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

October 22, 2007

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.

1. Introduction

In a series of influential papers, Lindbeck and Weibull (1987), Dixit and Londregan (1995, 1996), and others develop models in which 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, 2007).

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 in 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 features of the states. 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

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

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 party or the characteristics of areas that tend to vote Democratic. Levitt and Snyder (1995) go a bit 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 typically find that the organizations in control of their cities tend to reward their core supporters with patronage (Holden, 1973; Rakove, 1975; Erie, 1978; and 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, and 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. In percentage terms, however, "moderately extreme" core groups gain the most from primaries. Second, as a party's core voters become more moderate, the party's

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

[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.

candidates offer more to the party's core voters. The party's probability of winning in the general election then falls.[5] Third, in contrast to Dixit-Londregan, group sizes matter for the distribution of transfers. The reason is that the fixed policy issue is a "public good" while transfers are private, and candidates make explicit trade-offs between the probability of winning on the policy 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 less in transfers per-capita.

We also consider various extensions of the basic model. First, we find that swing groups are better off if they can coordinate the party affiliation of their voters and "capture" one of the party's primaries. However, they would be even better off if there were no primaries at all.

Second, we consider the impact of a "valence" advantage. When the advantage is held by a political party, 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.

However, when the advantage is held by a candidate, 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 exists and swing do not do as well as when there is no primary. A similar outcome arises when one candidate has a resource advantage. We can think of this type of advantage arising from personal characteristics of the candidates, the incumbency advantage, or seniority.

As noted above, the term primary election could actually be replaced with alternative internal nomination processes as long as the process is dominated by the representatives of groups (or blocks of voters) rather than by office-seeking politicians.

[5]This means that the party whose core voters are more extreme will have a higher probability of winning the general election. Some other models generate similar predictions or similar logic (e.g., Gersbach, 1998; Serra, 2007).

2. Related Literature

Primary elections are only one possible 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 simlar 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; Sim 2002; Arulampalamy, 2007).

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 Arulampalamy et al. 2007).

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.

3. Model

Our model considers electoral competition between two parties, X and Y, under complete and perfect information. 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 election 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.[6] 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

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

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.[7]

The preferences of group 2 voters on the fixed issue are stochastic. Specifically, γ_2 is a random variable whose value of γ_2 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.

Voter utility is linear in income. So, if candidate k from party Y wins the voter receives a 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 $\gamma_2 > y_2^k - x_2^j - \alpha$.

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. 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. The two primary winners then compete in the general election.

For both variants of the game, we derive a unique subgame perfect equilibrium. The equilibrium consists of transfer announcements for each candidate and voting strategies for each voter at each election. Note our assumptions about voter preferences ensure that all

[7] We could also 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.

voters within each group vote for the same candidate in the general election.

4. Basic Results

It will first be convenient to derive a general expression for party X's probability of winning the general election. 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, the (interior) probability that the party X candidate wins is:

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

4.1 No Primaries

First suppose there is only a general election. Then each party's candidates maximize probability of winning that election. It follows from (1) that the uniquely optimal strategy for each candidate is to maximize her allocation to group 2. The first remark summarizes the 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 each party's probability of victory is $1/2 + \alpha/\theta$. The equilibrium expected utilities of each group's members are then:

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

Note that the last three terms in E_2^G are the expected utility from the fixed issue and valence: $\int_{-\alpha}^{\theta/2} (\gamma_2 + \alpha)/\theta \; d\gamma_2$.

4.2 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.[8]

Primary voters are forward-looking when voting in the primary, taking into account the expected outcome in the general election. Assume that $n_1 > n_2/2$ and $n_3 > n_2/2$, so 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 and giving transfers to group 1. Similarly, candidates running in party Y's primary both offer to maximize expected utility of a group-3 voter. So, extremists do better (or at least no worse) with primaries than without.

We derive a pure strategy equilibrium by finding the optimal platform strategy within each party, given an expected winning platform from the opposing party. If a party's best response platform is unique, then all of that party's candidates must adopt it in equilibrium. 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:

$$\begin{aligned} E_1(\overline{x},\overline{y}) &= \left[\frac{x_2 - y_2 + \alpha}{\theta} + \frac{1}{2}\right](x_1 - y_1 + \gamma_1) + y_1 \\ E_3(\overline{x},\overline{y}) &= \left[\frac{x_2 - y_2 + \alpha}{\theta} + \frac{1}{2}\right](x_3 - y_3 + \gamma_3) + y_3. \end{aligned}$$

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

$$\begin{aligned} E_1(\overline{x},\overline{y}) &= \left[\frac{\alpha + (n_1 y_1 + n_3 y_3 - n_1 x_1 - n_3 x_3)/n_2}{\theta} + \frac{1}{2}\right](x_1 - y_1 + \gamma_1) + y_1 \\ E_3(\overline{x},\overline{y}) &= \left[\frac{\alpha + (n_1 y_1 + n_3 y_3 - n_1 x_1 - n_3 x_3)/n_2}{\theta} + \frac{1}{2}\right](x_3 - y_3 + \gamma_3) + y_3. \end{aligned}$$

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:

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

$$E_3(\overline{x},\overline{y}) = \left[\frac{n_3 y_3 - n_1 x_1}{\theta n_2} + \frac{\alpha}{\theta} + \frac{1}{2}\right](-y_3 + \gamma_3) + y_3 \tag{3}$$

[8] We could also assume that group 2 voters do not vote in either primary.

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:

$$\begin{aligned} x_1^P &= \frac{n_3 y_3^P - n_1\gamma_1 + n_2(\theta/2 + \alpha)}{2n_1} \\ y_3^P &= \frac{n_1 x_1^P + n_3\gamma_3 + n_2(\theta/2 - \alpha)}{2n_3}. \end{aligned}$$

Solving these yields the following unique equilibrium allocations.

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

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

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

$$(x_1^P, y_3^P) = \begin{cases} (0,0) & \text{if } n_2(\alpha + \theta/2) \le n_1\gamma_1 \text{ and } n_2(\alpha - \theta/2) \le -n_3\gamma_3 \\ (0, \frac{n_3\gamma_3 + n_2(\theta/2 - \alpha)}{2n_3}) & \text{if } n_2(\alpha + \theta/2) \le (2n_1\gamma_1 - n_3\gamma_3)/3 \text{ and} \\ & \quad n_2(\alpha - \theta/2) \in (-n_3\gamma_3, 2 - n_3\gamma_3) \\ (0, \frac{1}{n_3}) & \text{if } n_2(\alpha + \theta/2) \le n_1\gamma_1 - 1 \text{ and} \\ & \quad n_2(\alpha - \theta/2) \ge 2 - n_3\gamma_3 \\ (\frac{-n_1\gamma_1 + n_2(\theta/2 + \alpha)}{2n_1}, 0) & \text{if } n_2(\alpha + \theta/2) \in (n_1\gamma_1, 2 + n_1\gamma_1) \text{ and} \\ & \quad n_2(\alpha - \theta/2) \le (n_1\gamma_1 - 2n_3\gamma_3)/3 \\ (\frac{1}{n_1}, 0) & \text{if } n_2(\alpha + \theta/2) \ge 2 + n_1\gamma_1 \text{ and} \\ & \quad n_2(\alpha - \theta/2) \le -1 - n_3\gamma_3 \\ (\frac{1}{n_1}, \frac{1 + n_3\gamma_3 + n_2(\theta/2 - \alpha)}{2n_3}) & \text{if } n_2(\alpha + \theta/2) \ge 1 + (2n_1\gamma_1 - n_3\gamma_3)/3 \text{ and} \\ & \quad n_2(\alpha - \theta/2) \in (-1 - n_3\gamma_3, 1 - n_3\gamma_3) \\ (\frac{1 - n_1\gamma_1 + n_2(\theta/2 + \alpha)}{2n_1}, \frac{1}{n_3}) & \text{if } n_2(\alpha + \theta/2) \in (-1 + n_1\gamma_1, 1 + n_1\gamma_1) \text{ and} \\ & \quad n_2(\alpha - \theta/2) \ge 1 + (n_1\gamma_1 - 2n_3\gamma_3)/3 \\ (\frac{1}{n_1}, \frac{1}{n_3}) & \text{if } n_2(\alpha + \theta/2) \ge 1 + n_1\gamma_1 \text{ and} \\ & \quad n_2(\alpha - \theta/2) \ge 1 - n_3\gamma_3. \end{cases} \tag{5}$$

This result contrasts usefully with that of Remark 1. With the exception of the first

corner case, which occurs when both core groups are large and extreme, the model predicts that primaries will result in higher payoffs for core groups.

The non-corner solutions provide unambiguous comparative statics about the effect of group size and preferences on allocations. These are summarized in the following remark.

Remark 2 (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 shrink in size; (ii) when the preferences of either party's core group 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.

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

$$p(x_1^P, y_3^P) = \frac{\gamma_1 n_1 + \gamma_3 n_3 + 2\alpha n_2}{3\theta n_2} + \frac{1}{2} \tag{6}$$

Thus,

Remark 3 (Probability 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.

5. Extensions

5.1 Primary Capture by Swing Voters

In the main model, it was assumed 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 would probably increase their welfare by coordinating to vote in the same primary. We examine this possibility by allowing all group 2 voters to participate in one primary. Obviously, changing the swing voter in the party X (respectively, Y) primary election requires that $n_2 > n_1$ (respectively, n_3).

Suppose that group 2 voters attempt to capture the party X primary. The analysis precedes as before, but party X candidates must now maximize the expected utility of group 2 citizens:

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

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). The unique equilibrium transfers when all group 2 citizens vote in the party X primary are:

$$(x_1^P, y_3^P) = \begin{cases} (0,0) & \text{if } n_2(\alpha - \theta/2) \leq -n_3\gamma_3 \\ (0, \frac{n_3\gamma_3 + n_2(\theta/2 - \alpha)}{2n_3}) & \text{if } n_2(\alpha - \theta/2) \in (-n_3\gamma_3, 2 - n_3\gamma_3) \\ (0, \frac{1}{n_3}) & \text{if } n_2(\alpha - \theta/2) \geq 2 - n_3\gamma_3. \end{cases} \tag{7}$$

As intuition might suggest, the equilibrium transfers are identical to those cases of Proposition 1 in which party X candidates promise everything to group 2.

Where relevant, the comparative statics identified in Remarks 2 and 3 continue to hold for this variant of the model. However, it is worth adding a few observations on 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.

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 group 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.

5.2 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, possibly arising from incumbency. 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. Modifying (1), the probability that this candidate wins becomes, at an interior solution:

$$p^b(\overline{x}^b, \overline{y}^k) = 1 - F(y_2^k - x_2^j) = \frac{\beta + x_2^b - y_2^k}{\theta} + \frac{1}{2}. \tag{8}$$

This expression clearly implies that within party X, candidate b can dominate any platform by candidate a. In response, candidate a can only adopt the weakly dominant platform $\overline{x}^a$ that maximizes the primary electorate's utility given the anticipated party Y platform. Candidate b will therefore win the primary election in equilibrium by maximizing (8) subject to providing group 1 voters with at least as much utility as candidate a.

To derive the equilibrium platforms, we therefore need to calculate first the platforms of candidate a and party Y. Suppose that the winning platforms in party X and Y be $\overline{x}^b$ and $\overline{y}$, respectively. The expected utility of group-1 voters given candidate a's platform x^a and $\overline{y}$ 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:

$$\begin{aligned} E_1^a(\overline{x}^a, \overline{y}) &= \left[\frac{1}{\theta}(n_1 y_1 + n_3 y_3 - n_1 x_1^a - n_3 x_3^a)/n_2 + \frac{1}{2}\right](x_1^a - y_1 + \gamma_1) + y_1 \\ E_3(\overline{x}^b, \overline{y}) &= \left[\frac{1}{\theta}(\beta + n_1 y_1 + n_3 y_3 - n_1 x_1^b - n_3 x_3^b)/n_2 + \frac{1}{2}\right](x_3^b - y_3 + \gamma_3) + y_3. \end{aligned}$$

Clearly, $\frac{\partial E_1^j}{\partial x_3^j}(\overline{x}, \overline{y}) < 0$ for each candidate j 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 under x^a and group-3 voters can then be written:

$$\begin{aligned} E_1^a(\overline{x}, \overline{y}) &= \left[\frac{n_3 y_3 - n_1 x_1^a}{\theta n_2} + \frac{1}{2}\right](x_1^a + \gamma_1) \\ E_3(\overline{x}^b, \overline{y}) &= \left[\frac{\beta + n_3 y_3 - n_1 x_1^b}{\theta n_2} + \frac{1}{2}\right](-y_3 + \gamma_3) + y_3 \end{aligned}$$

As with the symmetric-candidate case, 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:

$$x_1^{Pa} = \frac{n_3 y_3^P - n_1 \gamma_1 + n_2 \theta/2}{2n_1} \tag{9}$$

$$y_3^P = \frac{n_1 x_1^{Pb} - \beta + n_3 \gamma_3 + n_2 \theta/2}{2n_3}. \tag{10}$$

which implies:

$$x_1^{Pa} = \frac{x_1^{Pb}}{4} + \frac{3n_2\theta/2 + n_3\gamma_3 - \beta}{4n_1} - \frac{\gamma_1}{2}. \tag{11}$$

Expressions (10) and (11) suggest that a personal advantage will force opponents to contribute more to group 2 in order to increase their probability of victory.

Candidate b now chooses the platform that maximizes her probability of victory, subject to the constraint of providing group 1 voters with higher expected utility than $\overline{x}^a$. This

implies that candidate b minimizes x_1^b subject to:

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

Collecting terms yields:

$$\left[-n_1 x_1^{Pb} + \beta + n_3\gamma_3 - 2n_1\gamma_1 + \frac{3\theta n_2}{2}\right] x_1^{Pb} \geq$$
$$\left[n_1 x_1^{Pb} - 2n_1 x_1^{Pa} - \beta + n_3\gamma_3 - 2n_1\gamma_1 + \frac{3\theta n_2}{2}\right] x_1^{Pa} - \beta\gamma_1.$$

By (8), 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}.

For β and γ_1 sufficiently large, candidate b is able to choose the corner solution of $x_1^{Pb} = 0$. This equilibrium is essentially similar to the $x_1^P = 0$ corner cases of the previous models. It is clear that in this environment, group 2 voters are better off in the presence of an advantaged candidate. More interestingly, the complete diversion of pork away group 1 makes its voters worse off even though the advantaged candidate is in their preferred party. Finally, candidate b's platform also reduces y_3^P relative to the $\beta = 0$ case. As a result, voters group 3 are also worse off when $\beta > 0$.

More generally, it can also be shown that in all cases, *all* candidates moderate their platforms when $\beta > 0$, in the sense of promising more to group 2. This implies that the centrist group always benefits from a candidate with a valence or incumbency advantage. The core groups correspondingly do worse in the presence of such a candidate.

In equilibrium, the advantaged candidate always wins her primary. This would imply that if running a candidacy were costly, then an incumbent would go unchallenged in a primary election. Nevertheless, the threat of a primary challenge generally causes the incumbent to give a positive transfer to her party's core group. This prevents her from simply maximizing her probability of victory, as candidates were able to do in the absence of primaries.

6. 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 a bunch of other cool predictions.

We are currently working on various extensions. What if parties' core groups are not homogenous but have moderate and extreme factions. A more difficult, but important extension, is to expand the number of groups beyond three.

While distinguishing across these models 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. Arulampalamy et al. (2007) 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 (2003) 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. is 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.

Furthermore, 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 particular reference presidential elections. But during this period only about a third of states used presidential primaries.

This evidence suggests a role for primaries, since factors such as credit claiming, mobilization (unless voting is mandatory), and specialized information about voter preferences, are more universal. Of course further empirical work is necessary to identify whether primary

elections are actually important for explaining the patterns noted above. For one, other countries may have nominating processes or other internal party competition that provides incentives for politicians to cater to non-swing groups.

REFERENCES

Ansolabehere, Stephen, James M. Snyder, Jr., and Michael M. Ting. 2003. "Bargaining in Bicameral Legislatures: When and Why Does Malapportionment Matter?" *American Political Science Review* 97: 471-481.

Arulampalamy, Wiji, Sugato Dasgupta, Amrita Dhillon, and Bhaskar Dutta. 2007. "Electoral Goals and Center-State Transfers: A Theoretical Model and Empirical Evidence from India." Unpublished manuscript.

Baron, David P., and John Ferejohn. 1989. "Bargaining in Legislatures." *American Political Science Review* 83: 1181-1206.

Browning, Clyde E. 1973. "The Geography of Federal Outlays." Studies in Geography No. 4. Chapel Hill: University of North Carolina Department of Geography.

Case, Anne. 2001. "Election Goals and Income Redistribution: Recent Evidence from Albania." *European Economic Review* 45: 405-423.

Colantoni, Claude S., Terrence J. Levesque, and Peter C. Ordeshook. 1975. "Campaign Resource Allocation Under the Electoral College." *American Political Science Review* 69: 41-161.

Cox, Gary W. and Mathew D. McCubbins, 1986. "Electoral politics as a Redistributive Game." *Journal of Politics* 48: 370-389.

Crampton, Eric. 2004. "Distributive Politics in a Strong Party System: Evidence from Canadian Job Grant Programs." Discussion Paper, University of Canterbury.

Dahlberg, Matz, and Eva Johansson. 2002. "On the Vote Purchasing Behavior of Incumbent Governments." *American Political Science Review* 96: 27-40.

Denemark, David. 2000. "Partisan Pork Barrel in Parliamentary Systems: Australian Constituency-Level Grants." *The Journal of Politics* 62: 896-915.

Dixit, Avinash, and John Londregan. 1995. "Redistributive Politics and Economic Efficiency." *American Political Science Review* 89: 856-866.

Dixit, Avinash, and John Londregan. 1996. "The Determinants of Success of Special Interests in Redistributive Politics." *Journal of Politics* 58: 1132-1155.

Erie, Stephen P. 1978. "Politics, the Public Sector, and Irish Social Mobility: San Francisco, 1870-1900." *Western Political Quarterly* 31: 274-289.

Fleck, Robert K. 1999. "Electoral Incentives, Public Policy, and the New Deal Realignment." *Southern Economic Journal* 65: 377-404.

Gersbach, Hans. 1998. "Communication Skills and Competition for Donors." *European Journal of Political Economy* 14: 3-18.

Holden, Matthew. 1973. *White Man's Burden.* New York: Chandler.

John, Peter, and Hugh Ward. 2001. "Political Manipulation in a Majoritarian Democracy: Central Government Targeting of Public Funds to English Subnational Government, in Space and Across Time." *British Journal of Politics and International Relations* 3 (3): 308-339.

Johnston, Michael. 1979. "Patrons and Clients, Jobs and Machines: A Case Study of the Uses of Patronage." *American Political Science Review* 73: 385-398.

Knight, Brian G. 2004. "Legislative Representation, Bargaining Power, and the Distribution of Federal Funds: Evidence from the U.S. Senate." NBER Working Paper Number 10385.

Kramer, Gerald H. "A Decision-Theoretic Analysis of a Problem in Political Campaigning." In *Mathematical Applications in Political Science*, volume 11, edited by Joseph L. Bernd. Dallas, TX: Southern Methodist University.

Larcinese, Valentino, Leonzio Rizzo, and Cecilia Testa. 2006. "Allocating the US Federal Budget to the States: the Impact of the President." *Journal of Politics*, 68 (May): 447-456.

Larcinese, Valentino, James M. Snyder, Jr., and Cecilia Testa. 2006. "Testing Models of Distributive Politics Using Federal Spending in the U.S. States." Unpublished manuscript, London School of Economics and Political Science.

Levitt, Steven D., and James M. Poterba. 1999. "Congressional Distributive Politics and State Economic Performance." *Public Choice* 99: 185-216.

Levitt, Stephen D., and James M. Snyder, Jr. 1995. "Political Parties and the Distribution of Federal Outlays." *American Journal of Political Science* 39: 958-980.

Lindbeck, Assar, and Jorgen W. Weibull. 1987. "Balanced-Budget Redistribution as the Outcome of Political Competition." *Public Choice* 52: 273-297.

McCarty, Nolan M. 2000. "Presidential Pork: Executive Veto Power and Distributive Politics." *American Political Science Review* 94: 117-129.

McKelvey, Richard D., and Raymond Riezman. 1992. "Seniority in Legislatures." *American Political Science Review* 86: 951-965.

Milligan, Kevin, and Michael Smart. 2005. "Regional Grants as Pork Barrel Politics." Unpublished manuscript, University of Toronto.

Nagler, Jonathan, and Jan Leighley. 1992. "Presidential Campaign Expenditures: Evidence on Allocations and Effects." *Public Choice*. 73(3)-April: 310-333.

Owens, John R., and Larry L. Wade. 1984. "Federal Spending in Congressional Districts." *Western Political Quarterly* 37: 404-423.

Rakove, Milton. 1975. *Don't Make No Waves, Don't Back No Losers*. Bloomington, IN: Indiana University Press.

Ritt, Leonard G. 1976. "Committee Position, Seniority, and the Distribution of Government Expenditures." *Public Policy* 24: 469-497.

Serra, Gilles. 2007. "Why and When do Political Parties Adopt Primary Elections? A Theoretical and Comparative Study." Unpublished dissertation, Harvard University.

Sim, Feng-ji. 2002. "Mobilizing the Masses: Party Strategy with Political Mobilization." Chapter 2 of unpublished SM Thesis, Massachusetts Institute of Technology.

Snyder, James M., Jr. 1989. "Election Goals and the Allocation of Campaign Resources." *Econometrica* 57: 637-660.

Stromberg, David. 2002. "Optimal Campaigning in Presidential Elections: The Probability of Being Florida." Institute for International Economic Studies, Stockholm University, Seminar Paper No. 706.

Stromberg, David. 2004. "Radio's Impact on Public Spending." *Quarterly Journal of Economics* 119 (February): 189-221.

Stromberg, David. 2007. "How the Electoral College Influences Campaigns and Policy: The Probability of Being Florida." *American Economic Review*, forthcoming.

Wallis, John J. 1987. "Employment, Politics and Economic Recovery during the Great Depression." *Review of Economics and Statistics* 69: 516-20.

Wallis, John J. 1996. "What Determines the Allocation of National Government Grants to the States?" NBER Historical Paper No. 90.

Wright, Gavin. 1974. "The Political Economy of New Deal Spending: An Econometric Analysis." *Review of Economics and Statistics* 56: 30-38.