Distributive Politics with Primaries[1]

Shigeo Hirano
Department of Political Science
Columbia University

James M. Snyder, Jr.
Departments of Political Science and Economics
Massachusetts Institute of Technology

Michael M. Ting
Department of Political Science and SIPA
Columbia University

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Abstract

We develop a model of electoral competition in which two parties compete for votes amongst three groups of voters. Each party first internally selects one of two candidates to run in a general election. Candidates within a party share a fixed ideological platform and can promise a distribution of a unit of public spending across groups. Without primary elections, the selection process is random. With primary elections, an ideologically friendly subset of the voters strategically chooses the candidate. In the basic model, primary elections cause politicians to cater to extreme groups rather than a moderate group with many "swing voters." The amount promised to extreme groups is decreasing in the ideological polarization of those groups, while each party's probability of victory is increasing in the size and extremity of its favored group. We also find that an incumbency advantage reduces the amount promised to extremists, and therefore benefit moderates.

In a series of influential papers, Lindbeck and Weibull (1987), Dixit and Londregan (1995, 1996), and others develop models where electoral competition drives political parties to target divisible resources towards groups or regions with relatively large numbers of "swing" voters.[1]

The evidence in support of these swing voter models, however, is mixed, at least for the United States. The strongest evidence comes from studies of the allocation of campaign resources. Several papers find that battleground states receive a disproportionate share of the advertising in U.S. presidential campaigns (Colantoni et al. 1975; Nagler and Leighley 1990; Stromberg 2008).

The evidence is noticeably weaker when we examine the distribution of government expenditures. Some studies of New Deal spending, federal grants, and federal employment find that states with a presidential vote share nearer to one-half, or a more variable presidential vote swing, receive somewhat more federal aid (e.g., Wright 1974; Wallis 1987, 1996; Fleck 1999; Stromberg 2002). However, Stromberg (2004) shows that these significant correlations vanish when state fixed effects are included, indicating that the results may reflect unmeasured state variables. Larcinese, Rizzo, and Testa (2006) and Larcinese, Snyder, and Testa (2006) find no evidence that states receive more federal funds if they have closer presidential races, more frequent presidential partisan swings, or a larger percentage of self-identified independent or moderate voters. Ansolabehere and Snyder (2006) examine the distribution of state aid to local governments, and find little support for the swing voter hypothesis.

There is probably more evidence in support of the idea that government expenditures flow disproportionately to areas with more "core" or "loyal" party voters. Some studies find a positive relationship between the share of federal spending going to a geographic area (state or county) and the Democratic vote in the area (e.g., Browning 1973; Ritt 1976; Owens and Wade 1984; Levitt and Snyder 1995).[2] Since Democrats were the majority party in Congress during the years studied, this provides some support for the idea that federal spoils go to the victors, but the results might also reflect the behavior of the Democratic

[1]Colantoni et al. (1975), Snyder (1989), Stromberg (2002), and others develop similar models in the context of allocating campaign resources.

[2]However, Larcinese, et al., (2006) do not find any significant relationships of this sort for U.S. states.

party or the characteristics of areas that tend to vote Democratic. Levitt and Snyder (1995) go further, comparing programs passed during years of unified Democratic control with programs passed during years of divided government, and find that programs passed during unified Democratic control exhibit a pro-Democratic geographic bias, while those passed during divided government do not.[3] Ansolabehere and Snyder (2006) find evidence that party control in U.S. states affects the allocation of state government aid in a similar direction: Democrats tend to skew the distribution of funds towards Democratic-leaning counties, and Republicans tend to allocate more to Republican-leaning counties. Finally, studies of the distribution of patronage by urban machines find that these organizations reward their core supporters with patronage (Holden 1973; Rakove 1975; Erie 1978; Johnston 1979).

What accounts for these patterns? We argue that primary elections – or, more generally, internal party competition for nominations – provide one possible answer.

This paper analyzes a two-stage model of distributive politics in which candidates must first win a primary election in order to represent their party in the general election. We begin with a simplified version of Lindbeck-Weibull/Dixit-Londregan, in which voters care both about an issue on which the parties have fixed positions, commonly thought of as social, religious or ideological issue, and also about monetary transfers. We then add two key features: (i) primary elections and (ii) uncertainty about the preferences of swing voters.

We find, first, that core groups receive more transfers with primaries, while swing groups receive less.[4] Core voters are also better off, in welfare terms, under primaries, while swing voters are worse off. The intuition for these results is straightforward. In the absence of primaries, the general election is the only election that matters, and all candidates maximally cater to swing voters. With primaries, however, the primary election in each party constitutes an additional hurdle that candidates must overcome, and core voters have disproportionate

[3]Levitt and Poterba (1999) also find indirect evidence that the majority party favors its core areas: areas represented by more senior Democrats tend to get more.

[4]Throughout this paper we use the term "transfers" to refer to the general class of distributive goods that politicians may control or influence. Also, the discussion in this paragraph is for interior equilibria. For some parameter values the equilibrium is at a corner in which there is no difference between the situations with and without primaries.

influence over who wins at that point. This gives them leverage over their party's candidates, which they exploit to extract promises of transfers.

Second, as the preferences of a party's core voters become more extreme regarding the social issue, the party's candidates offer less to its core voters. The party's probability of winning in the general election then rises.[5] This happens because the core voters are more concerned with winning for the sake of the social issue, and are less willing to risk losing the general election in return for transfers when their party does win.

Third, in contrast to Dixit-Londregan, group sizes matter for the distribution of transfers. The reason is that the social issue is a "public good," while transfers are private, and candidates make explicit trade-offs between the probability of winning on the social issue and transfers in the primaries. As a result, if a party has more core voters it will have a higher probability of winning the general election, but its core voters will receive smaller transfers per-capita.

Finally, when a political party's candidates hold a "valence" advantage, the advantaged party will have a higher probability of winning the general election, and it will allocate more transfers to core and less to swing voters. The other party will allocate less to core and more to swing voters. The welfare of core voters in the advantaged (other) party is higher (lower) than without the party valence advantage.

We also consider various extensions of the basic model. First, we find that swing groups are better off if they can coordinate their members' behavior to "capture" one of the party's primaries. However, they would be even better off if there were no primaries at all. Second, when the valence advantage is held by a candidate rather than a party, the advantaged candidate's core voters will receive fewer transfers, and the swing voters will receive more transfers, than if the advantage did not exist. The core voters are not as well off as when there is no candidate advantage and swing do not do as well as when there is no primary. We can think of this type of advantage arising from personal characteristics of the candidates, superior resources, the incumbency advantage, or seniority.

Our paper contributes not only to the literature on distributive politics, but also to the

[5]Some other models generate similar predictions or have a similar logic (e.g., Gersbach 1998; Serra 2007).

literature on primary elections. Although primaries are used to nominate almost all major elected officials in the U.S., and their use is increasing in many other countries, the number of formal models that explicitly incorporate primaries is quite small.[6] Moreover, virtually all of the existing models focus on competition in a one-dimensional policy space. Ours is the first to introduce distributional issues.

Related Literature

Primary elections are only one factor that might account for observed patterns in distributive politics.

The theoretical literature offers several other explanations. Cox and McCubbins (1986) emphasize the role of specialized information. They argue that Democratic politicians know more about the preferences of Democratic voters, while Republican politicians know more about the preferences of Republican voters. Democratic politicians are therefore more efficient at providing government projects and services to Democratic voters than to Republicans or independents, and get a larger "bang for the buck" (in votes) when they allocate funds to Democrats. This is similar to the "machine politics" model in Dixit and Londregan (1996), where parties must transfer funds using "leaky buckets" and the amount of leakage may vary by party and interest group targeted.

Mobilization is another possible story. In "swing voter" models turnout is fixed, so electoral competition is driven by efforts at "conversion" rather than mobilization. The strategy of targeting loyal voters makes more sense when mobilizing voters is a key aspect of electoral competition. If spending primarily mobilizes voters – either directly as a form of advertising, or via retrospective voting, or indirectly by buying the support of local elites or groups – then the marginal benefit to spending an additional dollar may be highest in areas with the highest density of a party's own voters (Kramer 1964; Cox and McCubbins 1986;

[6] See, e.g., Aranson and Ordeshook (1972), Coleman (1972), Morton and Williams (2001), Owen and Grofman (2006), and Serra (2007). A growing literature examines sequential voting (e.g. Dekel and Piccione 2000; Callander 2007; Battaglini et al. 2007). This literature primarily focuses issues concerning information aggregation, which are quite different those we study. Carey and Polga-Hecimovich (2006) document the large increase in the use of primaries in Latin America.

Sim 2002; Arulampalam, et al. 2009).

Credit-claiming issues may also provide incentives to target core areas. Who will attend the ribbon-cutting ceremonies for new bridges, schools, hospitals, and libraries? In a heavily Democratic area the politicians will almost all be Democrats, and they will leave no doubt about which party is responsible for the locality's good fortune. In electorally marginal areas, however, half the politicians may be Democrats and half may be Republicans, and the impression is not likely to be so partisan. Neither party may benefit much (although individual politicians, running as incumbents, may benefit; see Arulampalam et al. 2009).

These models may not be exclusive. It may be the case, for example, that the loyalists of the out-party receive disproportionately small shares of the public dollar, which swing areas and loyal areas do equally well.

In all of these models, one underlying assumption is that politicians are mainly interested in winning elections, and offer government transfers or projects in order to appeal to voters. Another possibility is that the distribution of public funds is not driven by electoral concerns, but by politicians' policy preferences, rent-seeking, or other forces. This can only be the case if electoral competition is weak, or if voters are unresponsive to distributive policies.

Finally, other theorists emphasize factors such as proposal power (Baron and Ferejohn 1989), legislative seniority (McKelvey and Riezman 1992), over- and under-representation (Ansolabehere et al. 2003; Knight 2004), committee structure, presidential leadership, and universalism (Weingast et al. 1981; McCarty 2000).

Surprisingly, none of these papers – and, to our knowledge, no paper in the theoretical literature – has proposed primaries as a key factor providing an incentive for politicians to distribute transfers to core groups.

Model

Our model considers electoral competition between two parties, X and Y. There are two main variants of the model. In the first, there are no primary elections, and in the second we introduce primaries within both parties. All elections are decided by plurality rule.

Voters are divided into three groups, indexed $i = 1, 2, 3$. The relative size of each group is n_i, with $\sum_{i=1}^{3} n_i = 1$. Also, no group is an outright majority, so $n_i < 1/2$ for $i = 1, 2, 3$. Group membership is important to the model because candidates are able to offer transfers that are targeted specifically toward a group. Within each group, members enjoy the benefits of a targeted transfer equally. Let the candidates in each party be denoted a and b.[7] Then $\overline{x}^j = (x_1^j, x_2^j, x_3^j)$ is the offer of candidate $j \in \{a, b\}$ in party X, and $\overline{y}^j = (y_1^k, y_2^k, y_3^k)$ is the offer of candidate $k \in \{a, b\}$ in party Y. These are "per-capita" transfers, and must be non-negative. Also, they must satisfy the budget constraints $\sum_{i,j} n_i x_i^j = 1$ and $\sum_{i,k} n_i y_i^k = 1$.

Candidates care only about winning office. Voters care about a "fixed" policy issue, candidate valence, and monetary transfers. All voters in each group have the same preference on the fixed issue. For each group $i = 1, 2, 3$, let γ_i denote the members' relative preferences for party X's position on the fixed issue. Groups 1 and 3 consist of "extremists" and group 2 consists of "moderates." We assume $\gamma_1 > K$ and $\gamma_3 < -K$, where $K = \max\{1/n_1, 1/n_3\}$. This guarantees that party X can never buy the support of group 3 voters, and party Y can never buy the support of group 1 voters. So, group 2 is the only swing group.

The preferences of group 2 voters on the fixed issue are stochastic. Specifically, γ_2 is a random variable whose value is revealed after the primary election and before the general election. We assume γ_2 is distributed uniformly on the interval $[-\theta/2, \theta/2]$. So, the density of γ_2 is $1/\theta$ for $\gamma_2 \in [-\theta/2, \theta/2]$ and 0 otherwise, and the c.d.f. is $F(\gamma_2) = 0$ for $\gamma_2 < -\theta/2$, $F(\gamma_2) = \gamma_2/\theta + 1/2$ for $\gamma_2 \in [-\theta/2, \theta/2]$, and $F(\gamma_2) = 1$ for $\gamma_2 > \theta/2$. We also allow party X to have a party-specific electoral advantage, by giving group 2 voters $\alpha \in [0, \theta/2]$ in valence from either party X candidate.[8]

Voter utility is linear in income. So, if candidate k from party Y wins the voter receives a

[7]The results of the model also hold for any larger number of candidates in each party.

[8]The uniform distribution is assumed for simplicity. The logic and qualitative results of the model hold for large class of symmetric, unimodal distributions. Note that our assumption about group 2 is similar to Coate (2004). As in his model, we could equivalently assume that the relative preference of group 2 voters is fixed at 0, and γ_2 represents a "valence" shock, or a shock on some other fixed issue, that only group 2 voters care about. One interpretation of this assumption is that potentially some event may occur or some piece of information may be revealed between the primary and general election and that there is ex ante uncertainty about how this will affect the preferences of group 2 voters.

payoff of y_i^k. If candidate j from party X wins the general election, then a voter from group $i = 1, 3$ receives a payoff of $x_i^j + \gamma_i$, and a voter from group 2 receives $x_2^j + \gamma_2 + \alpha$. So, a voter from group $i = 1, 3$ votes for party X's candidate in the general election if $\gamma_i > y_i^k - x_i^j$, and a voter from group 2 votes for party X's candidate in the general election if $\gamma_2 > y_2^k - x_2^j - \alpha$.[9]

In both games, candidates begin play by offering transfer vectors $\overline{x}^a$, $\overline{x}^b$, $\overline{y}^a$, and $\overline{y}^b$ to the voters. These platforms are binding policy commitments and cannot be changed. In the game without primaries, the subsequent sequence of play is as follows. Two candidates are chosen exogenously, one for each party, and these two compete in the general election. The simplest assumption is that each candidate is chosen to be their party's nominee with probability 1/2, but this is not necessary. With primaries, the two candidates within each party first compete for the party's nomination. The electorate in the party X primary is group 1 (the party that favors party X's ideological position) and half of group 2. Likewise, the electorate in the party Y primary is group 3 and half of group 2. Our results hold under any assumption about the distribution of group 2 voters' participation in the primaries (such as complete abstention), as long as they are a minority in both primaries. We consider the case where group 2 voters "capture" a primary in the first part of the Extensions section below. The two primary winners then compete in the general election.

We derive subgame perfect equilibria for both variants of the game. An equilibrium consists of transfer announcements for each candidate and voting strategies for each voter at each election.

Basic Results

We begin by deriving a general expression for party X's probability of winning the general election. We will use this frequently in the analysis that follows. For any transfer vectors $(\overline{x}^j, \overline{y}^k)$, all voters in group 1 vote for the party X candidate and all voters in group 3 vote for the party Y candidate. Since no group constitutes a majority, the party X candidate wins if $\gamma_2 > y_2^k - x_2^j - \alpha$. Thus, at an interior solution, the probability that the party X

[9]The linearity assumption is made for simplicity. The logic and qualitative results of the model hold for any strictly increasing, concave utility function.

candidate wins is:

$$p(\overline{x}^j, \overline{y}^k) = 1 - F(y_2^k - x_2^j - \alpha) = \frac{x_2^j - y_2^k + \alpha}{\theta} + \frac{1}{2}. \qquad (1)$$

No Primaries

First suppose there is only a general election. Then each party's candidates maximize the probability of winning that election. It follows from (1) that the uniquely optimal strategy for each candidate is to offer the maximal amount of transfers (i.e., the entire dollar) to group 2. The first remark summarizes the resulting allocation and voting strategies.

Remark 1 (Transfers and Voting Under No Primaries). Without primaries, all candidates offer the transfer vector $\overline{x}^a = \overline{x}^b = \overline{y}^a = \overline{y}^b = (0, 1/n_2, 0)$. Group 1 and 3 members vote for the party X and Y candidates, respectively. Group 2 members vote for party X's candidate if $\gamma_2 > -\alpha$ and for party Y's candidate if $\gamma_2 < -\alpha$. ■

These strategies imply that party X's probability of victory is $1/2+\alpha/\theta$. The equilibrium expected utilities of each group's members are then:[10]

$$\begin{aligned} E_1^G &= \left(\frac{1}{2} + \frac{\alpha}{\theta}\right)\gamma_1 \\ E_2^G &= \frac{1}{n_2} + \frac{\theta}{8} + \frac{\alpha}{2} + \frac{\alpha^2}{2\theta} \\ E_3^G &= \left(\frac{1}{2} + \frac{\alpha}{\theta}\right)\gamma_3. \end{aligned}$$

Primaries

Now, suppose there is a primary, with group 1 and half of group 2 voting in party X's primary, and group 3 and half of group 2 voting in party Y's primary.[11]

Primary voters are forward-looking when voting in the primary, taking into account the expected outcome in the general election.[12] Assume that $n_1 > n_2/2$ and $n_3 > n_2/2$, so

[10]The last three terms in E_2^G are the expected utility from the fixed issue and valence, or $\int_{-\alpha}^{\theta/2}(\gamma_2+\alpha)/\theta \, d\gamma_2$.

[11]As noted above, we could also assume that group 2 voters do not vote in either primary.

[12]Respondents in the presidential primary exit poll surveys claim to value electability when deciding how to vote. For example in the 2004 Democratic primaries, more exit poll respondents cited the ability to "defeat George W. Bush" than any other response to the question "Which ONE candidate quality mattered most in deciding how you voted today?"

group 1 is a majority in party X's primary and group 3 is a majority in party Y's primary. Then candidates running in party X's primary both offer to maximize expected utility of a group-1 voter. This means trading off optimally (from a group-1 voter's point of view) between winning the general election and giving transfers to group 1. Similarly, candidates running in party Y's primary both offer to maximize the expected utility of a group-3 voter.

We derive a pure strategy equilibrium by finding the optimal platform strategy within each party, given an expected winning platform from the opposing party. Let $\overline{x}$ and $\overline{y}$ denote arbitrary platforms from parties X and Y. The expected utilities of group-1 and group-3 voters are then:

$$E_1(\overline{x}, \overline{y}) = \left[\frac{x_2 - y_2 + \alpha}{\theta} + \frac{1}{2}\right](x_1 - y_1 + \gamma_1) + y_1 \tag{2}$$

$$E_3(\overline{x}, \overline{y}) = \left[\frac{x_2 - y_2 + \alpha}{\theta} + \frac{1}{2}\right](x_3 - y_3 + \gamma_3) + y_3. \tag{3}$$

To see how the equilibrium of this model differs from that of the no-primaries model, suppose initially that both party X candidates promised the entire dollar to group 2. By offering group 1 a small amount of transfers instead, a primary candidate would reduce her chances of victory in the general election, but this loss is outweighed by the increase in group 1's expected transfers. The other primary candidate then has an incentive to follow suit. Symmetric incentives cause party Y's primary candidates to offer more to group 3. The candidates do not necessarily offer everything to their core groups, however, since beyond a certain level those voters would actually prefer a candidate who devoted more to group 2 in order to win the general election.

The objective functions for all candidates are strictly concave, and so the equilibrium platform strategies are pure and unique. The first main result solves for this system and states the main, interior solution. Proposition 1′, which includes the corner cases as well, is stated and proved in the Appendix. The solution is straightforward to derive because of our assumptions that $|\gamma_1|$ and $|\gamma_3|$ are "large," which gives neither party's candidates any incentive to give to the other party's core group. Each party's platform decision then boils down to a single choice over the relative amount to give to their own core group. Since each party's best-response platform is unique, all of its candidates adopt it in equilibrium.

Proposition 1 (Transfers with Primaries). At an interior solution:

$$(x_1^P, y_3^P) = \left(\frac{3n_2\theta + 2n_2\alpha + 2n_3\gamma_3}{6n_1} - \frac{2\gamma_1}{3}, \frac{3n_2\theta - 2n_2\alpha - 2n_1\gamma_1}{6n_3} + \frac{2\gamma_3}{3}\right) > (0,0). \quad \blacksquare \qquad (4)$$

This result contrasts sharply with that of Remark 1. The model predicts that, at an interior equilibrium, primaries result in positive transfers to core groups.[13] Primaries also result in higher expected payoffs to both parties' core groups than in a world without primaries. This happens because the probability of victory of a core group's preferred party increases when the opposition party reduces its contribution to group 2. Taking the opposition's contribution as given, each party's optimal contribution must then strictly increase its core group's expected utility over that in the no-primaries model. By contrast, members of group 2 receive lower expected payoffs when there are primaries, as they are promised strictly less than $1/n_2$ by both parties.

Proposition 1 also provides unambiguous comparative statics about the effects of group size and preferences on allocations.[14] These are easily derived by differentiating the expressions for x_1^P and y_3^P from the proposition, and are summarized in the following remark.

Remark 2 (Comparative Statics on Core Group Contributions). At an interior equilibrium, each party gives more to its core group (i.e., group 1 for party X, group 3 for party Y): (i) when the core group of either party shrinks in size; (ii) when the preferences of either party's core group on the fixed issue become more moderate; (iii) when group 2 grows in size; (iv) when group 2's preferences over the fixed issue become more uncertain; and (v) when its relative valence advantage increases. $\blacksquare$

[13] Examining Proposition 1′, we see that this holds except in the first corner case of the proposition, which occurs when both core groups are large and extreme.

[14] The reaction functions, which can be found at the end of the proof of Proposition 1′, show that spending on core voters are strategic complements. Thus, for example as the promises to group 1 (group 3) increase, the probability that party X (party Y) wins the general election decreases, which increases the marginal returns of promises to group 3 (group 1). Similarly, as group 1 (group 3) becomes more extreme, the value of winning increase for group 1 (group 3). Thus group 1 (group 3) will accept lower transfers in return for a higher probability of winning, which as noted above also affects transfers to group 3 (group 1).

Note that an increase in ideological variance within group 2 has the same effect as an increase in the degree of moderation in the preferences of the parties' core groups.

We can also compute comparative statics on each party's probability of victory. Rewriting (1) yields the following probability that party X wins at an interior solution.

$$p(x_1^P, y_3^P) = \frac{\gamma_1 n_1 + \gamma_3 n_3 + \alpha n_2}{3\theta n_2} + \frac{1}{2} \tag{5}$$

Differentiating this expression, it is straightforward to prove the following remark.

Remark 3 (Comparative Statics on Probabilities of Victory). At an interior equilibrium, each party's probability of victory is increasing in the size and ideological extremism of its core group (therefore, each party's probability of victory is decreasing in the size and ideological extremism of the opposing party's core group). Each party's probability of victory is increasing in the size of its relative valence advantage. ■

The effect of group 2's size and heterogeneity are ambiguous. An electorally advantaged party (i.e., the one with the greater probability of victory) benefits when group 2 becomes smaller or more concentrated, while the disadvantaged party benefits from group 2 becoming larger and more dispersed. A higher variance in group 2's preferences reduces the importance of transfers in determining the election outcome – thus, win probabilities are equalized and parties promise more to their base groups.

Extensions

In this section we relax two assumptions of the main model. The model assumes that the pivotal voter in each primary was part of an extreme or core group. This was done in part by splitting group 2's voters among the primaries in each party. However, these voters could probably increase their welfare by coordinating to vote in the same primary. The first extension examines this possibility by allowing all group 2 voters to participate in one primary. The model further assumed that candidates within a party had equal valence levels. The second extension explores the implications of replacing the party-specific advantage with a candidate-specific advantage.

Primary Capture by Swing Voters

Suppose that group 2 voters attempt to capture the party X primary. Obviously, even if such a "raid" occurs, the pivotal voter in the party X primary election changes only if $n_2 > n_1$, and the pivotal voter in party Y's primary election changes only if $n_2 > n_3$. The analysis precedes as before, but party X candidates must now maximize the expected utility of group 2 citizens:

$$E_2(\overline{x}, \overline{y}) = \left[\frac{x_2 - y_2 + \alpha}{\theta} + \frac{1}{2}\right](x_2 - y_2 + \gamma_2 + \alpha) + y_2.$$

The optimal strategy of party X's candidates is clearly to maximize x_2, and hence $x_1^P = x_3^P = 0$ and $x_2^P = 1/n_2$. This is the transfer vector that maximizes party X's probability of victory, and has the same effect as removing party X's primary election.

Now re-writing (3), the objective for party Y's candidates becomes:

$$E_3(\overline{x}, \overline{y}) = \left[\frac{n_3 y_3}{\theta n_2} + \frac{\alpha}{\theta} + \frac{1}{2}\right](-y_3 + \gamma_3) + y_3.$$

This is again a concave one-variable choice problem. The next result summarizes the equilibrium transfer strategies.

Proposition 2 (Transfers with Primary Capture). Suppose $n_2 > n_1$. The unique equilibrium transfers when all group 2 citizens vote in the party X primary are:

$$(x_1^P, y_3^P) = \begin{cases} (0, 0) & \text{if } n_2(\theta/2 - \alpha) \leq -n_3\gamma_3 \\ (0, \frac{n_3\gamma_3 + n_2(\theta/2 - \alpha)}{2n_3}) & \text{if } n_2(\theta/2 - \alpha) \in (-n_3\gamma_3, 2 - n_3\gamma_3) \\ (0, \frac{1}{n_3}) & \text{if } n_2(\theta/2 - \alpha) \geq 2 - n_3\gamma_3. \quad \blacksquare \end{cases} \tag{6}$$

As intuition might suggest, the equilibrium transfers are identical to the corner cases of Proposition 1′ in which party X candidates promise everything to group 2. We therefore omit the proof.

Where relevant, the comparative statics identified in Remarks 2 and 3 continue to hold for this variant of the model. In particular, if party Y's candidates are at an interior solution (the middle case of Proposition 2), then transfers to party Y's core group (group 3) increase when group 3 shrinks in size, when the preferences of group 3 on the fixed issue become more moderate, when group 2 grows in size, when group 2's preferences over the fixed issue become more uncertain, and when party Y's relative valence advantage increases.

Regarding group welfare, with the exception of a few corner cases the takeover of either primary by group 2 benefits that group at the expense of the core groups. This is true even for the party that has no group 2 voters in its primary, as it must contribute more to group 2 in response to the takeover. Comparing Proposition 2 to Remark 1, it is also clear that group 2 would be even better off if there were no primaries at all.

Finally, if group 2 were able to choose which primary to raid, then it would have an incentive to capture the primary of the party with a smaller or more moderate group of core supporters. As Remark 2 implies, that party's candidates would tend to offer group 2 fewer transfers if it is not captured.

Candidate Specific Valence Advantage

Suppose now that party X's valence advantage is $\alpha = 0$, but candidate b in party X has a personal advantage among group 2 voters. This may come from incumbency, or perhaps from superior ability or charisma. Thus $\gamma_2^b = \gamma_2 + \beta$, where $\beta > 0$. The advantaged party X candidate now wins if $\gamma_2 + \beta > y_2^k - x_2^j$. We assume that voters break ties in favor of candidate b. Let $\overline{x}^{Pa}$ and $\overline{x}^{Pb}$ denote the equilibrium allocation vectors of candidates a and b of party X, and $\overline{y}^{P\beta}$ the equilibrium allocation vector of the party Y candidates.

The main implication of the personal advantage is that it forces opponents to contribute more to group 2 in order to increase their probability of victory. To see why, it is helpful to modify (1) to state the (interior) probability that the advantaged candidate wins:

$$p^b(\overline{x}^b, \overline{y}^k) = 1 - F(y_2^k - x_2^j) = \frac{\beta + x_2^b - y_2^k}{\theta} + \frac{1}{2}. \tag{7}$$

This expression clearly implies that in the party X primary, candidate b can make group 1 voters strictly better off than candidate a simply by offering a platform near candidate a's. While there are multiple equilibria, we focus on what is perhaps the most plausible one, where candidate a adopts the platform $\overline{x}^{Pa}$ that would maximize group 1's utility given an anticipated platform by the party Y candidate. Candidate b can then win the primary election by maximizing (7) subject to providing group 1 voters with at least as much expected utility as candidate a. This is done by raising x_2^j by enough to make group 1 voters indifferent between candidates a and b. Thus, at an interior solution we must have $x_1^{Pb} < x_1^{Pa}$, since group 1 voters will still prefer candidate b if she offers slightly less than x_1^{Pa}.

In response to candidate b's more moderate platform, the party Y candidates (who perceive candidate b to be their real competition) adjust their strategies by also offering more to group 2 than in the basic model. This raises their probability of victory against candidate b at the expense of transfers for voters in group 3. In turn, the more moderate party Y platforms induce moderation by candidate a.

Remark 4 formally establishes that at an interior equilibrium, all candidates moderate their platforms when $\beta > 0$. This implies that the centrist group benefits from having a candidate with a valence or incumbency advantage. Correspondingly, the core groups do worse in the presence of such a candidate. Even the core group whose candidate is advantaged can be worse off, because that candidate exploits her advantage only to improve her electoral prospects, rather than to benefit core voters. The result is proved in the Appendix.

Remark 4 (Contributions with a Candidate Advantage). At an interior solution, if $\beta > 0$, then $x_1^{Pb} < x_1^{Pa} < x_1^P$, and $y_3^{P\beta} < y_3^P$. ■

When β and γ_1 are sufficiently large, candidate b can choose the corner solution of $x_1^{Pb} = 0$, giving all transfers to group 2. This equilibrium is essentially similar to the $x_1^P = 0$ corner cases of the previous models. Clearly, in this corner case group 2 voters are even better off in the presence of an advantaged candidate, and group 3 voters are worse off. Group 1 voters may be better or worse off, depending on the size of β.[15]

Note finally that in equilibrium, the advantaged candidate always wins her primary.

[15]Consider the following example: $\theta = 24$, $\gamma_1 = 9$, $\gamma_3 = -9$, and $n_1 = n_2 = n_3 = 1/3$. If $\beta = 0$, so no candidate has a personal advantage, then the equilibrium with primary elections is at a corner, with all candidates offering transfers only to their parties' core groups: $\overline{x}^P = (3, 0, 0)$ and $\overline{y}^P = (0, 0, 3)$. For $\beta > 1$, the equilibrium has $\overline{x}^{Pa} = (3/2, 3/2, 0)$, $\overline{x}^{Pb} = (0, 3, 0)$, and $\overline{y}^{!P\beta} = (0, 3, 0)$; thus, candidate b in party X and both candidates from party Y offer transfers only to group 2, while candidate a in party X splits the transfers equally between groups 1 and 2. If $\beta < 4$ then group 1 voters are worse off than in the case with $\beta = 0$, but if $\beta > 4$ then group 1 voters are better off.

This implies that if running a candidacy were costly, an incumbent would go unchallenged in the primary election. Nonetheless, the threat of a primary challenge generally causes the incumbent to offer positive transfers to her party's core group. This prevents her from simply maximizing her probability of victory, as she would do in the absence of primaries.

Empirical Implications

As noted above, primary elections are only one factor that might lead parties or candidates to allocate transfers to their core groups. Other factors include specialized information about voter preferences, the need to mobilize voters, difficulties in credit-claiming, and simple rent-division. While distinguishing across these hypotheses is beyond the scope of this paper, it is worth noting that the empirical literature appears to find more support for "swing voter" behavior outside the U.S., in countries that do not use primary elections. Arulampalam et al. (2009) find that Indian states that are "swing" but also aligned with the governing parties receive larger shares of public grants. Dahlberg and Johansen (2002) find evidence that the more pivotal regions (of 20) in Sweden were more successful in winning environmental grants from the central government. Crampton (2004) finds a positive correlation between competitiveness of the race and spending in Canadian provinces that are not ruled by the liberal party. Milligan and Smart (2005) also study Canada, and find that closeness of the electoral race has a positive effect on spending, at least for seats held by the opposition party. John and Ward (2001) find evidence that central government aid to local governments in the U.K. goes disproportionately to marginal districts. Case (2001) finds that during the Berisha administration in Albania block grants tended to be targeted at swing communes. Denemark (2000) also finds evidence that marginal seats in Australia receive a disproportionate amount of local community sports grants.

In addition, the strongest evidence for "swing voter" behavior in the U.S. is from studies of the distribution of federal New Deal spending across states, with a focus on presidential elections. But during this period only about a third of states used presidential primaries. This evidence suggests a possible role for primaries, since factors such as credit claiming, mobilization (unless voting is mandatory), and specialized information, are more universal. Of course further empirical work is necessary to identify whether primary elections are actually important for explaining the patterns noted above. In particular, other countries may have nominating processes or other internal party competition that provides similar incentives for politicians to cater to non-swing groups.

Other evidence from the elections literature is consistent with our model. Our model suggests that we should observe a relationship between general election outcomes and asymmetries in primary competition between the political parties. Candidates who are less concerned with primary competition will be able to promise more transfers to "swing" voters, which should increase the attractiveness of these candidates in the general election. A number of empirical papers find evidence that primary competition is negatively correlated with general election outcomes for presidential races (e.g. Kenney and Rice 1987) and for statewide and federal offices (e.g. Bernstein 1977; Born 1981; Kenney and Rice 1984). Whether primary competition does negatively influence general election outcomes is still an open research question, but the claim is at least consistent with our model.[16]

A related empirical implication is that political leaders who are primarily concerned with winning should generally not support the use of primaries in their own party if the opposition party does not also use primaries (or some other competitive nomination method). While the motivation for introducing primary elections is still open to debate, it is worth noting that when primaries were adopted in U.S. states they were legally imposed on both major parties, at least outside the south.[17] This is consistent with our model's predictions.[18]

Finally, in the previous section we note that candidate-specific valence advantages should have an even larger effect on competition and outcomes in primary elections than in general

[16]Several studies find little evidence for a relationship between primary and general election outcomes (e.g. Hacker 1965; Pierson and Smith 1975; Atkeson 1998).

[17]Merriam and Overacker (1928) and Ware (2002) provide a description of the historical development of primary elections in the US.

[18]The use of primaries in Latin America is more puzzling since parties often choose to nominate presidential candidates with primary elections even when opposition parties chose their nominees by alternative methods. However, one obvious difference between the Latin American cases and our model is that multiple parties tend to compete in Latin American elections.

elections. To the extent that the incumbency advantage is a candidate specific valence advantage, we would expect the incumbency advantage to have a greater impact on primary election competition than general election competition. Ansolabehere, et al. (2007) find that the incumbency advantage, as measured by the sophomore surge, is substantially larger in primary elections compared to general elections. Also, in the latter part of the 20th century, when the primary incumbency advantage was especially large, only a minority of primary elections to statewide and federal offices with an incumbent candidates were even contested, and only a fraction of those were competitive (Ansolabehere, et al. 2006). Although numerous factors affect both primary competition and incumbency advantage, these patterns are at least consistent with our model.

Conclusions

The main result of the above model is that the presence of primary elections leads candidates to increase transfers to their parties' core groups and decrease transfers to swing groups. The model also makes some non-obvious predictions. For example, if a party's core group becomes more extreme, then the party's candidate will tend to offer *more* transfers to swing voters. Also, a party's core group may be *worse off* if it has an incumbent with a personal electoral advantage.

Our model is highly stylized and simple, and might be extended in various directions. What if parties' core groups are not homogenous but have moderate and extreme factions? What if there are more than three groups? What if there are three or more parties?

Our paper also suggests further avenues for empirical research. First, if primaries affect campaign promises, then we should expect to observe other political behaviors related to these campaign promises to also be affected by whether parties use primaries – e.g. endorsements and campaign contributions. More specifically, if voters' and organizations' partisan attachments increase with the amount of transfers they are promised, then the members of "core" groups will be more likely to support – proclaim stronger partisan affiliations, donate campaign contributions, give endorsements – to their party's candidate when she is nominated by a primary. Second, our model implies that we should observe a relationship between general election outcomes and asymmetries in primary competition between the political parties. Candidates who are less concerned with primary competition will be able to promise more transfers to "swing" voters, which should increase the attractiveness of these candidates in the general election. Finally, the model provides additional empirical implications for how campaign promises and related behavior will vary depending upon the incumbency status of the candidates. To the extent that the incumbency advantage is a candidate-specific valence advantage, the model implies that swing voters should strongly support incumbents. In contrast, relative to swing voters, the core groups of a party should more actively support the party's non-incumbents, especially in open-seat races.

Finally, our model focuses on the effects of competition when party nominations are made using primary elections. As noted above, other nomination processes may allow internal party competition to yield similar results as ones we attribute to primaries. Future empirical and theoretical research should explore the effects of the different types of non-primary nomination systems both in the pre-primary U.S. and in other countries.

APPENDIX

Proposition 1′ (Transfers with Primaries). At an interior solution:

$$(x_1^P, y_3^P) = \left(\frac{3n_2\theta + 2n_2\alpha + 2n_3\gamma_3}{6n_1} - \frac{2\gamma_1}{3}, \frac{3n_2\theta - 2n_2\alpha - 2n_1\gamma_1}{6n_3} + \frac{2\gamma_3}{3} \right).$$

When (x_1^P, y_3^P) is not interior, the following corner solutions arise:

$$(x_1^P, y_3^P) = \begin{cases} (0,0) & \text{if } n_2(\theta/2+\alpha) \leq n_1\gamma_1 \text{ and } n_2(\theta/2-\alpha) \leq -n_3\gamma_3 \\ (0, \frac{n_3\gamma_3 + n_2(\theta/2-\alpha)}{2n_3}) & \text{if } n_2(3\theta/2+\alpha) \leq 2n_1\gamma_1 - n_3\gamma_3 \text{ and} \\ & \quad n_2(\theta/2-\alpha) \in (-n_3\gamma_3, 2 - n_3\gamma_3) \\ (0, \frac{1}{n_3}) & \text{if } n_2(\theta/2+\alpha) \leq n_1\gamma_1 - 1 \text{ and} \\ & \quad n_2(\theta/2-\alpha) \geq 2 - n_3\gamma_3 \\ (\frac{-n_1\gamma_1 + n_2(\theta/2+\alpha)}{2n_1}, 0) & \text{if } n_2(\theta/2+\alpha) \in (n_1\gamma_1, 2 + n_1\gamma_1) \text{ and} \\ & \quad n_2(3\theta/2-\alpha) \leq n_1\gamma_1 - 2n_3\gamma_3 \\ (\frac{1}{n_1}, 0) & \text{if } n_2(\theta/2+\alpha) \geq 2 + n_1\gamma_1 \text{ and} \\ & \quad n_2(\theta/2-\alpha) \leq -1 - n_3\gamma_3 \\ (\frac{1}{n_1}, \frac{1 + n_3\gamma_3 + n_2(\theta/2-\alpha)}{2n_3}) & \text{if } n_2(3\theta/2+\alpha) \geq 3 + 2n_1\gamma_1 - n_3\gamma_3 \text{ and} \\ & \quad n_2(\theta/2-\alpha) \in (-1 - n_3\gamma_3, 1 - n_3\gamma_3) \\ (\frac{1 - n_1\gamma_1 + n_2(\theta/2+\alpha)}{2n_1}, \frac{1}{n_3}) & \text{if } n_2(\theta/2+\alpha) \in (n_1\gamma_1 - 1, 1 + n_1\gamma_1) \text{ and} \\ & \quad n_2(3\theta/2-\alpha) \geq 3 + n_1\gamma_1 - 2n_3\gamma_3 \\ (\frac{1}{n_1}, \frac{1}{n_3}) & \text{if } n_2(\theta/2+\alpha) \geq 1 + n_1\gamma_1 \text{ and} \\ & \quad n_2(\theta/2-\alpha) \geq 1 - n_3\gamma_3. \quad \blacksquare \end{cases}$$

Proof. The budget constraints and weak domination imply that $x_2 = (1 - n_1x_1 - n_3x_3)/n_2$ and $y_2 = (1 - n_1y_1 - n_3y_3)/n_2$. Substituting these into (2) and (3) yields:

$$\begin{aligned} E_1(\overline{x}, \overline{y}) &= \left[\frac{\alpha + (n_1y_1 + n_3y_3 - n_1x_1 - n_3x_3)/n_2}{\theta} + \frac{1}{2} \right] (x_1 - y_1 + \gamma_1) + y_1 \\ E_3(\overline{x}, \overline{y}) &= \left[\frac{\alpha + (n_1y_1 + n_3y_3 - n_1x_1 - n_3x_3)/n_2}{\theta} + \frac{1}{2} \right] (x_3 - y_3 + \gamma_3) + y_3. \end{aligned}$$

Clearly, $\frac{\partial E_1}{\partial x_3}(\overline{x}, \overline{y}) < 0$ and $\frac{\partial E_3}{\partial y_1}(\overline{x}, \overline{y}) < 0$ for all $(\overline{x}, \overline{y})$, so $x_3^P = y_1^P = 0$. The expected utilities of group-1 and group-3 voters can then be written:

$$E_1(\overline{x}, \overline{y}) = \left[\frac{n_3y_3 - n_1x_1}{\theta n_2} + \frac{\alpha}{\theta} + \frac{1}{2} \right] (x_1 + \gamma_1) \tag{8}$$

$$E_3(\overline{x}, \overline{y}) = \left[\frac{n_3y_3 - n_1x_1}{\theta n_2} + \frac{\alpha}{\theta} + \frac{1}{2} \right] (-y_3 + \gamma_3) + y_3 \tag{9}$$

These are now concave one-variable choice problems. Thus for any $\overline{x}$ (respectively, $\overline{y}$), there is a unique platform for party Y (respectively, X) that maximizes the utility of the pivotal voter in group 3 (respectively, 1). Each party's candidates must therefore choose the same platform in equilibrium. The two party X candidates simply choose $x_1 \in [0, 1/n_1]$ and the two party Y candidates simply choose $y_3 \in [0, 1/n_3]$.

While candidates within each party choose the same allocation vectors, each party's platform might be different. Denoting the equilibrium transfer vectors $\overline{x}^P$ and $\overline{y}^P$, the first-order conditions can now be written:

$$x_1^P = \frac{n_3 y_3^P - n_1\gamma_1 + n_2(\theta/2 + \alpha)}{2n_1} \tag{10}$$

$$y_3^P = \frac{n_1 x_1^P + n_3\gamma_3 + n_2(\theta/2 - \alpha)}{2n_3}. \tag{11}$$

Solving these yields the stated unique equilibrium allocations. ■

Proof of Remark 4. We begin by calculating the platforms of candidate a and party Y, and then characterize properties of candidate b's optimal choice. Suppose that the winning platforms in party X and Y are $\overline{x}^b$ and $\overline{y}$, respectively. The expected utility of group-1 voters from candidate a's platform $\overline{x}^a$ given $\overline{y}$ is:

$$E_1^a(\overline{x}^a, \overline{y}) = \left[\frac{x_2^a - y_2}{\theta} + \frac{1}{2}\right](x_1^a - y_1 + \gamma_1) + y_1.$$

Similiarly, the expected utility of group-3 voters given $\overline{x}^b$ and $\overline{y}$ is:

$$E_3(\overline{x}^b, \overline{y}) = \left[\frac{\beta + x_2^b - y_2}{\theta} + \frac{1}{2}\right](x_3^b - y_3 + \gamma_3) + y_3.$$

The budget constraints and weak domination imply that $x_2^j = (1 - n_1 x_1^j - n_3 x_3^j)/n_2$ for each candidate j, and $y_2 = (1 - n_1 y_1 - n_3 y_3)/n_2$. Substituting these yields:

$$E_1^a(\overline{x}^a, \overline{y}) = \left[\frac{1}{\theta}(n_1 y_1 + n_3 y_3 - n_1 x_1^a - n_3 x_3^a)/n_2 + \frac{1}{2}\right](x_1^a - y_1 + \gamma_1) + y_1$$

$$E_3(\overline{x}^b, \overline{y}) = \left[\frac{1}{\theta}(n_1 y_1 + n_3 y_3 - n_1 x_1^b - n_3 x_3^b)/n_2 + \frac{\beta}{\theta} + \frac{1}{2}\right](x_3^b - y_3 + \gamma_3) + y_3.$$

Clearly, $\frac{\partial E_1^a}{\partial x_3^a}(\overline{x}^a, \overline{y}) < 0$ for candidate a; hence $x_3^{Pa} = 0$. By an analogous argument, $x_3^{Pb} = 0$. Next, $\frac{\partial E_3}{\partial y_1}(\overline{x}^b, \overline{y}) < 0$ for all $(\overline{x}^b, \overline{y})$, so $y_1^P = 0$. The expected utilities of group-1 under x^a and group-3 voters can then be written:

$$E_1^a(\overline{x}^a, \overline{y}) = \left[\frac{n_3 y_3 - n_1 x_1^a}{\theta n_2} + \frac{1}{2}\right](x_1^a + \gamma_1)$$

$$E_3(\overline{x}^b, \overline{y}) = \left[\frac{n_3 y_3 - n_1 x_1^b}{\theta n_2} + \frac{\beta}{\theta} + \frac{1}{2}\right](-y_3 + \gamma_3) + y_3$$

These are concave one-variable choice problems. Thus for any $\overline{x}^b$, there exists a unique platform for party Y that maximizes the utility of the pivotal voter in group 3. Party Y's candidates therefore choose identical platforms. Within party X, candidate a has a unique best response against $\overline{y}$.

The first-order conditions for each player can now be written:

$$x_1^{Pa} = \frac{n_3 y_3^{P\beta} - n_1\gamma_1 + n_2\theta/2}{2n_1} \tag{12}$$

$$y_3^{P\beta} = \frac{n_1 x_1^{Pb} + n_3\gamma_3 + n_2(\theta/2 - \beta)}{2n_3}. \tag{13}$$

which implies:

$$x_1^{Pa} = \frac{x_1^{Pb}}{4} + \frac{n_2(3\theta/2 - \beta) + n_3\gamma_3}{4n_1} - \frac{\gamma_1}{2}. \tag{14}$$

Candidate b now chooses the platform that maximizes her probability of victory, subject to the constraint that she provides group 1 voters with higher expected utility than $\overline{x}^a$. Using the analogous expected utility calculation as for candidate a, $E_1^b(\overline{x}^b, \overline{y}) = [\frac{n_3 y_3 - n_1 x_1^b}{\theta n_2} + \frac{\beta}{\theta} + \frac{1}{2}](x_1^b + \gamma_1)$. Substituting for y_3, candidate b minimizes x_1^b subject to:

$$\left[\frac{n_1 x_1^{Pb}/2 + n_3\gamma_3/2 + n_2(\theta/4 + \beta/2) - n_1 x_1^{Pb}}{\theta n_2} + \frac{1}{2}\right](x_1^{Pb} + \gamma_1) \geq$$
$$\left[\frac{n_1 x_1^{Pb}/2 + n_3\gamma_3/2 + n_2(\theta/4 - \beta/2) - n_1 x_1^{Pa}}{\theta n_2} + \frac{1}{2}\right](x_1^{Pa} + \gamma_1). \tag{15}$$

To establish the result, we first show that $\beta > 0$ implies $y_3^{P\beta} < y_3^P$. Suppose to the contrary that $y_3^{P\beta} \geq y_3^P$. Then using (11) and (13), the difference in the party Y allocation is:

$$y_3^{P\beta} - y_3^P = \frac{n_1(x_1^{Pb} - x_1^P) - n_2\beta}{2n_3}.$$

Rearranging terms, this expression implies that the difference in candidate b's allocation is:

$$x_1^{Pb} - x_1^P = \frac{2n_3(y_3^{P\beta} - y_3^P) + n_2\beta}{n_1}.$$

Using (10) and (12), the difference in the candidate a allocation is:

$$x_1^{Pa} - x_1^P = \frac{n_3(y_3^{P\beta} - y_3^P)}{2n_1}.$$

Taking the difference of the last two expressions yields:

$$x_1^{Pb} - x_1^{Pa} = \frac{3n_3(y_3^{P\beta} - y_3^P) + 2n_2\beta}{2n_1}.$$

This expression implies that $x_1^{Pb} > x_1^{Pa}$. But candidate b could then do strictly better than x_1^{Pb} by choosing $x_1^b = x_1^{Pa}$ instead. This would increase her probability of winning while still satisfying (15), thereby offering group 1 voters a strictly higher expected utility than candidate a: contradiction. Thus $y_3^{P\beta} < y_3^P$.

Now observe that if $y_3^{P\beta} < y_3^P$, then (12) implies that $x_1^{Pa} < x_1^P$. And by the argument in the preceding paragraph, we have $x_1^{Pb} < x_1^{Pa}$. ∎

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