E c o n o m i c s   B u l l e t i n

Valence characteristics and entry of a third party

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Abstract

This paper offers an explanation for the discrepancy between Downs' prediction of convergence to the median and the real world observations of nonconvergence. We modify Palfrey (1984) by introducing valence characteristics and show that there exist equilibria with entry in which the entrant may choose to be an extremist.

I thank an anonymous refereee for helpful comments and suggestions.
Citation: Kim, Kwang−ho, (2005) "Valence characteristics and entry of a third party." *Economics Bulletin*, Vol. 4, No. 18 pp. 1−9
Submitted: September 20, 2005. **Accepted:** December 22, 2005.
URL: http://www.economicsbulletin.com/2005/volume4/EB−05D70021A.pdf

1 Introduction

In countries where there are established major parties and evanescent minor parties, a common feature is that minor parties are usually extremists: they are either very progressive or very conservative. In fact, we scarcely observe minor parties with intermediate platforms. This observation makes an interesting subject of study.

This paper aims at providing an explanation of this observation. For that purpose, we build on Palfrey (1984), in which there are two established parties and a potential new party. Palfrey's main focus is on the location of two major parties in the presence of a potential entrant. He shows that in this situation, two major parties differentiate and the new party enters between them. More specifically, if voters are uniformly distributed along the interval $[-1, 1]$, the two major parties locate at $-\frac{1}{2}$ and $\frac{1}{2}$ and the minor party chooses a location between them.

His main contribution is that in contrast to Downs (1957), two parties will not converge to the median if there is a potential entry by a third party. This well reflects the reality. In fact, we know of no country where two major parties take up the same platform. The implication on the position of an entering party is, however, somewhat counterfactual. As mentioned above, minor parties are usually extremists rather than centrists.

Palfrey implicitly assumes that all parties are identical except for platforms. Voters are only concerned about the policy and vote accordingly. But in reality, established major parties enjoy huge advantage over new minor parties. Equivalently, a new minor party suffers from disadvantage that results from various sources. To capture this, we introduce the so called valence characteristics. They include, for example, charisma, name recognition, greater campaign funds, incumbent advantage and so on. The existence of it is obvious. If people did care only about policies, any candidate in the U.S. presidential election who copies the policy of, say, the Democratic Party would get the same number of votes as the Democratic Party would, which would be far from the truth.

We show that if the advantage of the established parties is huge, the new party chooses not to enter and the two big parties choose the same policy as in Downs. This contrasts with Palfrey. If the advantage is not too small, then the two parties can again deter entry by differentiating a little. Finally, if the advantage is too small to prevent entry, it is shown that there exist equilibria in which the new party may choose to be an extremist. Palfrey's case obtains as a special case.

Aragones and Palfrey (2002) investigate two-candidate elections in Downsian setting where one candidate enjoys an advantage over the other. Our paper can be regarded as a complement to this work. Ansolabehere, Snyder and Steward (2001) analyze the ideological positioning of the U.S. House candidates and find that challengers' positions are usually more extreme than incumbents'. Although not directly applicable to our paper as they focus on two-party competition, their finding is supportive of the extreme entrants that arise in equilibrium in our model. The equilibrium in our paper is reminiscent of the three-candidate equilibria in the citizen-candidate models by Besley and Coate (1997) and Osborne and Slivinski (1996). In those equilibria, a spoiler candidate who does not have a chance of winning nevertheless enters the race to prevent the candidate whom he likes less from winning.

2 The Model

Voters are uniformly distributed along the interval $X = [-1, 1]$. Candidates' objective is to maximize expected votes. There are two incumbent candidates L and R in the first period.[1] Each of them simultaneously announces his policy choice l and r respectively. There is a potential candidate E. In the second period, he decides whether to enter and if he does, he also announces a policy choice e. There is no entry cost.

After the location of all candidates, voters vote for one and only one of the candidates. Voting is sincere, i.e., people vote for the candidate who gives the highest utility. There is no abstention. The utility of voter $x \in [-1, 1]$ when candidate $K \in \{L, R, E\}$ wins and implements the corresponding policy $k \in \{l, r, e\}$ is given by

$$u(x, K) = -(x-k)^2 + \varepsilon_K,$$

where ε_K captures the valence characteristic of candidate K.[2] A natural assumption is that incumbents have advantage over the entrant. Here, we assume that the two incumbents have the same valence values while the entrant has disadvantage, i.e., $\varepsilon_L = \varepsilon_R > \varepsilon_E$. We define $\varepsilon = \varepsilon_L - \varepsilon_E \ (= \varepsilon_R - \varepsilon_E)$. We assume that if a voter is indifferent between the incumbents and the entrant, he always votes for the incumbents. Moreover, we assume that if one is indifferent between the two incumbents, he randomizes.

We also assume that the entrant does not enter if he can get no votes. If he gets the same number of votes from more than one policy, he randomizes over them.

3 Results

We are interested in subgame perfect equilibria and hence work backwards. Voters' behavior is trivial; observing the announced policies, they simply vote for the candidate that yields the highest payoff. The strategy of the entrant candidate E is also straightforward; observing the announcements by the incumbents, he will choose a position that will earn the most votes. If there are multiple optimal locations, he may randomize. Finally, the incumbents choose their locations fully aware of the entrant's location strategy in the second period and the voting behavior.

3.1 Voting

Voters' strategy is simple. They vote for the candidate $K \in \{L, R, E\}$ with the highest value of

$$u(x, K) = -(x-k)^2 + \varepsilon_K.$$

Note that since $\varepsilon_L = \varepsilon_R > \varepsilon_E$, the only relevant valence value is ε. For example, a voter x prefers L to R if

$$-(x-l)^2 > -(x-r)^2,$$

and prefers L to E if

$$-(x-l)^2 + \varepsilon > -(x-e)^2.$$

[1] The name is of course irrelevant. The results hold up to the permuation of L and R.

[2] Any single-peaked, symmetric, and strictly concave function will yield the same qualitative results.

3.2 Entrant Candidate

Given ε and the incumbent candidates' policy choices l and r, E determines whether to enter and, if he does, what policy e to choose in order to maximize votes. We let $e \in \emptyset \cup \{f(\cdot)\}$, where $\emptyset$ denotes no entry and $f(\cdot)$ is a density function over X.[3] In particular, if E has a finite number of optimal choices $\tilde{X} = \{x_1, x_2, ..., x_n\} \in X^n$, then $f(\cdot)$ is represented by a probability distribution $P(\tilde{X})$. In this case, $\tilde{e} = (p_1,\ p_2, ..., p_n) \in \left\{P(\tilde{X})\right\}$ means that E chooses policy x_j with probability p_j, $j = 1, 2, ..., n$.

Depending on the values of ε, l, and r, E will want to reside in the left, in the middle, or in the right. Since the incumbents have advantage in valence values, E will not want to choose a policy e that is too close to l or r. In an extreme case, if E chooses the same policy with one of the incumbents, he will get 0 votes no matter how little the valence disadvantage is; being disadvantaged and having chosen the same policy with an incumbent, he is completely dominated by the incumbent.

From now on, we assume without loss of generality that $l \leq r$. We first observe the followings.

Lemma 1 *Suppose E can get some votes by entering to the right of R. Then, if he chooses to enter to the right of R, his optimal policy choice is $r + \sqrt{\varepsilon}$.*

Proof. Suppose $e > r$. From $-(x-r)^2 + \varepsilon = -(x-e)^2$, we get $x_r = \frac{1}{2}\left(r + e + \frac{\varepsilon}{e-r}\right)$. This voter is indifferent between R and E. All the voters to the right of this voter vote for E. Hence, E gets a vote fraction

$$\frac{1}{2}(1 - x_r) = \frac{1}{2}\left(1 - \frac{1}{2}\left(e + r + \frac{\varepsilon}{e-r}\right)\right)$$

and this is maximized by $e = r + \sqrt{\varepsilon}$. ■

Lemma 2 *Suppose E can get some votes by entering to the left of L. Then, if he chooses to enter to the left of L, his optimal policy choice is $l - \sqrt{\varepsilon}$.*

Proof. Suppose $e < l$. From $-(x-l)^2 + \varepsilon = -(x-e)^2$, we get $x_l = \frac{1}{2}\left(l + e - \frac{\varepsilon}{l-e}\right)$. This voter is indifferent between L and E. All the voters to the left of this voter vote for E. Hence, E gets a vote fraction

$$\frac{1}{2}(x_l - (-1)) = \frac{1}{2}\left(\frac{1}{2}\left(l + e - \frac{\varepsilon}{l-e}\right) + 1\right)$$

and this is maximized by $e = l - \sqrt{\varepsilon}$. ■

Lemmas 1 and 2 show that E will choose a policy that is moderately different from the incumbents' to overcome the valence disadvantage. We can immediately see that the larger the disadvantage of E, the farther away he will move away from the incumbents toward extremity.

[3] Formally, given ε, E's strategy is $e_\varepsilon : [-1,1]^2 \longrightarrow \emptyset \cup \{f(\cdot)\}$. To avoid confusion, we denote the randomization by $\tilde{e}$, and a realization of it by e.

Lemma 3 *Suppose E can get some votes by entering between L and R. Then, if he chooses to enter between L and R, his optimal policy choice is $\frac{1}{2}(l+r)$.*

Proof. Let e be such that $l < e < r$. From $-(x-l)^2+\varepsilon = -(x-e)^2$, we get $x_l = \frac{1}{2}\left(e+l+\frac{\varepsilon}{e-l}\right)$, and from $-(x-r)^2+\varepsilon = -(x-e)^2$, we get $x_r = \frac{1}{2}\left(r+e-\frac{\varepsilon}{r-e}\right)$. Voter x_r is indifferent between R and E, and voter x_l is indifferent between L and E. All the people in between prefer E to either L or R. Hence, E gets a vote fraction

$$\frac{1}{2}(x_r - x_l) = \frac{1}{4}\left(r-l-\varepsilon\left(\frac{1}{r-e}+\frac{1}{e-l}\right)\right).$$

This is maximized by $e = \frac{1}{2}(l+r)$. ∎

Lemma 3 shows that among the policies between l and r, the optimal choice for E is the exact midpoint. This is due to the strict concavity of the utility function.[4]

Overall, there are three candidate points for E's choice: $l-\sqrt{\varepsilon}$, $\frac{1}{2}(l+r)$, and $r+\sqrt{\varepsilon}$. Now, E's decision is straightforward. Roughly speaking, he chooses the policy e that gives him the most votes taking into account the above results. If the optimal policy is unique, he will definitely choose it. Otherwise, he will randomize. If, for example, he is indifferent among $l-\sqrt{\varepsilon}$, $\frac{1}{2}(l+r)$, and $r+\sqrt{\varepsilon}$, he will randomize over them. This is captured by the probability distribution $P\left(l-\sqrt{\varepsilon}, \frac{1}{2}(l+r), r+\sqrt{\varepsilon}\right)$. For example, $\tilde{e} = (p_L, p_C, p_R)$ implies that he chooses $l-\sqrt{\varepsilon}$, $\frac{1}{2}(l+r)$, and $r+\sqrt{\varepsilon}$ with probability p_L, p_C, and p_R $(= 1-p_L-p_C)$, respectively.

3.3 Incumbent Candidates

Given ε and taking into account the entrant's optimal choice given above, the two incumbents each choose l and r to maximize votes. In principle, we should consider $L\,(R)$'s best response to each $r\,(l)$ for various values of ε. One problem is that in some cases best responses are not well defined. For example, if $\varepsilon = 5$ and $r = 1$, then L will choose l arbitrarily close to 1. This implies that when $\varepsilon = 5$, there is no Nash equilibrium in which $r = 1$.[5]

Here, we get away with the formal analysis for getting the best responses by noting that the two incumbents' locations should be symmetric in equilibrium, i.e., $l = -r$. It can be easily shown that if they are not symmetric, one is better off than the other and hence the inferior candidate would always want to deviate. The next subsection presents the results.

3.4 Equilibrium

We have the following equilibrium outcomes. We first consider the case where ε is very large.

Proposition 1 *If $\varepsilon \geq 1$, then $l = r = 0$ and no entry occurs.*

[4] If the utility function takes the form $u(x,K) = -|x-k|+\varepsilon_K$, then any $e \in (l+\varepsilon, r-\varepsilon)$ is optimal.

[5] For a formal discussion, refer to the limit equilibrium in Palfrey (1984).

Proof. If $\varepsilon \geq 1$, E cannot get any votes as long as $l \in [-1, 0]$ and $r \in [0, 1]$ since

$$\max \left\{ -(x-l)^2 + \varepsilon, \ -(x-r)^2 + \varepsilon \right\} \geq -(x-e)^2$$

for any $x, e \in [-1, 1]$. Therefore, E will not enter and this makes the setting equivalent to that of Downsian competition. Therefore, convergence on the median is the unique equilibrium. It is straightforward to see that no equilibrium exists if $l, r \in [-1, 0]$ or $l, r \in [0, 1]$. Hence, convergence on the median is indeed the unique equilibrium outcome. ■

If $\varepsilon \geq 1$, then the disadvantage is so huge that the entrant cannot survive. Therefore, virtually there is no threat of entry and the two incumbents produce a Downsian result.

Next, if ε is a little bit smaller but still significantly large, we have the following result.

Proposition 2 *If $\frac{1}{4} \leq \varepsilon < 1$, then $r = 1 - \sqrt{\varepsilon}$, $l = -r$ and no entry occurs.*

Proof. Given $\frac{1}{4} \leq \varepsilon < 1$, E cannot get any votes as long as $l \in [-\sqrt{\varepsilon}, -1 + \sqrt{\varepsilon}]$ and $r \in [1 - \sqrt{\varepsilon}, \sqrt{\varepsilon}]$ since

$$\max \left\{ -\left(x - \left(1 - \sqrt{\varepsilon}\right)\right)^2 + \varepsilon, -\left(x + \left(1 - \sqrt{\varepsilon}\right)\right)^2 + \varepsilon \right\} \geq -(x-e)^2$$

for any x, $e \in [-1, 1]$, and hence he will not enter. Given this, the incumbents will maximally converge toward the median; otherwise, they can always move toward the median and get more votes. Hence, $l = -1 + \sqrt{\varepsilon}$ and $r = 1 - \sqrt{\varepsilon}$ are the unique equilibrium location with no entry. Again, it is straightforward to see that at least one incumbent will have a profitable deviation if $l \notin [-\sqrt{\varepsilon}, -1 + \sqrt{\varepsilon}]$ or $r \notin [1 - \sqrt{\varepsilon}, \sqrt{\varepsilon}]$. Therefore, $l = -1 + \sqrt{\varepsilon}$ and $r = 1 - \sqrt{\varepsilon}$ are the unique equilibrium location. ■

The idea is simple. If $\varepsilon < 1$, then incumbents will not stand at the center because the entrant will enter either to the left or to the right and get some votes. Hence, they differentiate a little just to prevent entry. The values $r = 1 - \sqrt{\varepsilon}$ and $l = -r$ do exactly this. Neither of them has any incentive to unilaterally deviate. If, for example, R moves slightly to the right, then he will simply lose some votes in the middle without getting anything. If he deviates slightly to the left, then he will encroach upon some of L's votes in the middle but by doing so will allow the entrant to kick in to his right. The loss is larger than the gain and he is better off sticking to $r = 1 - \sqrt{\varepsilon}$.

Finally, if ε is too small, entry is inevitable. We have the following result.

Proposition 3 *If $0 < \varepsilon < \frac{1}{4}$, then $r = \frac{1}{4} g(\varepsilon)$ and $l = -r$, where $g(\varepsilon) = 1 - \sqrt{\varepsilon} + \sqrt{9\varepsilon - 2\sqrt{\varepsilon} + 1}$. E chooses policies $-\frac{1}{4} g(\varepsilon) - \sqrt{\varepsilon}$, 0, and $\frac{1}{4} g(\varepsilon) + \sqrt{\varepsilon}$ with probability p, $1 - 2p$, and p, respectively, where $0 \leq p \leq \frac{1}{2}$.*

Proof. Now, no pair of (l, r) can deter entry. Suppose the incumbents choose l and r, where $l - \sqrt{\varepsilon} > 0$, $l + \sqrt{\varepsilon} < r - \sqrt{\varepsilon}$, and $r + \sqrt{\varepsilon} < 1$. (It will be made straightforward from the following analysis that this set of inequalities is a necessary condition for equilibrium.) Then, there are three target areas for E to enter: left of $l - \sqrt{\varepsilon}$, between

$l+\sqrt{\varepsilon}$ and $r-\sqrt{\varepsilon}$, and right of $r+\sqrt{\varepsilon}$. In each case, we know from the Lemmas that E's optimal locations are $e=l-\sqrt{\varepsilon},\ \frac{1}{2}(l+r)$, and $r+\sqrt{\varepsilon}$, respectively.
Now note that l and r should be such that E gets equal votes from the three areas so that he is indifferent among them. Suppose, by contrast, there is a unique vote-maximizing position for E. If the location is $l-\sqrt{\varepsilon}$, then L can do better by moving to the left appropriately, inducing E to move to either the center or the far right. If it is $r+\sqrt{\varepsilon}$, R can deviate to the right and do better. If it is $\frac{1}{2}(l+r)$, then either party can deviate to the center slightly and gain more with E still in the center. Similarly, we can easily show that incumbents have profitable deviations if there are two optimal positions for E. Therefore, the votes that E can get from the three locations should be equal in equilibrium. Now, to get the optimal location, take $\varepsilon\in(0,\frac{1}{4})$ and let $l=-r$ due to symmetry. If E choose $e=r+\sqrt{\varepsilon}$, he gets a total vote of $1-(r+\sqrt{\varepsilon})$. (The extreme left case is analogous.) The optimal center position is $e=\frac{1}{2}(l+r)=0$. From $-(x-r)^2+\varepsilon=-x^2$ follows $x=\frac{1}{2}\left(r-\frac{\varepsilon}{r}\right)$. Since $l=-r$, the total number of votes for E is $r-\frac{\varepsilon}{r}$. Solving $1-(r+\sqrt{\varepsilon})=r-\frac{\varepsilon}{r}$ gives $r=\frac{1}{4}\left(1-\sqrt{\varepsilon}+\sqrt{9\varepsilon-2\sqrt{\varepsilon}+1}\right)$.
Given this, E is indifferent among the three positions and therefore randomizes arbitrarily. However, not all the randomizations are permissible in equilibrium. If, for example, E chose $l-\sqrt{\varepsilon}$ with higher probability than he did $r+\sqrt{\varepsilon}$, then L would be strictly better off moving slightly to the left so that E will choose $\frac{1}{2}(l+r)$ with probability 1 since this will give L higher expected votes. This is true for any $\tilde{e}=(p_L,p_C,p_R)$ with $p_L>p_R$. Similarly, R will deviate slightly to the right for any $\tilde{e}=(p_L,p_C,p_R)$ with $p_L<p_R$. Hence, in equilibrium, the randomization should be symmetric, i.e., $p_L=p_R$. Thus follows the randomization $\tilde{e}=(p,1-2p,p)$. ■

Now, the advantage is too small and hence entry is inevitable. If the incumbents differentiate too little, E will choose to be an extremist and take too many votes from either L or R. If they differentiate too much, E will be a centrist and again take too many votes from the incumbents. Hence, the incumbents will differentiate so that the entrant is indifferent among the three locations $l-\sqrt{\varepsilon},\ \frac{1}{2}(l+r)$, and $r+\sqrt{\varepsilon}$. The values $r=\frac{1}{4}g(\varepsilon)$ and $l=-r$ play this role. It is straightforward that neither incumbent has any incentive to unilaterally deviate when E randomizes symmetrically. If, for example, R moves slightly to the right, then E will for sure get into the middle, winning more votes. This decreases R's expected votes. If, on the other hand, he deviates slightly to the left, the entrant will enter to his right with certainty and this loss far exceeds the gain from the middle.

In summary, we have

1. If $0<\varepsilon<\frac{1}{4}$, $l=-\frac{1}{4}g(\varepsilon)$, $r=\frac{1}{4}g(\varepsilon)$ and $\tilde{e}=(p,\ 1-2p,\ p)$,
2. If $\frac{1}{4}\leq\varepsilon<1$, $l=-1+\sqrt{\varepsilon}$, $r=1-\sqrt{\varepsilon}$, and no entry occurs,
3. If $\varepsilon\geq 1$, $l=0$, $r=0$, and no entry occurs,

where $g(\varepsilon)=1-\sqrt{\varepsilon}+\sqrt{9\varepsilon-2\sqrt{\varepsilon}+1}$ and $\tilde{e}=(p,\ 1-2p,\ p)$, $0\leq p\leq\frac{1}{2}$ is a mixed strategy over the policies $-\frac{1}{4}g(\varepsilon)-\sqrt{\varepsilon}$, 0, and $\frac{1}{4}g(\varepsilon)+\sqrt{\varepsilon}$.

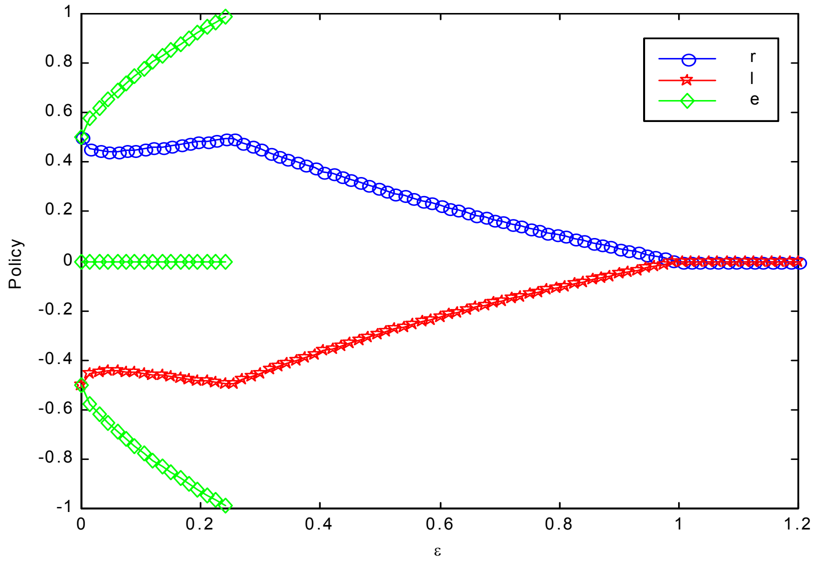

Figure 1: Optimal l, r, and e

Also of interest are the expected votes for each candidate. One would expect higher votes for the incumbents as ε gets larger and the opposite for the entrant. The following result confirms this intuition.

Corollary 1 *Let s_I and s_E be the expected fraction of votes for the incumbents and the entrant respectively. Then, we have the following.*

$$s_I = \begin{cases} \frac{1}{2} - \frac{g(\varepsilon)}{16} + \frac{\varepsilon}{g(\varepsilon)}, & 0 < \varepsilon < \frac{1}{4} \\ \frac{1}{2}, & \varepsilon \geq \frac{1}{4} \end{cases}$$

$$s_E = \begin{cases} \frac{g(\varepsilon)}{8} - \frac{2\varepsilon}{g(\varepsilon)}, & 0 < \varepsilon < \frac{1}{4} \\ 0, & \varepsilon \geq \frac{1}{4} \end{cases}$$

These are calculated simply by dividing the total expected votes for each candidate by the measure of the total population, which is 2.

Figure 1 shows candidates' optimal policy choices. As shown above, if $\varepsilon \geq 1$, we get a Downsian result. For $\varepsilon \in [\frac{1}{4}, 1)$, two incumbents minimally differentiate just to prevent entry. The degree of differentiation decreases in ε in this interval. That is, the larger the advantage, the less they find it necessary to differ. For $\varepsilon \in (0, \frac{1}{4})$, the entrant randomizes over the three policies and the degree of differentiation first decreases and then increases in ε. Note that in this case, two different levels of ε would result in the same position of incumbent candidates. Also note that Palfrey's case obtains as a special case when $\varepsilon = 0$. In this case, E randomizes over $\tilde{X} = \{-\frac{1}{2}, \frac{1}{2}\}$.

Figure 2 shows the vote shares in percentage for the incumbents and the entrant. For $\varepsilon \geq \frac{1}{4}$, the entrant does not enter and the two incumbents divide votes equally. For $\varepsilon \in (0, \frac{1}{4})$, incumbents' expected share increases and the entrant's share decreases in ε,

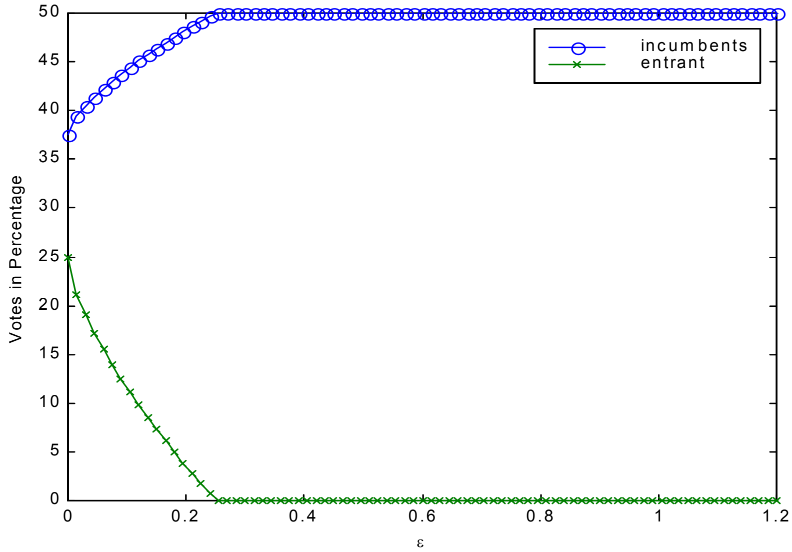

Figure 2: Expected Votes in Percentage

which is quite intuitive. When $\varepsilon = 0$, two incumbents each get $\frac{3}{8}$ and the entrant gets $\frac{1}{4}$ as in Palfrey.

4 Discussion and Conclusion

- Groseclose (1999) also briefly addresses this issue. He says that the results are qualitatively the same as in Palfrey. But this is true when we allow for only pure strategies. We regard the entrant's pure strategy to choose the midpoint as a special case which cannot address the issue raised in the introduction.

- If the equilibrium p is close to 0, we can scarcely observe a centrist minor party. In an extreme case where $p = 0$, i.e., when $\tilde{e} = \left(\frac{1}{2}, 0, \frac{1}{2}\right)$, we will only observe extremists.

- The fact that there are no two major parties adopting the same policy implies, in our model, that the advantage ε is not so large as to completely deter entry without diverging from the median.

- We assumed that E does not enter if he cannot get any votes. Since there is no entry cost, we could have assumed that he chooses to enter at any position, which does not affect the incumbents' strategy. Then, in equilibrium we would have a minor candidate who virtually gets no vote. This might reflect the reality.

Our model is simple and abstracts from many real issues. We can think of some possible extensions which will make this model more realistic. For example, we can consider a game in which the entrant is now able to invest in his name value before he enters. Incumbents should take this into account when they announce policy. This way, we can endogenize the disadvantage as a function of the original disadvantage. Another extension is one in which the two incumbents are opportunistic whereas the entrant is ideological. In this setup we can also think of an infinitely repeated game, in which reputation may play an important role.

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