in Figures 3-7. Inspection of the figures indicates that the model with expected utility maximising voters implies identical equilibrium behaviour to the model with ambiguity averse voters, provided that party positions are not too extreme – that is, roughly, provided $\theta_j^K \in [-0.6, 0.6]$ for each $K \in \{X, Y\}$ and $j \in \{1, 2\}$. By contrast, when parties take much more extreme positions, the model with expected utility maximising voters implies that each party chooses to emphasise only one issue in its campaigns. That is, they set $e_j^K = 1$ for one issue and $e_j^{\neg K} = 0$ for the other issue. Indeed, we find that when party positions are outside the interval $[-1.3, 1.3]$—not shown in the figures—parties choose to emphasise only one issue in campaigns in virtually all cases.

Figure 8: Party 1's Emphasis on Issue X as its Position Varies, Expected Utility-Maximizing vs. Ambiguity-Averse Voters



To understand intuitively where the results for the model with expected utility maximising voters come from, Figure 13 plots the equilibrium value of ϕ_1^X for different positions θ_1^X of Party 1, at the baseline parameter values. When θ_1^X is close to zero, we find that $\phi_1^X = 1$. That is, in these cases, all voters who observe only Party 1's position on issue X choose to vote for that party. This is exactly the same as what occurs when

issue. This closely resembles results from most previous models of party issue emphasis, in which the clarity incentive was not present.

Figure 9: Party 1's Emphasis on Issue X as Party 2's Position on Y Varies, Expected Utility-Maximizing vs. Ambiguity-Averse Voters

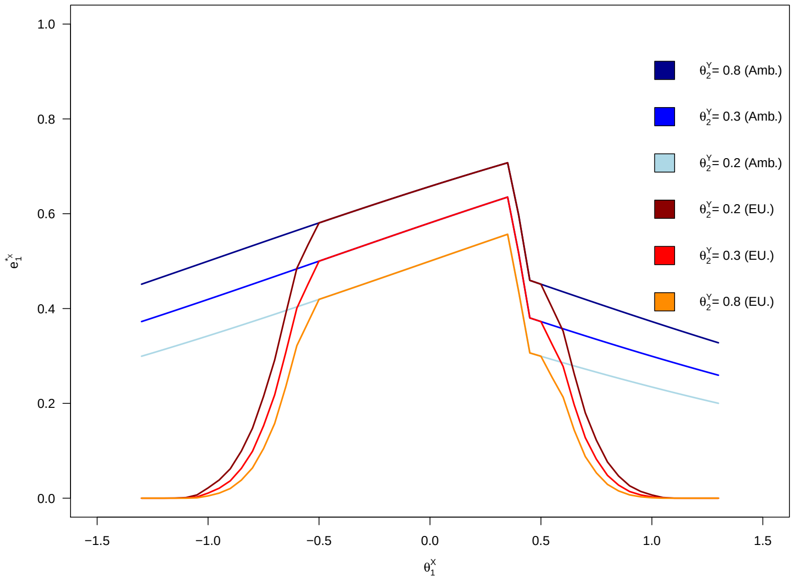


Figure 10: Party 1's Emphasis on Issue X as $\overline{\pi}_X$ Varies, Expected Utility-Maximizing vs. Ambiguity-Averse Voters

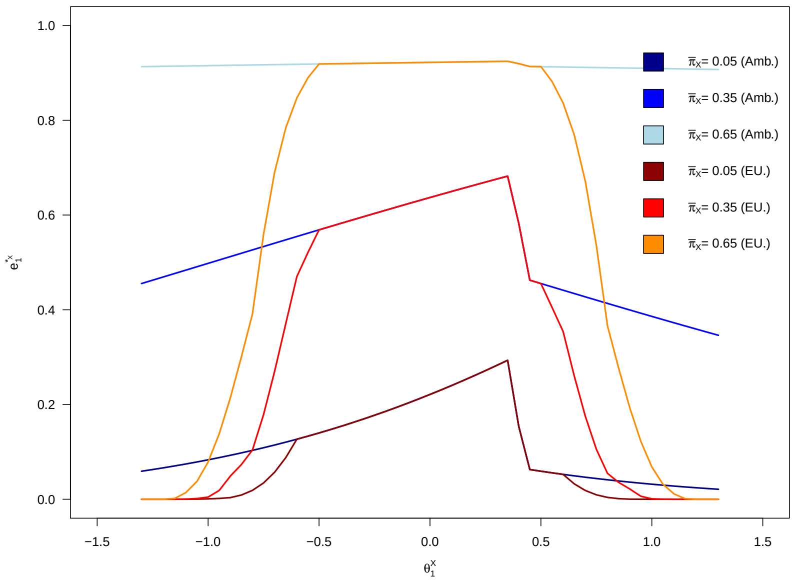


Figure 11: Party 1's Emphasis on Issue X as $\overline{\pi}_Y$ Varies, Expected Utility-Maximizing vs. Ambiguity-Averse Voters

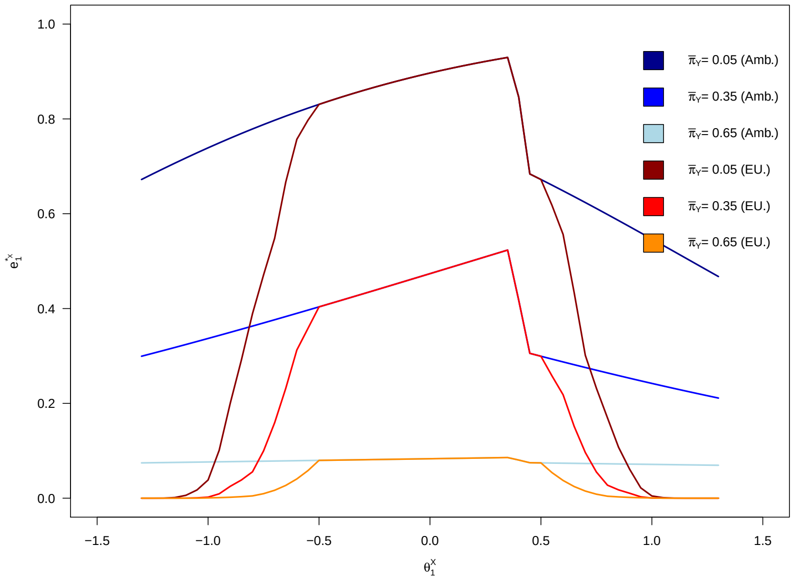


Figure 12: Party 1's Emphasis on Issue X as γ_0, γ_1 Vary, Expected Utility-Maximizing vs. Ambiguity-Averse Voters

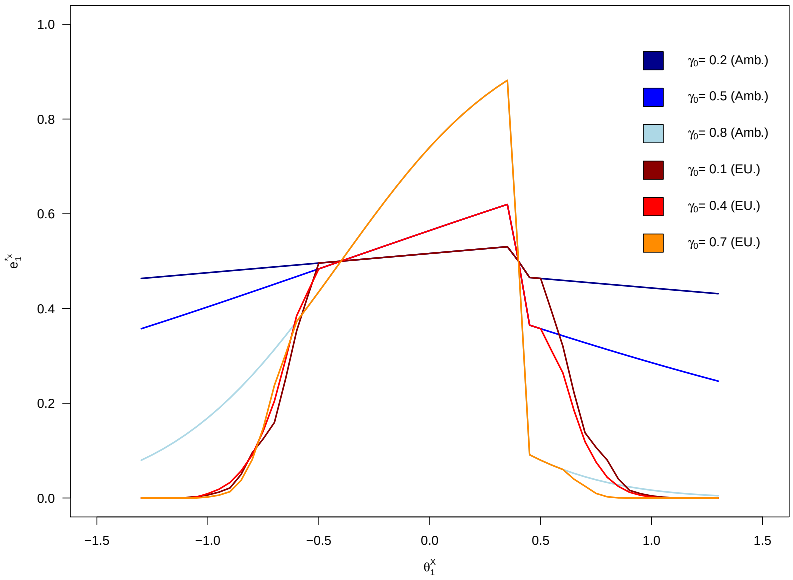
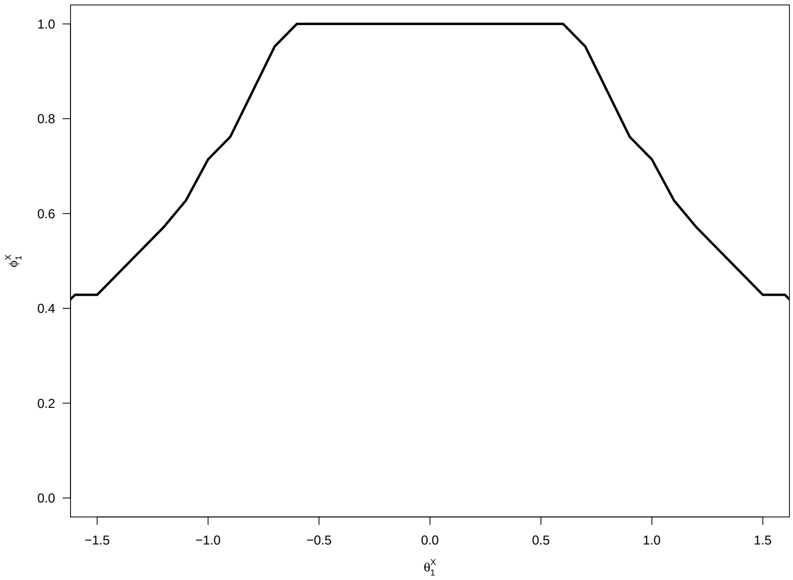


Figure 13: Φ_1^X as θ_1^X varies, with Expected Utility-Maximizing Voters



voters are ambiguity averse. Therefore, it is no surprise that the equilibrium of the model with expected utility maximising voters is the same as with ambiguitiy averse voters for party positions close to zero. On the other hand, when θ_1^X is far from zero, we find that $\phi_1^X < 0.5$. That is, if Party 1 has a position far from zero, the majority of voters who see only its position still choose to vote for Party 2, out of a belief that Party 2's position is unlikely to be as extreme as Party 1's. In these cases, the clarity incentive for Party 1 on issue X is non-existent: Party 1 has no incentive to clarify its position on issue X because the more voters observe its position the more they will be repelled. In the absence of a clarity incentive, party strategies are based upon the salience effect of campaigns: parties choose to focus entirely on the issue on which they are most popular, in order to increase the salience of this issue.