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# HOW PRESSURE GROUPS ACTIVATE VOTERS AND MOVE CANDIDATES CLOSER TO THE MEDIAN*

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This article shows how uninformed but rational voters can respond intelligently to political advertising. The article models a situation where a candidate must rely on a pressure group for financing political advertising and making endorsements. The pressure group uses its power over the purse to influence the position chosen by the candidate. Nevertheless, when uninformed voters use a strategic rule of thumb, pressure-group contributions always move the outcome of the election closer to the median voter. By using such a rule of thumb, when there is advertising, uninformed voters can have the same influence on the election as informed voters.

How should uninformed but rational voters respond to political advertising? Can pressure groups, with financial resources to fund political campaigns that provide information on the candidates, gain at the expense of the median voter? This article seeks to answer these and related questions.

Building on the framework introduced by Baron (1994) and used extensively by others, I model the case where there are two types of voters: informed and uninformed. I investigate two opposing assumptions regarding candidate preferences:

(1) Both candidates maximise the probability of winning.
(2) Both candidates are policy motivated and maximise expected policy implementation.

I consider a situation close to being a 'worst-case scenario'. A pressure group, which, for convenience, I will assume is on the right, has a monopoly on campaign funds and can make the following binding take-it-or-leave-it offer to one of the candidates: in exchange for the candidate taking a particular position, the pressure group (for example, the National Rifle Association) will endorse the candidate as being closer to the pressure group's most preferred position and provide money to advertise that this is the case. Despite the extreme power of the pressure group in this model, I show that pressure group contributions to political campaigns move the outcome towards the most preferred position of the median voter overall when uninformed voters employ the following strategic rule of thumb: vote for the endorsed candidate if the voter is to the right of the median voter and vote for the other candidate if the voter is to the left of the median.

The intuition behind this result is as follows. In the absence of political advertising, uninformed voters do not know the relative positions of the candidates and abstain. The outcome is therefore at the median of the informed voters. If a right-wing pressure group endorses one of the candidates as being closer to its preferred position, uninformed voters then know the relative positions of the candidates and will vote according to the above rule of thumb. Of course, a right-wing pressure group will only

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provide such information in the first place if there are more uninformed voters to the right of the median *informed* voter than to the left. That is, the pressure group finds it optimal to endorse a candidate and 'activate' the group of uninformed voters if and only if the overall median is to the right of the median informed voter. The endorsed candidate is induced to accept the endorsement itself exactly because a sufficiently large majority of the uninformed (but now activated) voters will vote for the candidate to enable the candidate to win.

Because uninformed voters do not actually know where the candidates are located, one might conceive of a situation where the candidates are so far to the right that some of the uninformed voters to the right of the median voter are to the left of the left candidate and nevertheless mistakenly vote for the candidate on the right. But I show that given the strategies of the candidates, this situation does not arise.

## 1. Literature Review

There is an extremely large literature, which assumes that uninformed voters are simple automatons – the more money a candidate spends on advertising, the more votes the candidate receives.[1] The main conclusion of this literature is that, *on average*, pressure group donations make the outcome worse for the median voter – a conclusion opposite of that derived here. In my literature review, I will ignore work that assumes irrational automatons and instead concentrate on those articles that assume rational voting by uninformed voters.

Potter *et al.* (1997), Gerber (1999), Prat (2002*a,b*), Coate (2004*a,b*) and Wittman (2007) consider the case where the voters know the positions of the candidates but not their relative quality (where quality stands for some characteristic of the candidate, such as leadership skill, valued by all the voters and orthogonal to policy position). This is in contrast to the model considered here, where the uninformed voters do not know the candidates' positions and the candidates do not differ in quality. In these models, the pressure group has inside information on the relative quality of the candidates and, in return for a more desirable position, may endorse one of the candidates as the high-quality candidate.[2] This characterisation of the political process seems to miss the mark. The NRA does not endorse a candidate because the candidate is smart or because the candidate is a good leader but because the candidate takes a position closer to its own position than the other candidate and it is this information about the candidate's stand on gun control that the NRA provides to voters. There are other differences between my model and this literature. Despite these differences in assumptions, some of the results are similar (especially from the perspective of the voters as automatons literature). In particular, imperfectly informed voters cannot be systematically fooled. Not surprisingly, some of the results also differ. In all of the aforementioned models, pressure group endorsements

[1] For reviews of this literature see Morton and Cameron (1992), Austen-Smith (1997) and Wittman (2009).

[2] Lohmann (1998) and Grossman and Helpman (1999) view members of pressure groups as being more sensitive to candidate positions than individual voters. As a consequence, candidates pay more attention to pressure groups. In that sense, members of pressure groups correspond to my informed voters. Neither Lohmann nor Grossman and Helpman is concerned with how uninformed voters who are not members of pressure groups respond to political advertising.

(implied by donations or directly stated) move the candidates away from the median voter; here, pressure group endorsements move the candidates toward the median voter. In several of these models, a pressure group with extreme preferences will capture all the benefits of its inside information and voter welfare is made worse by the existence of the pressure group.[3] Here, advertising always improves the welfare of the median voter. The reason for these differing results appears to be due to the nature of the information provided. Information on relative quality helps the high-quality candidate; while information on relative position only helps the candidate closer to the median voter.

Perhaps closest in spirit is the work by McKelvey and Ordeshook (1985).[4] They assume that uninformed voters know:

(1) the distribution of preferences of the informed and uninformed voters;
(2) where they are in the distribution (e.g., 80th percentile to the right);
(3) which candidate is on the right; and
(4) poll data showing the percentage of voters preferring each candidate.

Given this information, the voters can make inferences about which candidate is closest. For example, if the poll data shows that 60% of the voters prefer the candidate on the right, then an uninformed voter on the extreme right can infer that he should vote for the candidate on the right. In the model that I present here, the uninformed voters have access to far less information and it is not necessary for them to make such complicated inferences.

I now consider the model in greater detail.

## 2. Assumptions

(*a*) *Let X be a one-dimensional issue space composed of N integer positions [*$1, 2, \ldots N$*]. Let x be an element of X.*

(*b*) *There are two candidates,* 1 *and* 2*, who choose positions* $x_1$ *and* $x_2$*, respectively. Let* $P_1$ *be the probability that candidate* 1 *wins the election and* $P_2$ *be the probability that candidate* 2 *wins the election* ($P_1 + P_2 = 1$)*. Both candidates have one of the following* 2 *objectives functions:*

(*i*) *Each candidate maximises her probability of being elected. That is, candidate i maximises* $P_i$*. If a candidate has a zero probability of being elected, then the candidate will maximise vote share (if the loser does not demonstrate a credible showing, the political party in the next election may replace the candidate with someone who the party thinks will know the distribution of voter preferences better). A candidate prefers an undominated position to one that is not; that is, given a choice between two positions, a candidate prefers the position that wins whether the candidate is a Stackleberg leader or*

[3] The reasoning is as follows: The median voters prefer the high-quality candidate who yields $Q$ more utility in quality and $Q - \varepsilon$ less utility in position over the low-quality candidate at the median voter's most preferred position. But the median voter prefers to have no advertising and both candidates at the median voter's most preferred position with the high-quality candidate winning half the time.

[4] Somewhat further afield is work by Cukierman (1991) and Grofman and Norrander (1991).

*treats the other player's position as given (Cournot behaviour) to one that wins only if the candidate engages in Cournot-type conjectures. For later reference, I refer to this last requirement as the undominated assumption.*

(*ii*) *Both candidates are policy motivated. Let* $V^i(x_j)$ *be candidate i's utility if candidate j wins the election and implements policy* $x_j (i,j = 1 \text{ or } 2)$. $V^i(x_j)$ *is strictly concave and symmetric with a maximum at* $\hat{v}_i$. *Candidate i maximises expected utility from implemented policy:* $P_1 V^i(x_1) + P_2 V^i(x_2)$. *If the policy outcome will be the same, a candidate prefers to accept an endorsement.*[5]

(*c*) *Each voter i has a symmetric and strictly concave utility function,* $U_i(x)$, *with a maximum at* $x = \hat{x}_i$, *i's most preferred position. There are n informed voters with a median most preferred position at integer* $\hat{x}_m^I$, *and m uninformed voters with a median most preferred position at integer* $\hat{x}_m^U$. *n is odd and m is even. There is at least one informed voter at every possible position. The number of voters strictly to the left of the overall median* $(\hat{x}_m^{I+U})$ *is equal to the number of voters strictly to the right of the overall median. The pressure group and the candidates know* $\hat{x}_m^I$ *and* $\hat{x}_m^U$.[6]

(*d*) *The pressure group has a symmetric and strictly concave policy preference function,* $U_p(x)$, *with a maximum at* $x = \hat{x}_p$. *For convenience, I assume that* $\hat{x}_p$ *is to the right of* $\hat{x}_m^I$. *Let* $y_c$ *be the amount of money donated by the pressure group to candidate C for advertising that candidate C is to the right of the other candidate.*[7] *I refer to candidate C as either candidate 1 or the 'endorsed' candidate.* $U_p(x) - y_1$ *is the pressure group's utility function when x is the winning position. The pressure group knows the objective of the candidates. To avoid wasting time on useless details I also assume that if pressure group donations move the election outcome closer to the pressure group's preferred position, then the benefit of doing so outweighs the cost. Finally, I assume that if the outcome is the same, the pressure group prefers that the winning candidate is the candidate endorsed by the pressure group (perhaps due to greater access).*

(*e*) *Uninformed voters do not observe* $x_1, x_2$, *or* $y_c$ *or, in the absence of political advertising, whether an offer has been made or to whom. The uninformed need not know with precision where their own most preferred position,* $\hat{x}_i$, *is located, but they do know whether their most preferred position is to the left, to the right or at the overall median. Through advertising they know which candidate is to the right of the other but they need not know directly whether the left candidate is to the extreme left and the right candidate is to the extreme right, or both are to the extreme left or right with the right candidate being slightly more to the right.*

Campaign contributors are often identified. In the US, such information is required by law. Furthermore, the candidate receiving funds often advertises that she has received support from various interest groups and sometimes the other candidate claims that the first candidate has been bought out by special interests.[8] Certainly, it is

[5] Other assumptions are possible. The argument is sped along when participants have lexicographic preferences to break ties.
[6] In a more complicated model, this knowledge could be gained over a series of elections.
[7] For simplicity, I assume that advertising is truthful. Alternatively, if the uninformed voters know that the pressure group is on the right and that the candidate has accepted donations from or agreed to be endorsed by the pressure group, then the uninformed voters can infer that the candidate is on the right.
[8] For a discussion of the importance of pressure group endorsements, see Lupia (1994). Here, an endorsement is a signal from the pressure group.

no secret when the National Rifle Association supports one of the candidates in an election and it is no secret where the NRA stands on gun control. Hence, my assumption that through advertising the uninformed voters know which candidate is to the right of the other seems justified.

The game proceeds as follows:

(1) Nature chooses the distribution of informed voters' preferences, the distribution of uninformed voters' preferences and then, if the candidates are policy motivated, the preferences of the candidates, which are drawn from a symmetric distribution around $\hat{x}^I_m$.[9]

(2) The pressure group makes a one-time take-it-or-leave-it offer to candidate 1.[10] If candidate 1 agrees to choose position $x^*$, then the pressure group will provide $y_1$ to the candidate for advertising that candidate 1 is to the right of candidate 2. If the agreement is accepted, it is binding on both sides.

This is a simplified version of a menu auction. Allowing the pressure group to make a one-time offer to one of the candidates without the possibility of the candidate making a counter offer increases the power of the pressure group. If, as I assume, the pressure group has the same information as the candidate, then the candidate cannot gain advantage because of inside information. With only one pressure group, instead of two or more, the power of the pressure group is maximised. These and other implicit assumptions create something close to being a worst-case scenario. If I can show that pressure group donations are welfare improving when the pressure group has all this power, then I have a very strong result, indeed.

(3) Candidate 2 knows whether candidate 1 has received an offer and if so, the required position, $x^*$. The candidates simultaneously decide their positions (candidate 1 decides whether to accept the offer, if one has been made, or chooses another position).[11] If candidate 1 rejects the offer, then the pressure group is out of the picture and we are back to the standard Downsian model.

(4) The positions of the candidates are then made public to the *informed* voters. If candidate 1 has accepted the pressure group's offer, then candidate 1 will use the pressure group's campaign donations to advertise to the (uninformed) voters that it is to the right of candidate 2.

(5) The voters choose.

Each informed voter observes the candidates' positions, $x_1$ and $x_2$. Each informed voter then votes or abstains. The uninformed voters first observe whether there has been advertising, and if there is, they discover which candidate is to the right, (possibly weakly to the right) of the other. Each uninformed voter then either votes or abstains.

[9] I make such an assumption so that the uninformed voters cannot make useful inferences about the candidates' preferences and positions. If they could, they might no longer be uninformed. The variance of the distribution around $\hat{x}^I_m$ may vary as $\hat{x}^I_m$ varies.

[10] For simplicity, I assume that the offer is made to only one candidate. The possibility of endorsing both candidates is considered in my working paper, but such a possibility has a certain illogic to it.

[11] The undominated assumption means that, for certain values of $x^*$, candidate 2 can predict candidate 1's choice. For these particular values of $x^*$, the analysis will be similar to the analysis that would be made if one were to assume that Candidate 1 makes the first move.

(6) The candidate receiving the most votes wins the election and implements $x_c$. The voters then receive utility $U_i(x_c)$.

I next consider a simple strategy by the uninformed and a counter strategy by the informed.

Definition. *The uninformed voters have a strategic rule of thumb if the following holds:*

*When there is no endorsement, then the uninformed voters vote for each candidate with probability* $1/2$ *or abstain.*

*When candidate* 1 *is endorsed as being to the right of candidate* 2 *and*

(*i*) *the voter's most preferred position coincides with* $\hat{x}_m^{I+U}$, *then the uninformed voter abstains;*

(*ii*) *the voter's most preferred position is strictly to the right of* $\hat{x}_m^{I+U}$, *then the uninformed voter votes for candidate* 1*;*

(*iii*) *the voter's most preferred position is strictly to the left of* $\hat{x}_m^{I+U}$, *then the uninformed voter votes for candidate* 2.

As I show, this rule of thumb works extremely well for uninformed voters as the outcome would not improve for them even if some or all of them became informed. It is hard to come up with other rules of thumb that would make sense for the uninformed. I consider some obvious contenders:

(1) *Vote for the endorsed candidate if you are uninformed.* Given this rule, the endorsed candidate would win with the most extreme right-wing position if a majority of voters were uninformed. This could easily be worse for many of the uninformed than not voting at all. Clearly, it would make sense for some of the uninformed to deviate from this alternative rule of thumb. If those who were most hurt by this rule (those who were to the left of the median voter overall) logically figured out that they were being hurt by this rule, then they would vote against the endorsed candidate and we would have the rule of thumb described above.

(2) *Vote against the endorsed candidate if you are uninformed.* No candidate would accept an endorsement given this rule of thumb. Again, those who were most hurt (this time those to the right of the median overall) could figure out that they were being hurt by this rule and instead vote for the endorsed candidate, thereby converging to the rule of thumb given above.

(3) *Choose a different focal point, say, the median informed voter.* Once again, those who were most hurt (this time those between the median informed voter and the median overall) would figure out that they were voting against their own interests and as a result we would have the rule of thumb described above.[12]

I have shown that it would make sense for some (perhaps most) of the uninformed to deviate from the above alternative rules. In contrast under the rule of thumb presented here, no set of uninformed voters can improve their welfare by deviating from the rule of thumb (this will be demonstrated later).

[12] One can also show that a rule of thumb that involves voting against a particular candidate in the absence of any endorsements is also not a good strategy.

Definition. *The informed voters have a counter strategy if the following holds:*

*If an informed voter is otherwise indifferent between the candidates' positions, then*

(*i*) *the informed voter will vote for the endorsed candidate if the outcome of the election is strictly better for the informed voter than the outcome in the absence of an endorsement;*[13]
(*ii*) *the informed voter will vote for the non-endorsed candidate if the outcome of the election is strictly worse for the informed voter than the outcome in the absence of an endorsement;*
(*iii*) *the informed voter will vote for each candidate with probability one-half if there is no endorsement or the informed voter is indifferent between the outcome when there is an endorsement and the outcome when there is no endorsement.*

This counter-strategy is plausible. Those informed voters who are hurt by endorsements would try to discourage endorsements by voting against the endorsed candidate if the informed voters were otherwise indifferent between the two candidate positions; while those informed voters who benefit from the existence of endorsements would try to encourage endorsements (and thereby rewarding the pressure group) by voting for the endorsed candidate if the informed voters were otherwise indifferent between the two candidates.[14]

I show that these two strategies produce a generalised Nash equilibrium, where no one individual *or group of uninformed voters* can improve their welfare by deviating from these strategies. The reason why I consider the more general version of the Nash equilibrium is that rarely can one voter can change the outcome of an election. Thus for example, a single member of a church might not be able to alter the election by changing his or her vote but all of the members of the church changing their vote in unison (if they had similar preferences) might be able to change the outcome of the election. Here, all the uninformed voters who vote for one of the candidates could not improve the outcome (from their perspective) by voting for the other candidate

## 3. An Intuitive Example

Before proceeding with the formal presentation, it is helpful to go through a simple example to illustrate how the strategic rule of thumb works. In Figure 1, there are 11 informed voters and 10 uninformed voters. I consider the case where both candidates are only interested in winning. In the absence of an endorsement, both candidates will be at the median informed voter's most preferred position, $\hat{x}_m^I$, and each will have a 50% chance of winning.

Now let me consider the outcome when candidate 1 is endorsed by the pressure group as being to the right of candidate 2. Employing their strategic rule of thumb, the two uninformed voters strictly to the left of $\hat{x}_m^{I+U}$ will vote for candidate 2; the seven uninformed voters strictly to the right of $\hat{x}_m^{I+U}$ will vote for candidate 1; and the two uninformed voters at $\hat{x}_m^{I+U}$ will abstain. Note that this voting takes place regardless of where the two candidates actually are.

[13] In order for the informed voters to engage in this counter strategy, they need to know the median of the informed voters and what the candidates are maximising.
[14] This particular counter-strategy assumption is actually not necessary. There are other assumptions that will produce similar results.

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| 1 | $\hat{x}_m^I$ | 3 | $\hat{x}_m^{I+U}$ | 5 |

Fig. 1. *Candidate Positions*

*Case* (*i*). First, let me suppose that the pressure group's most preferred position is at 3 and $x^* = 3$. If candidate 1 accepts the offer, she will win regardless of candidate 2's choices; this would not be the case if candidate 1 were to reject the offer. To understand the logic, suppose that candidate 2 knows that candidate 1 will accept the offer. Then candidate 2 will choose that position which maximises the number of votes from the informed voters. This means that candidate 2 will be to the left of $x^*$. If candidate 2 chooses position $x^* - 1 = \hat{x}_m^I$, then the six informed voters strictly to the left of $x^* = 3$ would vote for candidate 2. In addition, the two uninformed voters to the left of the overall median would vote for candidate 2. However, the five informed voters weakly to the right of $x^* = 3$ and the seven uninformed voters strictly to the right of $\hat{x}_m^{I+U}$ would vote for candidate 1. So candidate 1 would win the election. In this example, the uninformed voter at position 3 incorrectly votes for candidate 2; similarly, the uninformed voter at $\hat{x}_m^{I+U}$ incorrectly abstains even though the voter prefers candidate 1. However such incorrect voting is not costly since their most preferred candidate wins despite their 'mistake'.

Note that because of the informed counter strategy, there is no advantage to candidate 2 from taking position $x^* = 3$. If candidate 2 were to do so, then the informed voters weakly to the right of 3 would still vote for the endorsed candidate since they are better off because of the endorsement than they would be in the absence of an endorsement. All the informed voters strictly to the left of 3 are worse off because of the endorsement and therefore they would continue to vote for the non-endorsed candidate. Of course, the uninformed do not change their vote because they do not observe the positions of the candidates.

*Case* (*ii*). A more interesting case is when the pressure group's most preferred position is at 5. Suppose that candidate 1 has agreed to be at position $x^* = \hat{x}_m^{I+U}$. If candidate 2 chooses $x^* - 1 = 3$, then all of the voters strictly to the left of $\hat{x}_m^{I+U}$ would vote for candidate 2 (seven informed and two uninformed) while all of the informed voters weakly to the right of $\hat{x}_m^{I+U}$ plus all of the uninformed voters strictly to the right of $\hat{x}_m^{I+U}$ would vote for candidate 1 (four informed and seven uninformed). In this example, candidate 2 would be worse off if she chose position $\hat{x}_m^{I+U}$ because the informed voter at position 3 would now vote for each candidate with probability 1/2 (because the candidates have the same position and the voter is indifferent to the endorsed outcome and the non-endorsed outcome) while none of the other informed voters would change their vote.[15] Note that without the vote of three of the uninformed voters at position 5, candidate 2 would win. So this is indeed a generalised Nash Equilibrium.

Suppose, for the moment, that candidate 1 would always accept position 5 in return for an endorsement and, in anticipation of candidate 1's choice, candidate 2 would always chose position $\hat{x}_m^{I+U}$. All the informed voters weakly to the left of $\hat{x}_m^{I+U}$ and all of the uninformed voters strictly to the left $\hat{x}_m^{I+U}$ would vote for candidate 2. Thus nine informed and two uninformed voters would vote for candidate 2, while only the nine voters at position 5 would vote for candidate 1. So, my supposition is incorrect. Instead candidate 1 would undertake a mixed strategy of acceptance that would in general make both the pressure group and candidate 1 worse off than if the pressure group had offered to endorse candidate 1 at position $\hat{x}_m^{I+U}$. See the Appendix for the proof.

*Case* (*iii*). Clearly if the pressure group's most preferred position were at $\hat{x}_m^I$, then there would be no need for an endorsement.

In a nutshell, when the uninformed and the pressure group have congruent interests (that is, their preferred positions are to the right of the median of the informed voters), then the pressure group will activate the uninformed voters by endorsing one of the candidates as the right-wing candidate. Note how much easier it is to announce relative positions (this candidate is closer to the National Rifle Association's position than the other candidate is) than it is to describe the exact position of a candidate (this candidate is against assault rifles being owned by children under 18, is only in favour of a one day delay for background checks, believes that armoured personal carriers might not qualify, and so forth).

## 4. Propositions

The following two Propositions, which give no role to pressure groups, will serve as benchmarks for comparison. Because the results are well known, they will be presented without proof.

Proposition A. *Suppose that there are no pressure groups. If candidates maximise the probability of winning* (*Assumption* (*b*)(*i*)), *then both candidates will be at the median of the informed voters,* $\hat{x}_m^I$.

Proposition B. *Suppose that there are no pressure groups and that the candidates maximise their expected utility from policy implementation (Assumption* (*b*)(*ii*)). *If the candidates' most preferred positions are on opposite sides of the median informed voter, then both candidates will be at* $\hat{x}_m^I$. *If the candidates' most preferred positions are on the same side of* $\hat{x}_m^I$, *then the winning outcome will be at the preferred position of the candidate whose most preferred position is closest to the median informed voter.*

I am now ready to show that pressure group donations move the outcome closer to the median voter.

[15] It can also be shown that choosing position 3 is better for candidate 2 than any other position.

Proposition 1. *Assume that uninformed voters employ the strategic rule of thumb, informed voters employ the counter strategy, all the participants know this to be the case and candidates maximise their probability of winning. If* $\hat{x}_p \geq \hat{x}_m^I$, *then under the above conditions:*[16]

(*i*) *If* $\hat{x}_m^I < \hat{x}_p \leq \hat{x}_m^{I+U}$, *then* $x^* = \hat{x}_p$. *Candidate 1 will accept the offer and win the election. This was illustrated in Figure 1, case* (*i*).

(*ii*) *If* $\hat{x}_m^I < \hat{x}_m^{I+U} < \hat{x}_p$, *then* $x^* - \hat{x}_m^{I+U} \leq \hat{x}_m^{I+U} - \hat{x}_m^I$. *If* $U_p(2\hat{x}_m^{I+U} - \hat{x}_m^I) - U_p(\hat{x}_m^{I+U}) \geq 2y_i$, *then* $x^* = \hat{x}_m^{I+U}$ *and candidate 1 will accept the offer and win the election; if* $U_p(2\hat{x}_m^{I+U} - \hat{x}_m^I) - U_p(\hat{x}_m^{I+U}) < 2y_i$, *then the pressure group might choose an* $x^* > \hat{x}_m^{I+U}$, *in which case candidate 1 will undertake a mixed strategy of acceptance. In all cases the median voter is better off than in the absence of the pressure group.*

(*iii*) *If* $\hat{x}_m^I = \hat{x}_p$, *then the outcome will be at the pressure group's most preferred position even without an endorsement. This was illustrated in Figure 1, case* (*iii*)

(*iv*) *If* $\hat{x}_m^{I+U} \leq \hat{x}_m^I < \hat{x}_p$, *then any offer that the pressure group would like to make would be rejected by the candidate.*

(*v*) *The strategic rule of thumb is a best strategy for every uninformed voter (acting individually or collectively with like-minded other uninformed voters).*

In a nutshell, pressure group offers will only be accepted if the outcome is closer to the median voter, overall.

*Proof.* (*i*) Suppose that $\hat{x}_m^I < \hat{x}_p \leq \hat{x}_m^{I+U}$ and that $x^* = \hat{x}_p$.

I first establish that candidate 1 will always win when she accepts the pressure group offer. Candidate 2 will try to appeal to as many informed voters as possible. This means that candidate 2 will choose a position weakly to the left of $x^* = \hat{x}_p$ since $\hat{x}_m^I < \hat{x}_p$. Suppose that candidate 2 were able to capture all of the informed voters strictly to the right of $\hat{x}_p$. Then candidate 1 would win for certain as all of the uninformed voters strictly to the right of $\hat{x}_m^{I+U}$ plus all of the informed voters weakly to the right of $\hat{x}_p$ will vote for candidate 1. This is more than half of all voters who actually vote. So candidate 1 will win if the uninformed voters act according to the strategic rule of thumb. If instead candidate 2 chooses $\hat{x}_p$, candidate 2 would definitely not gain any informed voters but might lose some due to the informed counter-strategy. Candidate 1 is obviously happy with this state of affairs as she will win regardless of candidate 2's choice (that is, accepting the offer is a dominant winning strategy for candidate 1). If she were to reject the offer, she could no longer guarantee that she would win. Setting $x_2 = x_1 - 1 = x^* - 1 = \hat{x}_p - 1$ is best for candidate 2 given $x_1 = x^* = \hat{x}_p \leq \hat{x}_m^{I+U}$.

I next determine whether this strategic rule of thumb is best for the uninformed voters. All of the uninformed voters strictly to the right of $\hat{x}_m^{I+U}$ have voted correctly; similarly all of the uninformed voters strictly to the left of $\hat{x}_p$ have voted correctly. The uninformed voters weakly between $\hat{x}_p$ and $\hat{x}_m^{I+U}$ have voted incorrectly but their preferred candidate has won. So there is no cost to their mistake. No set of uninformed (or informed) voters can improve their welfare by switching their vote. Hence, I have a generalised Nash equilibrium.

The pressure group has obtained its most preferred position. Clearly, it would not want to choose another position. So if the cost of the campaign contribution is less than

[16] The same logic holds for the symmetric case where $\hat{x}_p < \hat{x}_m^I$

the benefit of improved outcome (as I have assumed), the pressure group will enter into an agreement with the candidate.

(*ii*) Suppose that $\hat{x}_m^I < \hat{x}_m^{I+U} < \hat{x}_p$.

First consider the case where the pressure group has made the following offer to candidate 1: $x^* = \hat{x}_m^{I+U}$. Using the exact same logic as was used in (*i*) I can demonstrate both that candidate 1 will win with certainty if she accepts the offer and that the strategic rule of thumb is a best strategy for the uninformed voters.

However, the pressure group would like to be closer to its most preferred position. Hence, it might want to choose an $x^* > \hat{x}_m^{I+U}$. So let me next consider the case where $x^* > \hat{x}_m^{I+U}$ and $\hat{x}_m^{I+U} - \hat{x}_m^I < x^* - \hat{x}_m^{I+U}$. By symmetry of the loss function, all of the informed voters weakly to the left of the median voter ($\hat{x}_m^{I+U}$) prefer $\hat{x}_m^I$ to $x^*$. The unendorsed candidate can guarantee that it will have at least a 50% chance of winning by choosing $\hat{x}_m^I$. If candidate 1 were to agree to the offer, all of the uninformed voters strictly to the left of $\hat{x}_m^{I+U}$ and all of the informed voters weakly to the left of $\hat{x}_m^{I+U}$ (and possible some of the informed voters weakly to the right) would vote for candidate 2. Candidate 1 would lose with certainty. Instead candidate 1 will reject the offer, and both candidates will choose $\hat{x}_m^I$, where each candidate has a 50% chance of winning. This is the unique Nash Equilibrium *for the candidates* given this particular $x^*$. Because the pressure group can do better by setting $x^* = \hat{x}_m^{I+U}$, such an offer will not be made in the first place. One can immediately see that the median voter cannot be made worse off by the presence of the pressure group.

I again check whether this strategic rule of thumb makes sense. Suppose that the candidate had accepted the offer. Some of the uninformed voters weakly to the right of the median voter might either mistakenly abstain (if they were at the median) or mistakenly vote for the endorsed candidate when they should have voted for the unendorsed candidate. But their mistakes are inconsequential as the unendorsed candidate would win in any event.

I next consider the case where $x^* > \hat{x}_m^{I+U}$ and the median voter weakly prefers $x^*$ over $\hat{x}_m^I$. If candidate 1 accepts the offer, candidate 2 will win if candidate 2 chooses any position within the closed set $[2\hat{x}_m^{I+U} - x^*+1,\ x^*-1]$. This is because the loss functions are symmetric and both $2\hat{x}_m^{I+U} - x^*+1$ and $x^* - 1$ are closer to $\hat{x}_m^{I+U}$ than $x^*$ is to $\hat{x}_m^{I+U}$. So candidate 1 would not accept the offer 100% of the time. In the Appendix, Lemma 1 shows that, when the advertising costs are not high, the mixed-strategy equilibrium is worse for the pressure group than choosing $x^* = \hat{x}_m^{I+U}$.

(*iii*) If $\hat{x}_m^I = \hat{x}_p$, then the outcome will be at the pressure group's most preferred position even without an endorsement. The pressure group would not undertake the cost of an endorsement in this case. But even if it did, the outcome would be the same.

(*iv*) The final possibility is that $\hat{x}_m^{I+U} \le \hat{x}_m^I < \hat{x}_p$.

If $x^* > \hat{x}_m^I$, candidate 1 accepts the offer and candidate 2 chooses $\hat{x}_m^I$, then candidate 1 would be sure to lose. All of the informed voters weakly to the left of $\hat{x}_m^I$ and all of the uninformed voters strictly to the left of $\hat{x}_m^{I+U}$ would vote for the unendorsed candidate. This is a majority of those voting and does not include any of the informed voters who are to the right of $\hat{x}_m^I$ but still prefer $\hat{x}_m^I$ to $x^*$ and therefore would also vote for candidate 2. Thus candidate 1 would reject the offer and choose $\hat{x}_m^I$.

I again check that the rule of thumb is a best strategy for an uninformed voter. Suppose that the candidate had accepted the endorsement. Some of the uninformed to the right of $\hat{x}_m^{I+U}$ might incorrectly vote for the endorsed candidate but this mistake is costless since the unendorsed candidate wins despite their mistake.

Clearly, the pressure group would not want to offer $x^* < \hat{x}_m^I$ and, if it did, then candidate 1 would reject the offer and the outcome would be at $\hat{x}_m^I$. So one would not expect the pressure group to make the offer in the first place. If the pressure group did make such an offer and the candidate accepted it, then the uninformed voters would vote incorrectly. But this circumstance will never arise.

Remark 1. If uninformed voters paid no attention to political advertising (say by abstaining regardless of preference) and pressure groups knew this to be the case, then the equilibrium outcome would be no political advertising. This equilibrium is unlikely on empirical and theoretical grounds. I do observe political advertising, suggesting that 'paying no attention' is not the strategy undertaken by the uninformed voters. Furthermore, this kind of abstention would not be sequentially rational – if there were an endorsement, then it would make no sense for the uninformed voters to ignore it. The strategic rule of thumb is better for both the pressure group and the median voter.[17]

Remark 2. Political advertising can only have the desired effect on uninformed voters if they neither know too little nor too much. Slight variations in the amount of knowledge held by the voters can undermine the power of pressure groups. Consider the following two opposing possibilities:

(*i*) If uninformed voters know the relative position of the candidates in the absence of political advertising, then advertising can have no effect on the outcome of the election – the voters already have the requisite information. Consequently, there is no need for pressure group donations that fund such advertising.

(*ii*) If the uninformed voters do not know the relative position of $\hat{x}_p$ (they think that $\hat{x}_p$ is equally likely to be on the left or right of $\hat{x}_m^I$) and advertising does not directly reveal the relative positions of $x_1$ and $x_2$, then all of the uninformed voters will vote against the endorsed candidate because both candidates have the same mean ($\hat{x}_m^I$) but the variance of the endorsed candidate is higher than the variance of the unendorsed candidate (since pressure group financing pulls the endorsed candidate farther away from $\hat{x}_m^I$) and voters are risk averse. Therefore, the candidate would not accept money from the pressure group in the first place.

Remark 3. I have assumed that political advertising informs the voters of the relative positions of the candidates. Not much is changed if the pressure group is on the extreme right, advertising tells the voters of the exact position of the endorsed

[17] If the uninformed voters had the contrary rule of thumb (voting against the endorsed candidate if the voter is strictly to the right of the median voter etc.) and the pressure group and candidate knew this to be the case, then the pressure group and candidate might be able to engage in a contrary advertising campaign, as well.

candidate and the uninformed can infer that the other candidate is to the left. However, exact position is probably much more costly to convey than relative position.

There are other possible variations of the model. For example, I have not considered the case where the pressure group gains access to the winning candidate. Also I have not considered the case where there is more than one pressure group. These variations are likely to strengthen the results. What I have here is a near worst-case scenario – one pressure group that does not value access. Nevertheless, the outcome is that the pressure group donations move the outcome from the median of the informed toward the median over all voters. Having more than one pressure group eliminates the monopoly power of the pressure group and introduces competition. Gaining access increases the power of the vote-maximising candidates *vis-à-vis* the pressure group. Such changes are unlikely to make things worse for the median voter. Indeed it is relatively easy to show that if there are two pressure groups, each on the opposite side of the median voter, then both candidates would always be at the median voter, overall. However, this result is not surprising and the assumption of two opposing but equally powerful pressure groups may be less realistic than the assumption of one pressure group (e.g., consumer pressure groups, if they exist, may be no match for producer pressure groups).

Fedderson and Pesendorfer (1998) also consider a situation where the uninformed have different preferences from the informed voters but in their model there are no maximising candidates and pressure groups that create the choice set for the voters, as is the case here. This narrowed choice set means that the strategic rule of thumb will not mislead the uninformed voters. An endorsement thus allows the uninformed to make the appropriate inferences so that the 'uninformed' are no longer uninformed. Despite these differences between the Fedderson and Pesendorfer article and this one, there is an underlying similarity. The strategic rule of thumb makes the median informed player the pivot; so by voting, the uninformed are implicitly leaving the decision to the more informed, a result in tune with their article.[18]

## 5. Policy-motivated Candidates

I next turn my attention to the case where candidates have policy preferences.

PROPOSITION 2. *Suppose that the uninformed voters employ the strategic rule of thumb, informed voters employ the counter strategy, and all the participants know this to be the case. If candidates maximise the expected policy outcome, then campaign advertising financed by the pressure group will shift the outcome toward the median voter. The strategic rule of thumb is best for each uninformed voter.*

[18] Austen-Smith (1987) assumes that political advertising reduces ambiguity about a candidate's position. In his model risk-averse voters are willing to vote for a candidate with an inferior expected position if the variance (ambiguity about the position) is smaller. In turn, a pressure group is willing to fund such advertising if the candidate moves closer to the preferred position of the pressure group. However if the candidates are maximising vote share, then voters are equally informed about both candidates – the unendorsed candidate is just to the left of the candidate funded by the right-wing pressure group. It thus makes sense for uninformed voters to use the strategic rule of thumb. So reducing ambiguity will result in a move toward the median uninformed voter's preferred position, a result contrary to that in Austen-Smith' paper.

Here I outline the argument for the most extreme case where $\hat{x}_m^I < \hat{v}_2 < \hat{x}_m^{I+U} < \hat{x}_p$, $\hat{v}_1$. Despite the fact that both the pressure group and candidate 1 prefer to be to the right of the median voter, the winning position will be at the median voter's most preferred position. That is, the pressure group will choose $x^* = \hat{x}_m^{I+U}$, and candidate 1 will accept the offer and win.

Suppose first that $x^* = \hat{x}_m^{I+U}$ and that candidate 1 has accepted the offer. We know from Proposition 1 that in this case candidate 1 will win regardless of the position chosen by candidate 2. It is clear that candidate 2 will want to choose a position to the left of candidate 1 and if candidate 1 were to reject the offer, the election outcome would be the position closest to the median informed voter and in any event to the left of $\hat{x}_m^{I+U}$, which would make candidate 1 worse off. So candidate 1 will accept the offer of $x^* = \hat{x}_m^{I+U}$ and win the election. By Proposition *B*, we know that, in the absence of a pressure group endorsement, the outcome would have been at $\hat{v}_2$, which is clearly farther away from the median voter, overall.

Next, suppose that $x^* > \hat{x}_m^{I+U} + 1$ and that candidate 2 chooses the larger of the following two positions: $\hat{v}_2$ and $2\,\hat{x}_m^{I+U} - x^* + 1$. If $\hat{v}_2$ is strictly larger, that is equivalent to saying that $\hat{v}_2$ is closer than $x^*$ is to $\hat{x}_m^{I+U}$. Therefore, by symmetry of the loss functions, all the voters weakly to the left (and possibly some to the right) of the median voter prefer $\hat{v}_2$. Candidate 2 will choose $\hat{v}_2$, and $\hat{v}_2$ will be the winning position regardless of candidate 1's choice. So once again, it is immediately apparent that the pressure group cannot make the outcome worse off for the median voter overall. If $2\hat{x}_m^{I+U} - x^* + 1$ is larger than $\hat{v}_2$, then $x^*$ is closer than $\hat{v}_2$ is to $\hat{x}_m^{I+U}$. If candidate 1 accepts the offer and chooses position $x^*$ and candidate 2 chooses $2\hat{x}_m^{I+U} - x^* + 1$, then candidate 2 will win the election. The reasoning is as follows. Candidate 2's choice, $2\hat{x}_m^{I+U} - x^* + 1$, is closer to the median voter than $x^*$ is; so, all of the voters weakly to the left of the median prefer $2\hat{x}_m^{I+U} - x^* + 1$. All of the informed voters weakly to the left of $\hat{x}_m^{I+U}$ and, all of the uninformed strictly to the left of $\hat{x}_m^{I+U}$ (using their strategic rule of thumb) would vote for the unendorsed candidate (candidate 2). This is at least a majority of those voting. If candidate 1 rejects the offer, the best that candidate 1 could do is to choose an $x_1 \geq 2\hat{x}_m^{I+U} - x^* + 1$. This is because candidate 2 has policy preferences. Here too, the winning position would be $2\hat{x}_m^{I+U} - x^* + 1 < \hat{x}_m^{I+U}$. I have assumed that if the policy outcome is the same, a policy-motivated candidate will accept the offer. Hence the strategies outlined above will take place. So, the outcome will be worse for both the pressure group and candidate 1 than when $x^* = \hat{x}_m^{I+U}$.

Finally, suppose that $x^* = \hat{x}_m^{I+U} + 1$. By a similar logic to the previous paragraph, if candidate 2 were to choose $\hat{x}_m^{I+U}$, then $\hat{x}_m^{I+U}$ will be the winning position whether or not candidate 1 accepts the offer. So, again candidate 1 will accept the offer, and candidate 2 will win the election. By assumption, other things being equal, the pressure group prefers to endorse the winning candidate, which would not be the case if this scenario held (but would be the case if $x^* = \hat{x}_m^{I+U}$). For all these reasons, the pressure group would instead choose $x^* = \hat{x}_m^{I+U}$, and candidate 1 would accept the offer and win the election.

Remark 4. Even if the pressure group had a convex utility function, the voters could not be made worse off than they would be in the absence of the pressure group because candidate 2 could defeat any extreme policy by continuing to offer $\hat{v}_2$.

REMARK 5. Consider the following variation in the basic model: candidate 2 has to make his decision before knowing the value of $x^*$ and candidate 1 has to make her decision before knowing candidate 2's choice. Then candidate 2 would choose $x_2 = \hat{x}_m^{I+U} - 1$, the pressure group would set $x^* = \hat{x}_m^{I+U}$ and candidate 1 would accept the pressure group's offer and win in this alternative version of the game.

## 6. Empirical Evidence

Even though empirical studies have, as yet, not been undertaken to specifically test the model, there is considerable evidence consistent with the assumptions and implications of the model presented here.

First I note that political advertising typically does not have a lot of content to it. However, pressure group endorsements by such groups as veterans' associations, unions, chambers of commerce and so forth are often included in campaign literature. This suggests that such endorsements are informative (advertising is not merely burning money as a signal of quality). And clearly, this political advertising is directed to the uninformed who, in the absence of such advertising, might not know either the positions of the candidates or who was endorsing them.

Statistical evidence corroborating the use of endorsements is found in Lupia (1994), who showed that voter choice on five ballot measures to reform insurance in California was strongly dependent on knowledge of the positions of various interest groups on the measures. Lupia identified fifteen organisations that took positions on one or more of the five measures. These organisations included the California Trial Lawyers Association, the insurance industry, Ralph Nader and the Friends of Motorcycling. The first two organisations tried to hide their sponsorship and advertised themselves as pro-consumer or pro-citizen, as did all the other organisations. Despite the fact that there were five complex measures on the ballot and that some organisations tried to hide their true identity, many of those who were otherwise *very poorly informed about the substance of the ballot measures were able to correctly identify the positions of the various interest groups and then make the same choice that they would have made if they had been fully informed.*

Looking at over 1,400 voters in the US 2000 election, Freedman *et al.* (2004) showed that political advertising increased political knowledge of the candidates. Gelman and King (1993), Finkel (1993) and Iyengar and Simon (2000) showed that campaigns, by increasing the amount of relevant political information available to voters, helped citizens cast votes in line with their *pre-existing attitudes and proclivities.* Arceneaux (2006), using cross-national survey data, showed that campaigns 'enlighten' voters as the election draws near. This effect was particularly noticeable for politically unsophisticated individuals (uninformed voters) who used campaigns to learn which party matched them ideologically. Rather than persuading voters to change their minds, as a model of voter irrationality would predict, this research suggests that campaigns help voters (particularly uninformed voters) to make up their minds.

In sum, the model presented here ties together a lot of disparate evidence into a unified theory of elections. There are also interesting possibilities for future work. If one could assemble the requisite data, one might be able to determine whether those jurisdictions with the greatest limits on campaign expenditures produced electoral outcomes that diverged most from the median voter's preferred position.[19]

## 7. Discussion

In this article, as is the case for special-interest voting models in general, the problem of credible commitments has been assumed away. Of course, candidates can renege on their promises to pressure groups or voters.[20] If candidates renege on their promises to pressure groups, pressure groups will not contribute to campaigns. If candidates renege on their promises to voters, voters will ignore promises.

I have presented a model where the pressure group provides valuable information. Under such circumstances, it is possible that the pressure group provides too much valuable information! The right-wing pressure group asks itself whether the benefit to its members from a move to the right by the candidate compensates for the cost of the campaign contributions. The pressure group does not consider the cost to others of this move right. So *including the cost of advertising*, the move right may not be welfare improving. In my analysis, the move right improves the welfare of a majority of voters (which the pressure group does not consider in its own benefit calculations either); so, even if the cost of advertising is included, it is still likely to be welfare improving since more people benefit than lose from the move. While pressure groups have been accused of many things, providing too much valuable information is not one of them.

The discussion has been in terms of candidates but the word 'political party' can be exchanged for the word 'candidate' without doing damage to the model. The model therefore can be used to analyse both the politics of Great Britain where the political party has more control and the politics of the US, where individual candidates have more power.

One can extend the results to two dimensions but the assumptions are very restrictive. Plott (1967) has shown that an equilibrium exists in two dimensions if and only if the distribution is radial symmetric. Assume that utility is a decreasing function of the distance of a policy from the voter's ideal point so that the voters' indifference curves are circular. Then radial symmetry is defined as follows. There exists a median voter such that for every line drawn through the median voter's ideal point there are an equal number of voter ideal points in both directions on the line. I have been comparing the outcome where only informed voters vote to the outcome where both informed voters and previously uninformed (but now partially informed) voters vote. In order for my results to hold in two dimensions, one must assume the following: there is a radial symmetric distribution of informed voters, as well as a radial symmetric distribution of all voters (with at least one informed voter being at the median overall). Without these assumptions, there will not be an equilibrium; so, little can be said (even in the absence of pressure groups). With radial symmetry, a two-dimensional issue space creates possibilities for deception by the pressure group and candidate. For example, the pressure group and candidate could frame the policy space as being in

[19] I thank a referee for this suggestion.

[20] But see Alesina (1988), Lott and Reed (1989) and Harrington (1992) for various ways candidates and political parties establish credible commitments.

terms of one issue, when the uninformed voters are concerned about both issues. If such framing occurred, then endorsements could make the voters worse off if they were to use the strategic rule of thumb outlined in this article. To avoid this theoretical possibility, one must assume that uninformed voters view endorsements and positions as being two-dimensional. Finally, there is the possibility that the pressure group lies about the relative positions of the candidates. Under such circumstances, it is possible for candidate 1 to win even if she is not at the median voter, overall. However, this possibility will not arise if the following holds: The distribution of voters is radial symmetric (as I have been assuming) and all of the voters are in the northwest and southeast quadrants (or all voters are in the northeast and southwest quadrants) defined by the median voter, overall.[21]

## 8. Concluding Remarks

I assume that uninformed voters use a simple rule of the thumb. Because in equilibrium this rule of thumb works in favour of each voter who employs it, no uninformed voter or set of uninformed voters will want to defect from using this rule of thumb. Indeed, I have shown that even if the uninformed voter were to become fully informed, in the presence of endorsements the uninformed voter could not improve the electoral outcome from his/her point of view. Thus I would expect this rule of thumb to survive.

I have modelled the behaviour of uninformed voters when campaigns are financed by pressure groups in the context of a spatial model where both candidates' positions are endogenous. In particular, I have shown how uninformed but rational voters can make intelligent inferences and act strategically with simple rules of thumb. The work here thus extends the basic Downsian model to the case where there are pressure groups and uninformed voters.

Contrary to the view of many, the models presented here suggest that even uninformed voters can respond rationally to political advertising. The following question then naturally arises. If, as argued in this article, campaign contributions by pressure groups aid the democratic process, then why do we see so many attempts like the McCain-Feingold bill to put limits on campaign financing? The answer lies in this article, also. As I have shown, pressure group contributions to political campaigns hurt some of the participants – informed voters on average and those informed voters whose preferences run contrary to the median uninformed voter in particular, as well as those policy motivated candidates whose preferences are more aligned with the median informed voter than with the median uninformed voter. It is not surprising that these actors and their supporters would be against unlimited campaign financing.

## Appendix

In the body of this article, I demonstrated that candidate 1 would not agree to an $x^*$ such that a majority of voters strictly prefer $\hat{x}_m^I$ over $x^*$. Here, I consider an $\boldsymbol{x}^* > \hat{x}_m^{I+U}$ such that a majority of voters weakly prefer $\boldsymbol{x}^*$ over $\hat{x}_m^I$. By symmetry of the utility functions, this is equivalent to saying

[21] Note that a one-dimensional space automatically satisfies the assumptions necessary for the pressure group to tell the truth. The pressure group would also want to tell the truth if lies were caught more than 50% of the time because, in such cases, Candidate 1 would prefer the no-endorsement equilibrium to lying.

that $\hat{x}_m^{I+U}$ is closer to $\boldsymbol{x}^*$ than it is to $\hat{x}_m^I$. Note that I will use the bold typeface when discussing $\boldsymbol{x}^* > \hat{x}_m^{I+U}$ and the normal typeface when discussing $x^* = \hat{x}_m^{I+U}$. To save time, I assume that $\hat{x}_p \geq \boldsymbol{x}^*$.

LEMMA 1. *When $\boldsymbol{x}^* > \hat{x}_m^{I+U}$, candidates 1 and 2 undertake mixed strategies. The median voter prefers the expected outcome to $\hat{x}_m^I$, the outcome that occurs in the absence of the pressure group. If the cost of advertising is not large (that is, $U_p(\boldsymbol{x}^*) - U_p(\hat{x}_m^{I+U}) > 2y_1$), then the pressure group will instead choose $x^* = \hat{x}_m^{I+U}$.*

*Proof.* I first consider the case where $\boldsymbol{x}^* > \hat{x}_m^{I+U}$ and the median voter, $\hat{x}_m^{I+U}$, strictly prefers $\boldsymbol{x}^*$ to $\hat{x}_m^I$ (later, I consider the case where the median voter is indifferent between the two). Letting candidate 1 be column and candidate 2 be row, the matrix of possibilities is shown in Table 1.[22]

When both candidates choose the same position and there is no endorsement, they each have a 50% chance of winning. Thus I have explained the diagonal values for the rectangle not including the last column (the accept endorsement column).

If there is no endorsement, then the uninformed cannot distinguish between the candidates, and the outcome of the election depends on the informed voters. Therefore, in the absence of an endorsement, the candidate who is closest to $\hat{x}_m^I$ will win the election. Hence, all of the off-diagonal elements above the diagonal and to the left of the accept column are 0% because candidate 1 is further away from the median informed voter. For similar reasons, all of the off-diagonal elements below the diagonal are 100%.[23] Clearly, when candidate 1 rejects the offer, his best strategy is to choose $\hat{x}_m^I$. So the only relevant columns are the first and the last.

If candidate 1 accepts the endorsement and chooses $\boldsymbol{x}^*$ and candidate 2 chooses $\hat{x}_m^I$, then a majority of those voting will vote for candidate 1. All of the informed weakly to the right and all of the uninformed voters strictly to the right of $\hat{x}_m^{I+U}$ (a majority of those voting) plus some of the informed voters weakly to the left of $\hat{x}_m^{I+U}$ will vote for candidate 1. So candidate 1 will win with certainty. It is possible that some of the uninformed voters mildly to the left of $\hat{x}_m^{I+U}$ mistakenly vote for candidate 2 but there is little cost to their mistake as their preferred candidate (candidate 1) wins despite their mistake.

If candidate 1 accepts the endorsement and chooses $\boldsymbol{x}^*$ and candidate 2 chooses $\boldsymbol{x}^*-\boldsymbol{1}$, then a majority of those voting will vote for candidate 2 (all of the uninformed voters strictly to the left of $\hat{x}_m^{I+U}$ plus all of the informed voters weakly to the left of $\boldsymbol{x}^* - \boldsymbol{1}$ vote for candidate 2). So

Table 1

*Percentage Probability that Candidate 1 Will Win the Election*

| | Candidate 1 | | | | |
|---|---|---|---|---|---|
| | Does not accept | | | | Accept |
| Candidate 2 | $\hat{x}_m^I$ | $2\hat{x}_m^{I+U} - \boldsymbol{x}^*$ | $2\hat{x}_m^{I+U} - \boldsymbol{x}^* + \boldsymbol{1}$ | $\boldsymbol{x}^* - 1$ | $\boldsymbol{x}^*$ |
| $\hat{x}_m^I$ | 50 | 0 | 0 | 0 | 100 |
| $2\hat{x}_m^{I+U} - \boldsymbol{x}^*$ | 100 | 50 | 0 | 0 | 50 |
| $2\hat{x}_m^{I+U} - \boldsymbol{x}^* + \boldsymbol{1}$ | 100 | 100 | 50 | 0 | 0 |
| $\boldsymbol{x}^*-1$ | 100 | 100 | 100 | 50 | 0 |

[22] It can be shown that other possible choices by the candidates are dominated by the choices listed.

[23] When there is no endorsement, the uninformed either do not vote or vote for each candidate with probability 1/2. If the latter is the case, then the relevant entries should be $100 - \varepsilon$ instead of 100 and $0 + \varepsilon$ instead of 0 with $\varepsilon$ approaching 0 as the number of uninformed voters increases toward infinity. For the purposes of the proof, all that is needed is that the elements above the diagonal equal $50 - \varepsilon$ and the elements below the diagonal equal $50 + \varepsilon$

candidate 2 will win with certainty. It is possible that some of the uninformed voters mildly to the right of $\hat{x}_m^{I+U}$ incorrectly vote for candidate 1 but again there is little cost to their mistake as their preferred candidate wins. The other rows and columns are irrelevant for the proof.

There are no pure-strategy equilibria. Candidate 1 will accept the offer 1/3 of the time and 2/3 of the time will reject the offer and choose $\hat{x}_m^I$. Candidate 2 will choose the first row 2/3 of the time and the third row 1/3 of the time. Note that $\hat{x}_m^I$ will be the winning position if and only if candidate 1 rejects the offer. Hence $\hat{x}_m^I$ will be the winning position 2/3 of the time (4/9 of the time both candidates will choose $\hat{x}_m^I$, and half of those times candidate 1 will win). Recall that $\boldsymbol{x}^*$ is closer to $\hat{x}_m^{I+U}$ than $\hat{x}_m^I$ is to $\hat{x}_m^{I+U}$. So the median voter prefers the expected outcome to the situation where the pressure group is not in the picture and the outcome is $\hat{x}_m^I$.

Ignoring the cost of advertising, the risk-averse pressure group strictly prefers a certain $\hat{x}_m^{I+U}$ over a 50/50 gamble between $\hat{x}_m^I$ and $\boldsymbol{x}^*$, which the pressure group prefers over a (2/3)/(1/3) gamble between $\hat{x}_m^I$ and $\boldsymbol{x}^*$, which the pressure group prefers to a (2/3)/(1/3) gamble between $\hat{x}_m^I$ and something less than or equal to $\boldsymbol{x}^*$ (as would be the case if candidate 2 chooses $X^* - 1$ when candidate 1 chooses $\boldsymbol{x}^*$).

The last possibility is that the median voter is indifferent between $\hat{x}_m^I$ and $\boldsymbol{x}^*$. This means that $\hat{x}_m^I = 2\hat{x}_m^{I+U} - \boldsymbol{x}^*$. The game matrix is the same as before except the second row and column are redundant. So, the analysis is just the same as before.

I now explicitly take into account the cost of advertising. When $\boldsymbol{x}^* > \hat{x}_m^{I+U}$, the pressure group's expected utility is: $(2/3)\ U_p(\hat{x}_m^I) + (2/9)U_p(\boldsymbol{x}^*) + (1/9)U_p(\boldsymbol{x}^* - 1) - (1/3)y_1$. Letting $z = \hat{x}_m^{I+U} - \hat{x}_m^I$ and recalling that I am looking at the case where $\boldsymbol{x}^*$ is not farther away than $\hat{x}_m^I$ is from $\hat{x}_m^{I+U}$, this last expression is less than $(2/3)\ U_p(\hat{x}_m^{I+U} - z) + (1/3)U_p(\hat{x}_m^{I+U} + z) - (1/3)y_1$. Letting $Z = U_p(\hat{x}_m^{I+U} + z) - U_p(\hat{x}_m^{I+U})$ and recalling that $U_p$ is strictly concave and that $\hat{x}_p \geq \boldsymbol{x}^*$, this last expression is less than $(2/3)[U_p(\hat{x}_{\mathrm{m}}^{\mathrm{I+U}}) - Z] + (1/3)[U_p(\hat{x}_{\mathrm{m}}^{\mathrm{I+U}}) + Z] - (1/3)y_1$. I next consider the circumstances where this last expression is less than the pressure group's expected utility when $\boldsymbol{x}^* = \hat{x}_m^{I+U}$ and the pressure group's expected utility is $U_p(\hat{x}_m^{I+U}) - y_1$. This is equivalent to saying that – $(1/3)\ Z < -(2/3)y_1$. In turn, this is equivalent to saying that $Z > 2y_1$.

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