REDISTRIBUTION, PORK AND ELECTIONS*

John D. Huber†
Department of Political Science
Columbia University

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

March 22, 2012

*We thank James Alt, Alexandre Debs, Jon Eguia, Nicola Persico, seminar audiences at the University of Wisconsin, NYU and Princeton, and panel participants at the 2008 Annual Meeting of the American Political Science Association for helpful comments.

†Political Science Department, 420 W 118th St., New York NY 10027 (jdh39@columbia.edu).

‡Political Science Department, 420 W 118th St., New York NY 10027 (mmt2033@columbia.edu).

Abstract

Why might citizens vote against redistributive policies from which they would seem to benefit? Many scholars focus on "wedge" issues such as religion or race, but another explanation might be geographically-based patronage or pork. We examine the tension between redistribution and patronage with a model that combines partisan elections across multiple districts with legislation in spatial and divide-the-dollar environments. The model yields a unique equilibrium that describes the circumstances under which poor voters support right-wing parties that favor low taxes and redistribution, and under which rich voters support left-wing parties that favor high taxes and redistribution. The model suggests that one reason standard tax and transfer models of redistribution often do not capture empirical reality is that redistributive transfers are a less efficient tool for attracting votes than are more targeted policy programs. The model also underlines the central importance of party discipline during legislative bargaining in shaping the importance of redistribution in voter behavior, and it describes why right-wing parties should have an advantage over left-wing ones in majoritarian systems.

1 Introduction

Since the classic work of Meltzer and Richard (1981), a standard assumption in political economy models of income redistribution is that political parties compete for votes using tax rates, where tax revenues fund transfers from rich to poor. These models predict a strong connection between income and the vote, with poor voters supporting left-wing parties that advocate high tax rates and redistribution levels, and rich voters supporting right-wing parties that oppose taxes and redistribution. Across democracies, however, this prediction of a strong income-vote relationship does not accurately describe actual voting behavior. Many voters in fact "cross over" — poor voters support right-wing parties and rich voters support left-wing ones. For example, while income is an important predictor of the U.S. vote (McCarty, Poole and Rosenthal 2006), Gelman, Park, Shor, Bafumi and Cortino (2008) estimate that over 40% of rich individuals supported the Democrats in the 2004 elections, and about 40% of poor individuals supported the Republicans. This paper develops a model of such cross-over voting.

The standard explanation for cross-over voting has been to invoke the importance of a second policy dimension that distracts voters from their economic self-interest (e.g., Roemer 1998). The "culture wars" arguments in the U.S., for example, hold that poor voters often support right-wing candidates because of their preferences on issues like gun control, religion or abortion (e.g., Hunter 1991, Frank 2004). While such issues are clearly important to certain voters, recent empirical research provides scant support for these arguments (e.g., Bartels 2008, Ansolabehere, Rodden and Snyder 2006). We therefore take a different approach, one that re-focuses attention on the economic self-interest of voters, but that recognizes that many government transfers are not actually from rich to poor, but rather occur along other lines. Without a more complete picture of such transfers, it is difficult to determine whether particular voting decisions promote an individual's economic self-interest.

We focus specifically on geographically-targeted transfers to specific districts, or "pork." Scholars have long linked pork programs to election strategies and outcomes (e.g., Key 1984, Ramseyer and Rosenbluth 1993, McGillivray 2004). Policies in this category that come immediately to mind include monies for public works such as airports, roads, and bridges. But such programs are in fact the tip of the iceberg when it comes to policies that provide district-specific economic benefits. Whenever a government decides, for example, where to locate public offices, hospitals, universities, military bases, or nationalized industries, there is a significant impact on the local economy and on the location of jobs. Government subsidies, tariff policies, and investments in research typically also benefit geographic-specific institutions or industries (such as automobiles, alternative energy, or agriculture). The size and scope of all such programs is very large, and indeed comparable to that of redistributive programs. More importantly, their value to specific individuals can dwarf that of rich-to-poor transfer payments. Thus, a clear understanding of how voters make choices based on personal economic benefits requires one to examine the tension between targeted transfers and redistributive programs.

Our model considers an environment with elections across multiple districts and legislative bargaining. In each district, a majority of voters are either poor (and receive means-tested redistribution) or rich (and receive no redistributive transfers but pay taxes). Candidates in each district represent either a "left" or "right" party, with the former favoring higher redistribution. Crucially, candidates may not commit to future voting decisions, and therefore policies are determined by majority rule in the elected government. After the election, the party winning a majority of seats determines how the budget is divided between redistribution and pork, and legislative bargaining determines how the pork is apportioned across districts.

The basic insight of the equilibrium is that when voters expect the party with "bad" redistributive policies to win at the national level, they may nonetheless cross-over vote for this party in order to obtain local pork. Poor voters, for example, may support right-wing parties in our model not because of preferences on abortion or some other policy unrelated to economic well-being, but rather because the total pork plus general redistribution the voter expects from the right-wing party exceeds that expected from the left. A key purpose of the model is to identify the circumstances under which such voting occurs.

In addition to this basic observation about cross-over voting, three central arguments emerge from the analysis. First, the model underscores the fact that tax-and-transfer redistributive programs are relatively inefficient electoral tools for political parties. Such means-tested programs often reach only a minority of voters in a given district, and thus they may often fail to influence its pivotal voter's calculation. If the benefits of means-tested programs do reach the median voter in a given district, they typically must be spread quite thinly across many individuals in society, lowering their value relative to that of more targeted policies. And if individuals are mobile yet collect the same redistributive benefits regardless of where they live, then broad-based redistributive programs cause politicians to abdicate a great deal of political control over how benefits are distributed across districts. A more targeted approach to distributing government benefits avoids these inefficiencies.

Second, the effect of individual income on the vote, and thus the relative efficiency of pork as an electoral tool, depends crucially on the role of political parties in legislative bargaining over the distribution of pork across districts. In order for pork to affect voting decisions, voters must form expectations about how their vote will affect its distribution, which will depend in turn on whether parties can exercise discipline over their members in the legislature. When parties are "strong" (i.e., highly disciplined), the majority party can exclude members of the minority party from pork, creating incentives for voters to support the winning party at the national level in order to obtain pork in their district. When parties are "weak," and pork is distributed in a free-for-all fashion, the impact of the voting outcome on pork weakens, and voters therefore have a stronger incentive to vote their redistributive interests. This result is consistent with the findings of Huber and Stanig (2009), who find that income-based voting polarization between rich and poor is higher in the U.S. (a weak party system) than in 22 of 23 strong-party countries in their study. The model therefore highlights the importance of considering how the structure of legislative politics affects voting on redistribution by constraining the ability of candidates to make credible promises to voters.

Third, the model suggests that although cross-over voting by rich and poor can occur in equilibrium, there is an asymmetry in majoritarian systems that advantages the rich voters and the right-wing party. Since cross-over voting occurs in order to obtain pork, and since the right-wing party spends a lower proportion of the budget on redistribution, it can devote a higher proportion of the budget to pork. The combination of more pork and the greater efficiency of pork for attracting voters implies that the incentives for the poor to cross-over vote for the right are typically greater than are the incentives for the rich to cross-over vote for the left. These incentives persist even when the left-wing party can raise taxes substantially to finance its programs. Our model therefore provides an intuition for why right-wing parties should have an advantage over left-wing ones in plurality electoral systems.

Our model builds on an extensive body of work on elections, legislatures and distributive politics. It is perhaps most closely related to a family of models originating with Lindbeck and Weibull (1987), which examines the electoral trade-off between distributive benefits and ideology. In their work, two parties with fixed ideological platforms compete for votes by offering transfers and taxes to groups of voters with heterogeneous ideological leanings. The well-known prediction is that pork should go to groups that contain many "swing," or ideologically uncommitted, voters. Relevant variations on this framework include Dixit and Londregan (1998), who link ideology with income inequality, and Hassler, Krusell, Storesletten and Zilbotti (2005), who model dynamic redistributive policy. Notably, Lopez-Rodriguez (2011) considers parties that have preferences for public goods and derives a right-wing advantage based on the right's ability to provide more pork.

Unlike the model presented here, these models assume that candidates can commit to transfer schedules, and do not explicitly address the consequences of geographically-based legislative representation. Some recent theories have developed the connection elections and government policy-making (e.g., Austen-Smith and Banks 1988, Baron and Diermeier 2001, Snyder and Ting 2003). In particular, Milesi-Ferretti, Perotti and Rostagno (2002) allow parties to compete on transfers to specific groups as well as geographic constituencies. Their paper, however, assumes that electoral districts are homogeneous and focuses on electoral systems and the level of government spending. Thus it does not cover the question of cross-over voting that is central here.

The policy outcomes in our model are related to those of a set of theories that explores the legislative or electoral tradeoffs between universal and targetable programs. Jackson and Moselle (2002) consider the problem of simultaneous bargaining over spatial policy and pork in a legislature. The lack of a simple equilibrium solution in their work motivates our simplifying assumption that these two issues are considered separately in our legislature. Volden and Wiseman (2007) derive closed-form solutions in a legislative bargaining game over the distribution of particularistic benefits and a collective good. Christiansen (2011) extends their model to include the election of legislators with diverse preferences over particularistic and collective goods. Models of electoral systems and redistribution in this vein such as Persson and Tabellini (1999) and Lizzeri and Persico (2001) have emphasized the advantage of targetable as opposed to public goods.

Finally, our model joins a line of recent research that investigates how redistribution is affected not by a second dimension that is orthogonal to economic self-interest, but by the ability of governments to target transfers to specific groups on a basis other than income. Levy (2005), for example, examines the formation of electoral coalitions between the rich (who receive low taxes) and those poor who value education (who receive higher educational spending). Fernàndez and Levy (2008) examine how the number of ethnic groups affects the incentives of poor voters to support right-wing parties to obtain group-based benefits. Huber and Stanig (2011) develop a theory of transfers through religious organizations and their influence on general redistribution, and Austen-Smith and Wallerstein (2006) examine how the ability to target transfers based on race affects redistribution. Although none of these models shares the institutional structure of our model or its focus on cross-over voting, like our model, they each underscore the fact that the distribution of government resources occurs along pathways other than income-based redistribution. Further, they show that such pathways can affect the formation of electoral coalitions based on income, and the amount of income-based redistribution that occurs.

The remainder of the paper is organized as follows. Section 2 describes the basic structure of the model. Section 3 examines the unique equilibrium when parties are weak, and Section 4 examines the unique equilibrium when parties are strong. We then consider an extension where the left-wing party can offer very high taxes. Section 6 concludes.

2 The Model

Our model combines partisan elections across n (odd) constituencies with legislation in both spatial and divide-the-dollar policy environments. Each district or state, denoted $S_1, \ldots, S_n$, contains a continuum of voters of measure 1. There are two types of voters, denoted by $t \in \{P, R\}$, which correspond informally to "poor" and "rich," respectively. Let p_k^t be the proportion of voters of type t in S_k. The total number of type t voters in society is then $n^t = \sum_{k=1}^{n} p_k^t$. We refer to a district as "rich" or "poor" if the respective types are a majority of its population, and let d^R and d^P represent the number of rich and poor districts, respectively.

The legislature divides a government budget between two kinds of transfers. First, it determines the proportion $1 - x$ to be spent on "redistribution." This is a means-tested income support or welfare program that benefits all (and only) poor voters equally. Second, it divides the remaining proportion x to "pork," or direct transfers to districts that benefit all (and only) members of the targeted district equally. This allocation is denoted by the n-vector $\mathbf{y}$. All spending is financed by a flat tax on rich citizens.

All election candidates and legislators belong to one of two (non-strategic) parties, denoted P_L and P_R, which respectively represent "Left" and "Right." Each party, P_j, has an exogenous platform $\lambda_j \in [0, 1]$ that describes its members' relative commitment to pork and redistribution. Specifically, members of P_j have single-peaked preferences over x and ideally wish to devote proportion λ_j of the budget to pork. Party P_R prefers a smaller welfare system than P_L, which implies $\lambda_R \geq \lambda_L$. For the election in each district, each party has one candidate, and a winner is chosen by plurality rule. Within each party, candidates are identical across districts. The legislature is composed of the n winning candidates.

The district S_k legislator cares about both x and her district's share of pork

y_k. While it is not necessary for the main results of the model, we assume for simplicity that each legislator has lexicographic preferences for x over y_k.[1] Utility over pork is linear. Thus, legislators are primarily concerned with the level of redistribution in society, and secondarily concerned with pork. Since the model does not address candidate selection of campaign strategies, it is unnecessary to specify utilities for election candidates.

The model links party platforms and the government's budget in a way that allows P_L to "advocate" larger overall budgets. The government budget is $b(x) = 1 + (1 - c)(1 - x)$. The parameter $c \in [0, 1]$ therefore represents an exogenous constraint — such as debt, existing social policy, the state of the economy, or international factors — on the feasibility of tax increases, and thus on how much larger the government will be when P_L wins than when P_R wins. To see its role, note that at one extreme, if $c = 1$, the government's resources are fixed at 1 regardless of which party wins the election, and any increases in welfare spending come at the expense of pork. The parties' differing commitments to pork and redistribution are therefore all that distinguishes them from each other, and the setting becomes a divide-the-dollar framework common to models of distributive politics. As c declines, the government budget increases as the proportion of revenues devoted to welfare spending increase, which implies that for any pair of party platforms, the ideal level of total taxes and spending of P_L will grow relative to that of P_R. At the other extreme, where $c = 0$, redistribution is funded entirely by *incremental* tax dollars. Observe that the total quantity of pork, $xb(x)$, is increasing in x, and the total quantity of welfare spending, $(1 - x)b(x)$, is decreasing in x, which implies that the total amount of pork available to P_R

[1] Many alternative utility functions would also generate our results. Lexicographic preferences simply ensure that a party P_j majority will choose $x = \lambda_j$ when bargaining over x, as opposed to a more cumbersome constrained maximum not equal to λ_j. The platform may also be viewed as each legislator's induced ideal value of x, after accounting for both ideology and anticipated pork.

is greater than that available to P_L for any c.

Although in principle c could be negative (and we explore this possibility in an extension below), it makes sense to focus attention on parameterizations of c that reflect the existing empirical understanding of differences between left- and right-wing parties. Such research suggests that globalization, the size of the welfare state, and voter distaste for large deficits makes the effect of partisan control of government on the overall size of government either quite small or non-existent (e.g., Cusack 1997, Garrett and Lange 1991). It therefore makes little sense to allow c to be so small that the budget differences between the two parties becomes unrealistically large. When $c = 0$ in our model, every extra dollar spent by the left on redistribution is funded by additional taxation, which probably allows the difference between left and right budgets to exceed what we actually observe empirically.[2]

Voters have quasilinear utility over money. In addition, voters receive ideological utility pertaining to outcomes unrelated to economic transfers, and this ideological dimension biases voters toward their most preferred party on the redistributive dimension. Let $u^t(\lambda_j)$ be the ideological utility that a voter of type t receives if party P_j wins in the voter's district. We assume that voters have an ideological preference for the party that favors their redistributive interests; thus, $u^P(\lambda_L) > u^P(\lambda_R)$ and $u^R(\lambda_R) > u^R(\lambda_L)$. Importantly, this gain in ideological utility from voting one's "class" interest can be arbitrarily small, but its inclusion insures that a voter will never cross-over vote unless so doing yields a higher monetary payoff from the government. That is, if a voter expects to receive the same monetary payoff for any vote choice, she will not cross-over vote. Including this ideological utility enables us to specify the voting strategies of voters who are

[2]For example, if P_L commits 55% of the budget to redistribution and P_R commits 45%, then when $c = 0$, the P_L budget would be 7% larger than that of P_R. This number is itself large, and to allow this difference to become even larger by allowing $c < 0$ is substantively questionable.

indifferent with respect to monetary payoffs, and to do so in a way that clearly stacks the deck against cross-over voting.

A district S_k voter's utility under a party P_j representative is therefore given by:

$$u_k(x, \mathbf{y}; t) = \begin{cases} u^t(\lambda_j) + y_k + \frac{(1-x)b(x)}{n^P} & \text{if } t = P \\ u^t(\lambda_j) + y_k - \frac{b(x)}{n^R} & \text{if } t = R. \end{cases}$$

The game begins with simultaneous elections in each district, where voters simultaneously choose between candidates from each party. After the election winners are determined, legislators bargain over the level of redistribution and the allocation of pork across districts. This bargaining takes place in two stages. First, legislators bargain over spatial policy. As noted above, legislators from the same party have identical preferences regarding redistribution. It is clear that in this stage, a wide variety of simple bargaining arrangements would lead to a median voter result. We therefore suppress the details of this stage, and allow the aggregate amount of redistribution to be $1-x = 1-\lambda_j$, where P_j is the party that wins a majority of districts. Second, legislators bargain over pork. Since legislators maximize the amount of pork that goes to their districts, this process pits them against each other, independent of party. We separate the two stages for analytical tractability; bargaining over both stages simultaneously can make the derivation of comparative statics almost intractable (Jackson and Moselle 2002).

We consider two different bargaining processes for pork, which capture the extremes of party discipline in the legislature. In the *weak party* bargaining process, parties do not play a role in how members form coalitions, and legislators are free to bargain with any other legislator. Since bargaining involves the entire chamber, the election outcome has no impact on the distribution of pork. In the *strong party* bargaining process, the majority party has unlimited proposal power and discipline. Because of perfect party discipline, the majority party can pass any legislation that is favored by a majority of its members, and therefore has no reason to offer pork to minority party legislators.

We are again agnostic about the details of the bargaining game at this stage, simply because many bargaining games predict equal ex ante expected payoffs in games where all players have equal voting weight. This is true of the non-cooperative models of Baron and Ferejohn (1989) and Morelli (1999), and also of power indices based on cooperative game theory, such as Shapley and Shubik (1954) and Banzhaf (1968). Thus the weak party bargaining process implies an *ex ante* expected pork level of $xb(x)/n$ for all districts. Likewise, the strong party bargaining process implies an *ex ante* expected pork level of $xb(x)/\overline{n}$ in districts represented by the majority party, where $\overline{n}$ is the total population of such districts. This quantity reflects the fact that districts not represented by the majority party must receive 0.

Because the outcome of the bargaining process can be reduced to an expected payoff, the model is effectively a simultaneous-move game amongst voters. We assume that voters choose as if they were pivotal in choosing their district's legislator. This implies that voters of the same type in a given district always vote the same way, and can therefore be treated as a single player. While Nash equilibria in this game are typically not unique, we can derive a unique prediction by considering coalition-proof Nash equilibria (CPNE).[3] CPNE rule out Nash equilibria in which subsets of players may credibly deviate from a Nash equilibrium. The concept is weaker than that of a strong Nash equilibrium, which rules out *any* Nash equilibrium in which a subset of players may profitably deviate. By contrast, CPNE only rules out equilibria with *self-enforcing* deviations. A coalition of deviators is self-enforcing if no subset thereof would receive strictly higher payoffs from deviating in turn from the coalition's proposed alternative

[3]Bernheim, Peleg, and Whinston (1987) only define CPNE for games with finite populations, but since all voters vote as if pivotal in their district, our game effectively has $2n$ players.

strategy profile. As Bernheim, Peleg, and Whinston (1987) show, all strong Nash equilibria are CPNE, but CPNE are not generally guaranteed to exist. In general, CPNE may exist when strong Nash do not, and as we show in Proposition 2 below, CPNE is sufficient to guarantee a unique level of cross-over voting when Nash equilibria are not unique.[4]

Apart from its appealing technical properties, CPNE is attractive substantively to the extent that there exist mechanisms outside the model that coordinate voters with similar incomes. Collections of voters of the same type across different districts are often organized as interest groups, such as unions or industry associations. Such groups may be the primary beneficiaries of district-specific pork, and might coordinate their members' votes through endorsements or campaign contributions. In this context, coalition proofness simply reflects the incentive of groups to maximize their collective welfare by voting in a cohesive manner. Thus, a group will contemplate deviating from a proposed voting strategy if and only if such a deviation would not cause a subgroup to splinter.

3 Weak Parties

We begin with the weak parties case, which will build intuition and serve as a benchmark for the subsequent analysis. In this environment, the distribution of pork is not controlled by the majority party. Instead, there is an "open" bargaining process that allows all elected legislators an equal opportunity to gain pork for their districts. This results in an *ex ante* expected pork allocation of $xb(x)/n$ regardless of the election winner.

To characterize voting strategies, note that poor voters always prefer a P_L victory on ideological grounds (i.e., $u^P(\lambda_L) > u^P(\lambda_R)$), while rich voters similarly prefer P_R. There are two cases to consider. First, if a poor voter perceives that her vote will not affect which party wins the election, then her vote will affect

[4]This refinement is applied in a similar fashion by Alesina and Rosenthal (1996).

neither her expected redistribution benefit nor her expected pork allocation. She will therefore vote for P_L to secure the preferred ideological policy benefits from a friendly legislator. Second, if a poor voter resides in a pivotal district, her vote determines the national party winner. This generates a potential trade-off between the expected amounts of pork and redistribution. Comparing expected utilities, a poor voter chooses P_L if:

$$u^P(\lambda_L) + \frac{\lambda_L b(\lambda_L)}{n} + \frac{(1-\lambda_L)b(\lambda_L)}{n^P} \geq u^P(\lambda_R) + \frac{\lambda_R b(\lambda_R)}{n} + \frac{(1-\lambda_R)b(\lambda_R)}{n^P}. \quad (1)$$

Since $\lambda_L b(\lambda_L) \leq \lambda_R b(\lambda_R)$, this condition is satisfied by the assumption that $n^P < n$.

The calculation for rich voters is very similar. In a non-pivotal district, they effectively choose only on the basis of ideology and therefore always vote for P_R. In a pivotal district, a rich voter chooses P_R if:

$$u^R(\lambda_R) + \frac{\lambda_R b(\lambda_R)}{n} - \frac{b(\lambda_R)}{n^R} \geq u^R(\lambda_L) + \frac{\lambda_L b(\lambda_L)}{n} - \frac{b(\lambda_R)}{n^R}. \quad (2)$$

Since supporting P_R yields higher ideological utility, more pork, and lower taxes, this condition always holds.

We summarize these derivations in Proposition 1, which simply states that under weak parties, no cross-over voting occurs. It is worth noting that the result does not require that poor (respectively, rich) voters strictly prefer P_L (respectively, P_R) on ideological grounds.

Proposition 1 *When parties are weak, there is no cross-over voting in equilibrium: rich voters support P_R and poor voters support P_L.* ■

4 Strong Parties

We now consider the strong party case. By controlling the legislative agenda and enforcing voting discipline, strong majority parties control the distribution of pork, and thus create cross-over voting incentives by rich and poor. In contrast with the weak party case, individuals may vote for the "wrong" party — even when it gives them worse ideological policy, higher taxes (for the rich) or lower levels of redistribution (for the poor) — because so doing allows them to elect a legislator from the winning coalition, ensuring access to pork.

4.1 Main Result

As before, poor voters prefer P_L on ideology and redistribution, and rich voters prefer P_R on these dimensions. However, both types of voters must now weigh these considerations against expectations of pork. To derive the equilibrium levels of support for each party, then, it is necessary to characterize the circumstances under which the rich and the poor will engage in cross-over voting. The best responses for voters in each district will depend in part on whether it is pivotal in determining the legislature's majority party

Consider the optimal voting strategies in district S_k. Let w_{-k} represent the number of districts excluding S_k that are expected to vote for P_R. Also, let $m = (n+1)/2$ denote the size of the smallest majority of districts. Suppose initially that district S_k's pivotal voter is rich. When would such a voter cross-over and support P_L? If the district is pivotal for the election outcome (i.e., $w_{-k} = m - 1$), then her expected utility from supporting the candidate from party P_j is:

$$u^R(\lambda_j) + \frac{\lambda_j b(\lambda_j)}{m} - \frac{b(\lambda_j)}{n^R}. \tag{3}$$

Since $u^R(\lambda_R) > u^R(\lambda_L)$, $\lambda_R b(\lambda_R)/m > \lambda_L b(\lambda_L)/m$ and $b(\lambda_R)/n^R \leq b(\lambda_L)/n^R$, the rich voter will never support P_L. That is, voting for the left would yield lower ideological utility, less pork, and potentially higher taxes than voting for the right, so cross-over voting will not occur.

If instead a majority of other districts are expected to support P_R (i.e., $w_{-k} \geq m$), then a rich voter will not be pivotal in determining the legislative majority. She will cross-over and support P_L only if:

$$u^R(\lambda_R) + \frac{\lambda_R b(\lambda_R)}{w_{-k}+1} - \frac{b(\lambda_R)}{n^R} < u^R(\lambda_L) - \frac{b(\lambda_R)}{n^R}.$$

Since the rich voter gets more pork and higher ideological utility by supporting P_R (with no implications for taxes), this expression can obviously never be satisfied. Consequently, a rich voter might support P_L only if she lives in a non-pivotal district, and if a majority of districts are expected to support P_L (i.e., when $w_{-k} < m-1$). In this case, taxes again cancel out and a rich voter supports P_L if and only if:

$$u^R(\lambda_R) - u^R(\lambda_L) < \frac{\lambda_L b(\lambda_L)}{n - w_{-k}}. \tag{4}$$

When $w_{-k} < m-1$, voting for P_L yields lower policy utility but more pork. The rich voter will vote for P_L if the loss in ideological utility is small relative to the gain in pork. Remark 1 combines these cases to summarize cross-over voting behavior by voters in rich districts.

Remark 1 *Rich voters in a given district will support P_L if and only if a majority of other districts support P_L (i.e., $w_{-k} < m-1$) and (4) holds.* ■

Next, consider cross-over voting by poor voters. In non-pivotal districts, their cross-over voting incentives are similar to those of rich voters. If P_L is expected to win a majority of districts (i.e., $w_{-k} < m-1$), then poor voters cannot influence the level of redistribution, and they obtain worse ideological policy and less pork by supporting P_R. That is, such poor voters will cross-over and vote P_R only if:

$$u^P(\lambda_L) + \frac{\lambda_L b(\lambda_L)}{n - w_{-k}} < u^P(\lambda_R), \tag{5}$$

which clearly cannot be satisfied.

If poor voters are in a non-pivotal district but P_R is expected to win a majority of districts ($w_{-k} \geq m$), then they again cannot influence the level of redistribution. In casting their vote, like the rich voter when P_L is expected to win a majority of districts, they must trade-off ideological policy from P_L against more pork from P_R. The poor voters in this case will cross-over and vote for P_R if and only if:

$$u^P(\lambda_L) - u^P(\lambda_R) < \frac{\lambda_R b(\lambda_R)}{w_{-k} + 1}. \tag{6}$$

The central difference between poor voters and rich voters occurs in pivotal districts. Recall that rich voters in a pivotal district will never vote for P_L because so doing results in worse ideological policy, less pork and potentially higher taxes. Poor voters in a pivotal district, by contrast, face a trade-off. If they support P_R, they receive *more* pork but less redistribution and worse ideological policy, so the poor voter in a pivotal district will cross-over and support P_R if and only if:

$$u^P(\lambda_L) + \frac{\lambda_L b(\lambda_L)}{m} + \frac{(1-\lambda_L)b(\lambda_L)}{n^P} < u^P(\lambda_R) + \frac{\lambda_R b(\lambda_R)}{m} + \frac{(1-\lambda_R)b(\lambda_R)}{n^P}. \tag{7}$$

Note that (7) implies (6) for $w_{-k} = m - 1$.

Remark 2 summarizes the cross-over voting conditions for poor voters:

Remark 2 *Poor voters in a given district will support P_R if and only if either a majority of other districts support P_R (i.e., $w_{-k} \geq m$) and (6) holds, or if the district is pivotal (i.e., $w_{-k} = m - 1$) and (7) holds.* ■

Together, Remarks 1 and 2 suggest two important implications of the equilibrium. First, Remark 1 indicates that rich voters will never cross-over and support P_L when a majority of districts support P_R, and Remark 2 indicates that poor voters will never cross-over and support P_R when there are a majority of districts supporting P_L. Thus, in any Nash equilibrium, the winning party must carry all like-minded districts. If P_L wins a legislative majority, then *all* districts for which poor voters are a majority must vote for P_L. Similarly, if P_R wins, all rich districts must vote for P_R. Second, the remarks suggest an important advantage that right-wing parties enjoy in pivotal districts. If a pivotal district has a majority of rich voters, then since these voters receive no redistribution and know that P_L offers less pork than P_R, they never face a trade-off between ideological policy, pork and redistribution. Rich voters in pivotal districts will therefore always support P_R, ensuring it of victory. By contrast, if a pivotal district has a majority of poor voters, then by (7), it is not certain that P_L will win because the poor voters may face a tradeoff: supporting P_R will yield more pork, but supporting P_L will yield superior outcomes in ideological policy and redistribution. If the value of pork from P_R is relatively large, then poor voters may cross-over and support P_R in a pivotal district.

We can now characterize the equilibrium levels of voter support for each party. It is useful to define explicitly the number of districts that will cross-over if the "wrong" party is expected to win. If P_R is expected to win a majority of seats, then Remark 2 indicates that the number of non-pivotal poor districts supporting P_R is:

$$\overline{w} = \begin{cases} 0 & \text{if } u^P(\lambda_L) - u^P(\lambda_R) > \frac{\lambda_R b(\lambda_R)}{d^R+1} \\ \max w \text{ s.t. } u^P(\lambda_L) - u^P(\lambda_R) < \frac{\lambda_R b(\lambda_R)}{d^R+w} & \text{if } u^P(\lambda_L) - u^P(\lambda_R) \in \left[\frac{\lambda_R b(\lambda_R)}{n}, \frac{\lambda_R b(\lambda_R)}{d^R+1}\right] \\ d^P & \text{otherwise.} \end{cases} \tag{8}$$

Intuitively, $\overline{w}$ is the size of the largest collection of poor districts such that poor voters contained within are willing to support P_R. Since $\lambda_R b(\lambda_R)/(d^R + w)$ is decreasing in w, $\overline{w}$ is uniquely defined. When the relative value of pork is sufficiently low, no districts cross-over vote, and when the relative value of pork is sufficiently strong, all poor districts cross-over vote.

Similarly, we define the (unique) number of non-pivotal rich districts that would support P_L if P_L is expected to win as:

$$\underline{w} = \begin{cases} 0 & \text{if } u^R(\lambda_R) - u^R(\lambda_L) > \frac{\lambda_L b(\lambda_L)}{d^P+1} \\ \max w \text{ s.t. } u^R(\lambda_R) - u^R(\lambda_L) < \frac{\lambda_L b(\lambda_L)}{d^P+w} & \text{if } u^R(\lambda_R) - u^R(\lambda_L) \in \left[\frac{\lambda_L b(\lambda_L)}{n}, \frac{\lambda_L b(\lambda_L)}{d^P+1}\right] \\ d^R & \text{otherwise.} \end{cases} \tag{9}$$

Let w^* be the number of districts supporting the winning party. We can use $\overline{w}$ and $\underline{w}$ to characterize the unique winner and w^* in a coalition-proof Nash equilibrium. The CPNE are unique up to combinations of the districts supporting each party, and we therefore use the term "unique" in this context.[5]

Proposition 2 *There is a unique coalition-proof Nash equilibrium, where:*

(i) If $d^R \geq m$ then P_R wins and $w^* = d^R + \overline{w}$.

(ii) If $d^R < m$ and (7) is satisfied, then P_R wins and $w^* = d^R + \overline{w}$.

(iii) If $d^R < m$ and (7) is not satisfied, then P_L wins and $w^* = d^P + \underline{w}$. ■

Proof. Notationally, let $\mathcal{D}$ denote the set of all districts, $\mathcal{W}$ a generic winning coalition of districts, and $\mathcal{C}$ a subcoalition of deviators from a prescribed strategy profile.

[5] Since districts of a given type have pivotal voters with identical preferences, any combination of $\overline{w}$ poor districts (or $\underline{w}$ rich ones) could vote with the winners in equilibrium. If voters of a given type were ideologically heterogeneous, then $\overline{w}$ and $\underline{w}$ would not be unique and some combinations would be possible in a coalition, since districts would differ in their propensities to cross-over vote.

Observe first that by (8), the number of poor districts supporting P_R in a Nash equilibrium cannot be greater than $\overline{w}$ (otherwise, a poor district supporting P_R would prefer switching to P_L) or less than $\overline{w}$ (otherwise, a poor district supporting P_L would prefer switching to P_R). Thus, only $\overline{w}$ poor districts can support P_R in a Nash equilibrium. Likewise, by (9), the number of rich districts supporting P_L in a Nash equilibrium can only be $\underline{w}$. Thus, for any configuration of districts and voter preferences, a profile of voting strategies in which each citizen votes as if she were pivotal is a Nash equilibrium only if: P_R wins and $w^* = d^R + \overline{w}$ (with all rich districts voting for P_R), or P_L wins and $w^* = d^P + \underline{w}$ (with all poor districts voting for P_L).

For either of these two strategy profiles to be a CPNE, it must be both self-enforcing and undominated by another self-enforcing strategy profile. Showing that a strategy profile is self-enforcing requires showing that each subcoalition $\mathcal{C}$ is playing a CPNE when holding the strategies of players not in $\mathcal{C}$ constant. It is clear that neither of the two possible Nash equilibria Pareto dominates the other. Thus for each case, we consider whether either of the two possible Nash equilibria is self-enforcing.

(i) Suppose that a CPNE in which P_L wins exists. Then for any winning coalition of size $|\mathcal{W}|$, any subcoalition $\mathcal{C}$ of $|\mathcal{W}| - m + 1$ rich districts would prefer to defect collectively to P_R. All such defectors would receive $u^R(\lambda_R) + \lambda_R b(\lambda_R)/m - b(\lambda_R)/n^R$, which is strictly higher than their payoff of $u^R(\lambda_L) + \lambda_L b(\lambda_L)/|\mathcal{W}| - b(\lambda_L)/n^R$ in the original coalition. Members of an arbitrary proper subset of $\mathcal{C}$ of size d would then receive $u^R(\lambda_L) + \lambda_L b(\lambda_L)/(|d| + m - 1) - b(\lambda_L)/n^R$ by deviating back to P_L. Since it is not profitable for any member of $\mathcal{C}$ to deviate back to P_L, the deviation by $\mathcal{C}$ is self-enforcing, contradicting that a CPNE exists in which P_L wins.

To show that a P_R victory is a CPNE, observe first that by Remarks 1, 2, and (8), the strategy profile under which $\mathcal{W}$ contains all rich districts and $\overline{w}$

poor districts voting for P_R is a Nash equilibrium. To show coalition proofness, consider any potential subcoalition of deviators $\mathcal{C}$. Suppose that $\mathcal{C}$ contains at least one rich district. Remark 1 then implies that any profitable deviation must result in a P_L victory. By (3) and the argument above, a subcoalition of $\mathcal{C}$ of rich districts would have a self-enforcing deviation to form a minimal-winning P_R coalition. Thus $\mathcal{C}$ can consist only of poor districts, and cannot affect P_R's victory. By (8), no subcoalition of poor districts in $\mathcal{W}$ can do better by switching to P_L, and no subcoalition of districts in $\mathcal{D} \setminus \mathcal{W}$ can do better by switching to P_R. Finally, any $\mathcal{C}$ containing poor districts from both $\mathcal{W}$ and $\mathcal{D} \setminus \mathcal{W}$ cannot strictly increase the payoffs of all poor voters in $\mathcal{C}$. The unique CPNE therefore has $w^* = d^R + \overline{w}$ districts supporting P_R.

(ii) We first show that P_L cannot win in equilibrium when (7) is satisfied. Suppose otherwise. Because $|\mathcal{W}| = m$ would imply that poor voters in pivotal districts vote for P_L in violation of (7), it follows that $|\mathcal{W}| > m$. The maximum payoff that poor voters from poor districts could therefore ever receive from a P_L majority would occur when $|\mathcal{W}| = m + 1$. Such a majority would yield poor voters in $\mathcal{W}$ a utility of:

$$u^P(\lambda_L) + \frac{\lambda_L b(\lambda_L)}{m+1} + \frac{(1-\lambda_L)b(\lambda_L)}{n^P} < u^P(\lambda_L) + \frac{\lambda_L b(\lambda_L)}{m} + \frac{(1-\lambda_L)b(\lambda_L)}{n^P}.$$

But since by (7) we have $u^P(\lambda_L)+\lambda_L b(\lambda_L)/m+(1-\lambda_L)b(\lambda_L)/n^P < u^P(\lambda_R)+\lambda_R b(\lambda_R)/m + (1-\lambda_R)b(\lambda_R)/n^P$, the utility to poor voters in poor districts from a minimal winning majority for P_R is greater than the utility from any possible P_L majority. From this it follows that if a majority of size $|\mathcal{W}| \geq m+1$ formed for P_L, there would exist a subcoalition $\mathcal{C}$ of $|\mathcal{W}| - m + 1$ poor districts that would prefer to defect collectively to P_R, thus inducing a minimum winning P_R majority. To show that the deviation by $\mathcal{C}$ is self-enforcing, note again that by (7), there is no subset of $\mathcal{C}$ that would prefer to defect back and support P_L, because all members prefer a minimum winning coalition for P_R to any winning coalition for P_L. This contradicts the existence of a CPNE where P_L wins.

It remains to show that a P_R victory with $w^* = d^R + \overline{w}$ represents a CPNE. Observe first that (7), (8), and Remarks 1 and 2 establish that it is a Nash equilibrium for $\mathcal{W}$ to contain all rich districts and $\overline{w} \geq m - d^R$ poor districts, all voting for P_R.

To show that this equilibrium is coalition-proof, there are two cases for a potential deviating coalition $\mathcal{C}$. First, suppose that P_R wins with the support of w' districts. Remark 1 then implies that no rich district can belong to $\mathcal{C}$, and hence $\mathcal{C}$ can contain only poor districts. There are two subcases: either $w^* \neq w'$ or $w^* = w'$. In the former subcase, (8) implies that at least one poor district in $\mathcal{C}$ does strictly worse under the deviation. In the latter, the new strategy profile simply permutes the poor districts the original, and thus not all districts in $\mathcal{C}$ strictly benefit from the deviation.

Second, suppose that P_L wins. By an argument identical to that in the proof that P_L cannot win in a CPNE, there exists a self-enforcing deviation by a proper subset of districts in $\mathcal{C}$ that would give P_R a minimum winning coalition. This deviation is better for poor districts in $\mathcal{C}$ than any possible winning coalition for P_L when (7) is satisfied. It must therefore also be better for any rich district in $\mathcal{C}$.

Thus there does not exist a self-enforcing deviation for $\mathcal{C}$. We conclude that in the unique CPNE, $w^* = d^R + \overline{w}$.

(iii) This proof is symmetric to that of case (i) and is therefore omitted. ■

Proposition 2 demonstrates that when parties are strong, cross-over voting incentives exist for rich and poor alike, as voters in both income groups may have incentives to support the "wrong" party in order to ensure access to pork. The extent to which this occurs depends on how voters weigh ideological policy, taxes, redistribution, and pork.

The general intuition for the model rests on the link between district-level voting incentives and national outcomes. Figure 1 illustrates this link. In the example, there are six poor districts and five rich districts. Suppose that if P_L is expected to win, one rich district would support P_L (i.e, $\underline{w} = 1$), and if P_R is expected to win, three poor districts would support P_R (i.e., $\overline{w} = 3$). The figure depicts the only two Nash equilibria that can exist in the case. In Nash Equilibrium 1, P_L wins with the support of all poor districts and one rich district. Similarly, in Nash Equilibrium 2, all rich districts must support P_R, joined by three poor districts.

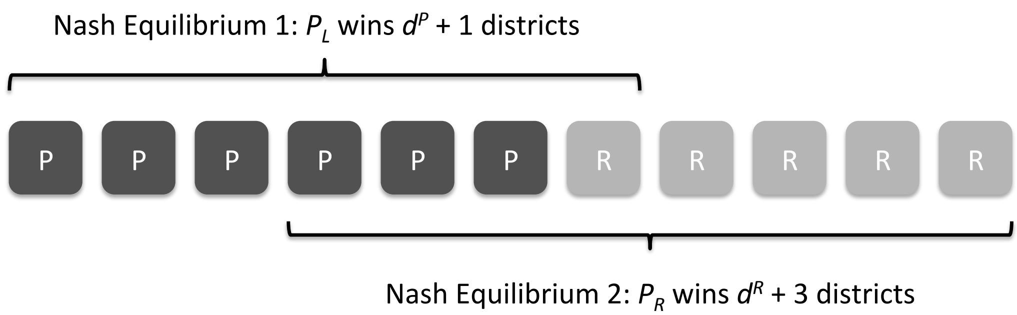

Figure 1: *Nash equilibria when* $\overline{w} = 3$ *and* $\underline{w} = 1$.

Which one of these equilibria is the unique CPNE depends on whether a poor pivotal district prefers a P_L or P_R legislative majority. Suppose that a pivotal poor district would vote for P_R. Then Nash Equilibrium 1 is not a strong Nash equilibrium because one rich district and one poor district would prefer to switch to P_R. It also cannot be a CPNE because neither defecting district could have an incentive to defect back to supporting P_L: both defecting districts would be pivotal in maintaining a P_R majority, and both prefer P_R when they are pivotal. Now consider Nash Equilibrium 2. This equilibrium may not be strong, since three poor districts might prefer to switch jointly to P_L. That is, it may be better for the three poor districts to be part of a minimum winning coalition for P_L than part of an oversized coalition (of size 8) for P_R. Nash Equilibrium 2 is coalition-proof, however, since any such defection to P_L is vulnerable to defection back to P_R: any one of the three defecting poor districts would be pivotal and would thus prefer switching to P_R, regaining a winning coalition for that party. The example therefore illustrates how cross-over voting by the poor can occur even when the poor have a majority of districts.

By the same logic, if a pivotal poor district prefers P_L, then Nash Equilibrium 2 is not a CPNE because the three poor districts supporting P_R would prefer switching to P_L. And Nash Equilibrium 1 is a CPNE: no coalition defecting from the majority would be stable because it would have to contain enough poor districts to change the majority to P_R, and in any such coalition, poor districts would defect back to supporting P_L. Thus cross-over voting by the rich can occur when the poor control a majority of districts and a pivotal poor voter prefers P_L.

4.2 Implications

The equilibria described in Propositions 1 and 2 yield several insights about how the availability of district-based pork and income-based redistribution affects voting behavior and election outcomes. We focus here on how party discipline affects income-based voting, the right-wing advantage that exists under strong parties, and the factors affecting cross-over voting — and thus the size of legislative coalitions — in strong party systems.

Party discipline and income-based voting. Propositions 1 and 2 make a simple but important point about how income and voting should be related across different types of party systems. If a voter believes that electoral outcomes will not affect the distribution of pork, then they can vote their redistributive interests, whereas if they believe that their access to government pork depends on their being represented by someone from the majority party, then they may vote against their redistributive interests to gain access to pork. We have argued that party discipline should play a central role in shaping these expectations.

In systems where parties are weak and do not constrain legislative bargaining over pork, voters need not worry about how elections affect pork, and thus can vote their redistributive interests. In systems where a disciplined majority party controls the distribution of pork, both rich and (especially) poor voters will have incentives to cross-over and vote for the "wrong" party. We should therefore expect to see the strongest relationship between income and the vote in systems with weak parties.

From a voter's perspective, the benefits of party strength are ambiguous. Strong parties tend to help voters in the winning coalition, since they will not have to share pork with election losers. Thus, when a majority of districts are rich, a poor district must either forego pork entirely or elect an ideologically undesirable representative. By contrast, weak parties tend to help voters who expect to lose the election, and so a poor voter might prefer weak parties when poor districts are in the minority.

Party discipline and the right-party advantage. Since party strength affects voting incentives by conditioning expectations regarding pork, strong parties also create an asymmetry between cross-over voting incentives for rich and poor, one that advantages right-wing parties. Because the right-wing party wants to limit redistribution, it has more government revenues available for pork — even if the left-wing party funds all the "extra" redistribution it advocates with taxes on the rich (this follows from the fact that $\lambda_j b(\lambda_j)$ is increasing in λ_j). This implies that poor voters have a greater incentive to cross-over than do rich voters.

This fact has two implications for the right-wing party's electoral prospects. First, as Proposition 2 describes and Figure 1 illustrates, even if a majority of districts are poor, the right-wing party might win due to cross-over voting by the poor. By contrast, if rich voters control a majority of districts, the left-wing party will never win. Second, left-wing coalitions are "smaller" than right-wing coalitions. That is, given identical levels of ideological supporters across districts, a right-wing coalition would attract more cross-over districts than a left-wing coalition. The following remark follows immediately from (8) and (9).

Remark 3 *The number of districts voting for P_L when P_L wins and d districts are poor is no greater than the number of districts voting for P_R when P_R wins and d districts are rich.* ■

The analysis therefore suggests a different explanation for why right-wing parties have an advantage in majoritarian systems (e.g., Iversen and Soskice 2006), one that is grounded in distributive politics. It further suggests that this advantage should be contingent on the existence of strong parties. On this point, it is interesting to note that the Democrats in the "weak party" U.S. have controlled majorities in the U.S. House of Representatives for much more time than have left-wing parties in "strong party" majoritarian systems like Australia, Britain, Canada, Ireland, Japan and New Zealand (until 1993). Using data from Iversen and Soskice, for example, from 1945-98, right-wing parties controlled government 74 percent of the time in these strong party countries, whereas the left-wing Democrats controlled the U.S. House in all but six years (or over 90 percent of the time).

Cross-over voting by the pivotal poor district when parties are strong. The effect of strong parties on voting outcomes depends to a large degree on the behavior of the poor voters in pivotal districts. Equation (7) determines how pivotal poor citizens vote and by extension whether P_R can win even in the face of a majority of poor districts. It is therefore useful to underscore two factors that affect whether this condition is satisfied. First, the value of general redistribution declines with the number of poor individuals, decreasing the relative value to pivotal poor voters of supporting P_L (and thus making it easier to satisfy (7)). Cross-over voting therefore increases as the number of poor voters increases. Second, the budget constraint (c) influences the relative value of supporting P_L. When c is at its minimum, the budget constraint is weakest, and every dollar devoted to redistribution is paid for by additional taxes on the rich. As the budget constraint tightens (c increases), so too does the budgetary tradeoff between redistribution and pork. Under the most constrained budget ($c = 1$), there is a one-to-one tradeoff between pork and general redistribution, so any resources for pork must be taken from the budget for redistribution. Thus, the relative value of supporting the left-wing party declines — and incentives for cross-over voting the poor increase — as the budget constraint tightens.[6]

5 Can the Left Compete on Pork?

In the strong party model, the right-wing advantage occurs in part because of the assumption that the left-wing party has a greater commitment to redistributive spending. A consequence of this assumption, embodied by the budget constraint parameter c, is that the right can always offer more pork and therefore attract more cross-over votes. As argued above, we feel that assuming $c \in [0, 1]$ is a very reasonable constraint on the ability of left parties to tax. But it is nonetheless worth asking whether the left can overcome the right-wing advantage by setting taxes so high with a negative c that it offers more redistribution and pork than the right-wing party.

The next remark establishes two effects of large budgets on P_L's competitiveness. First, pivotal poor voters can be induced to vote always for P_L if c is sufficiently small and the left-wing platform is more moderate than the right-wing platform. Under these conditions P_L offers more pork (i.e., $\lambda_L b(\lambda_L) \geq \lambda_R b(\lambda_R)$), and as a result, (7) cannot be satisfied and poor voters will not allow P_R to win when a majority of districts are poor. Second, even when P_L can offer more pork than P_R, the symmetric condition to (7) for pivotal rich voters to cross over is difficult to satisfy. The necessary condition in the remark cannot hold, for exam-

[6] The effect of polarization in party platforms (λ_j) on cross-over voting by the poor is ambiguous.

ple, if $n^R < m$ (i.e., rich voters are not a large majority of the total population), or even if $\lambda_L \leq 1/2$ (i.e., the left-wing party spends less than half the budget on pork). The reason is that rich voters are taxed for the very large budget that would provide both more generous redistribution and more pork. This suppresses P_L's pork advantage and also the rich voters' incentives to cross-over.

Proposition 3 *For $c < 0$:*

(i) Pivotal poor voters vote for P_L if $|\lambda_L - 1/2| \leq |\lambda_R - 1/2|$ and $c \leq \frac{\lambda_L(2-\lambda_L)-\lambda_R(2-\lambda_R)}{\lambda_L(1-\lambda_L)-\lambda_R(1-\lambda_R)}$.

(ii) Pivotal rich voters vote for P_L only if $\lambda_L > 1/2$, $c < \frac{\lambda_L(2-\lambda_L)-\lambda_R(2-\lambda_R)}{\lambda_L(1-\lambda_L)-\lambda_R(1-\lambda_R)}$ and $n^R > m/\lambda_L$. ■

Proof. (i) It is easily verified that if $\lambda_L b(\lambda_L) \geq \lambda_R b(\lambda_R)$, then (7) cannot be satisfied and pivotal poor voters will vote for P_L. This condition reduces to:

$$\lambda_L(2-\lambda_L) - \lambda_R(2-\lambda_R) \quad \geq \quad [\lambda_L(1-\lambda_L) - \lambda_R(1-\lambda_R)]c. \tag{10}$$

The left-hand side of (10) is always negative. Thus when $c < 0$, (10) holds if and only if $\lambda_L(1-\lambda_L) \geq \lambda_R(1-\lambda_R)$, or equivalently $|\lambda_L - 1/2| \leq |\lambda_R - 1/2|$, and $c \leq (\lambda_L(2-\lambda_L) - \lambda_R(2-\lambda_R))/(\lambda_L(1-\lambda_L) - \lambda_R(1-\lambda_R))$.

(ii) From (3), a pivotal rich voter votes for P_L if:

$$u^R(\lambda_L) + \frac{\lambda_L b(\lambda_L)}{m} - \frac{b(\lambda_L)}{n^R} > u^R(\lambda_R) + \frac{\lambda_R b(\lambda_R)}{m} - \frac{b(\lambda_R)}{n^R}. \tag{11}$$

Noting that $u^R(\lambda_R) > u^R(\lambda_L)$ and rearranging terms, (11) holds only if $(\lambda_L b(\lambda_L) - \lambda_R b(\lambda_R))/m > (b(\lambda_L) - b(\lambda_R))/n^R$. Since $b(\lambda_L) - b(\lambda_R) > 0$, this requires $\lambda_L b(\lambda_L) > \lambda_R b(\lambda_R)$, which is the same condition as in part (i), but with a strict inequality. Further, since $\lambda_L \leq \lambda_R$, (11) can hold only if:

$$\frac{\lambda_L(b(\lambda_L) - b(\lambda_R))}{m} > \frac{b(\lambda_L) - b(\lambda_R)}{n^R}. \tag{12}$$

Reducing yields the necessary condition $n^R > m/\lambda_L$. Finally, $n^R > m/\lambda_L$ cannot be satisfied if $\lambda_L \leq 1/2$, and so $|\lambda_L - 1/2| \leq |\lambda_R - 1/2|$ reduces to $\lambda_L > 1/2$. ■

The implications of this remark for the set of possible CPNE are significant. Applying the same equilibrium derivation as that in Proposition 2, there exist conditions — unrealistic ones in our view — when the left-wing party can negate the right-wing advantage with very high taxes and budgets. And unless some very constraining parameter restrictions are satisfied, *when a majority of districts are rich, rich voters will not join a P_L coalition.*[7] More typically, the party whose natural constituents control a majority of districts will win. Thus, while an outsized left budget may indeed eliminate the right-wing advantage, it is more difficult for the left to gain a corresponding left-wing advantage.

6 Conclusion

When deciding how to vote, issues unrelated to economic well-being undoubtedly influence citizen choices. Our analysis, however, cautions against assuming *either* that this is the only reason why voters may support the "wrong" party *or* that when voters vote against their redistributive interests, they are voting against their economic interests. Redistribution from rich to poor is but one way that governments distribute tax revenues, and voters may maximize their economic well-being by supporting a party that is not their most-preferred on that issue.

By focusing on pork-barrel politics, the model here explores one of the central ways that governments distribute revenues on a basis unrelated to individual income. A central intuition from the model concerns the importance of legislative party discipline in an environment where parties cannot commit to distributive platforms. When parties are weak, voters expect the same level of pork no matter

[7] Of course, (7) is also not always satisfied, though the analogous parameter restrictions on whether pivotal poor voters will cross over are less demanding than those for the rich.

which party they support, and thus redistributive preferences are fundamental to vote choice. When parties are strong, by contrast, the winning party can exclude losers from pork. The stark contrast between winning and losing in this setting makes pork an especially efficient way to attract voters. This causes voters to weigh a trade-off between pork and income-based redistribution. The value of being included in the majority-controlled pork-coalition will often be decisive, resulting in cross-over voting. Our model therefore suggests that cross-over voting levels should be highest in systems where the majority party in the legislature can concentrate the distribution of pork in electorally supportive districts.

The analysis also brings into sharp relief an advantage that rich voters and right-wing parties should have in majoritarian systems with strong parties. Since the right-wing party can offer more pork, it benefits when voters have pork-based incentives to elect a legislator from the expected majority party. Rich voters in pivotal districts never support left-wing parties, but poor voters in pivotal districts may support right-wing parties. The incentives of poor voters to do so increases as the population of poor voters increases and as constraints on the government budget increase. These cross-over voting incentives also imply that all things equal, right-wing legislative majorities should be larger than left-wing majorities.

Two limitations of our model suggest avenues for further research. First, the model treats party strength as exogenous. As the analysis above suggests, party strength has implications for the expected payoffs of party members, and it would therefore be interesting to consider ways in which party strength might evolve in response to the electoral incentives posed in our model. Second, the model assumes that eligibility for redistribution — or the identity of the "poor" — is exogenous. Analyzing endogenous determination of eligibility for redistribution programs may require a richer set of assumptions about voter types and taxation, but may make it possible to understand how politicians create electoral coalitions that transcend economic groups.

References

Alesina, Alberto, and Howard Rosenthal (1996). "A Theory of Divided Government." *Econometrica*, 64, 1311–1341.

Ansolabehere, Stephen, Jonathan Rodden, and James M. Snyder (2006). "Purple America." *Journal of Economic Perspectives*, 20, 97–118.

Austen-Smith, David, and Jeffrey Banks (1988). "Elections, Coalitions, and Legislative Outcomes." *American Political Science Review*, 82, 405–422.

Austen-Smith, David, and Michael Wallerstein (2006). "Redistribution and Affirmative Action." *Journal of Public Economics*, 90, 1789–1823.

Banzhaf, John F., III (1968). "One Man 3.312 Votes: A Mathematical Analysis of the Electoral College." *Villanova Law Review*, 13, 304–332.

Baron, David, and Daniel Diermeier (2001). "Elections, Governments, and Parliaments in Proportional Representation Systems." *Quarterly Journal of Economics*, 116, 933–967.

Baron, David, and John Ferejohn (1989). "Bargaining in Legislatures." *American Political Science Review*, 83, 1181–1206.

Bartels, Larry M. (2008). *Unequal Democracy: The Political Economy of the New Guilded Age.* Princeton, NJ: Princeton University Press.

Bernheim, B. Douglas, Bezalel Peleg, and Michael D. Whinston (1987). "Coalition-Proof Nash Equilibria I. Concepts." *Journal of Economic Theory*, 42, 1–12.

Christiansen, Nels (2011). "Strategic Delegation in a Legislative Bargaining Model with Pork and Public Goods." Typescript, Trinity University, San Antonio, TX.

Cusack, Thomas (1997). "Partisan Politics and Public Finance: Changes in Public Spending in the Industrialized Democracies, 1955-89." *Public Choice*, 91, 375–395.

Dixit, Avinash, and John Londregan (1998). "Ideology, Tactics, and Efficiency in Redistributive Politics." *Quarterly Journal of Economics*, 113, 497–529.

Fernàndez, Raquel, and Gilat Levy (2008). "Diversity and Redistribution." *Journal of Public Economics*, 92, 925–943.

Frank, Thomas (2004). *Whats the Matter With Kansas? How Conservatives Won the Heart of America.* New York: Metropolitan Books.

Garrett, Geoffrey, and Peter Lange (1991). "Political Responses to Interdependence: What's "Left" for the Left?" *International Organization*, 45, 539–564.

Gelman, Andrew, David Park, Boris Shor, Joseph Bafumi, and Jeronimo Cortino (2008). *Red State, Blue State, Rich State, Poor State: Why Americans Vote the Way They Do.* Princeton, NJ: Princeton University Press.

Hassler, John, Per Krusell, Kjetil Storesletten, and Fabrizio Zilbotti (2005). "The Dynamics of Government." *Journal of Monetary Economics*, 52, 1331–1358.

Huber, John D., and Piero Stanig (2009). "Individual Income and Voting for Redistribution Across Democracies." Typescript, Columbia University.

Huber, John D., and Piero Stanig (2011). "Church-State Separation and Redistribution." *Journal of Public Economics*, 95, 828–836.

Hunter, James Davison (1991). *Culture Wars: The Struggle to Define America.* New York: Basic Books.

Iversen, Torben, and David Soskice (2006). "Electoral Institutions and the Politics of Coalitions: Why Some Democracies Redistribute More Than Others." *American Political Science Review*, 100, 165–181.

Jackson, Matthew O., and Boaz Moselle (2002). "Coalition and Party Formation in a Legislative Voting Game." *Journal of Economic Theory*, 103, 49–87.

Key, V. O. (1984). *Southern Politics in State and Nation.* Knoxville, TN: The University of Tennessee Press.

Levy, Gilat (2005). "The Politics of Public Provision of Education." *Quarterly Journal of Economics*, 120, 1507–1534.

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

Lizzeri, Alessandro, and Nicola Persico (2001). "The Provision of Public Goods under Alternative Electoral Incentives." *American Economic Review*, 91, 225–239.

Lopez-Rodriguez, David (2011). "Distributive Politics and Economic Ideology." Unpublished manuscript, University of Barcelona.

McCarty, Nolan, Keith T. Poole, and Howard Rosenthal (2006). *Polarized America: The Dance of Ideology and Unequal Riches.* Cambridge, MA: MIT Press.

McGillivray, Fiona (2004). *Privileging Industry: The Comparative Politics of Trade and Industrial Policy.* Princeton, NJ: Princeton University Press.

Meltzer, Allan H., and Scott F. Richard (1981). "A Rational Theory of the Size of Government." *Journal of Political Economy*, 89, 914–927.

Milesi-Ferretti, Gian Maria, Roberto Perotti, and Massimo Rostagno (2002). "Electoral Systems and Public Spending." *Quarterly Journal of Economics*, 117, 609–657.

Morelli, Massimo (1999). "Demand Competition and Policy Compromise in Legislative Bargaining." *American Political Science Review*, 93, 809–820.

Persson, Torsten, and Guido Tabellini (1999). "The Size and Scope of Government: Comparative Politics with Rational Politicians." *European Economic Review*, 43, 699–735.

Ramseyer, J. Mark, and Frances Rosenbluth (1993). *Japan's Political Marketplace.* Cambridge, MA: Harvard University Press.

Roemer, John E. (1998). "Why the Poor Do Not Expropriate the Rich: An Old Argument in New Garb." *Journal of Public Economics*, 70, 399–424.

Shapley, Lloyd S., and Martin Shubik (1954). "A Method for Evaluating the Distribution of Power in a Committee System." *American Political Science*

Review, 48, 787–792.

Snyder, James M., Jr., and Michael M. Ting (2003). "Roll Calls, Party Labels, and Elections." *Political Analysis*, 11, 420–444.

Volden, Craig, and Alan E. Wiseman (2007). "Bargaining in Legislatures Over Particularistic and Collective Goods." *American Political Science Review*, 101, 79–92.