

# Constituency Service with Electoral and Institutional Variation\*

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## Abstract

We analyze a model of constituency service provision to understand how the level of constituency service responds to variation in both institutions and the competitiveness of elections. We show that single-member districts, separately elected executives, and more ideologically balanced electorates all increase incentives for constituency service. We use these results to explain why constituency service and party strength are negatively related in comparative evidence but positively related in historical evidence. We also discuss incentives for divided delegations and for personalized constituencies in multi-member districts.

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There is substantial variation in the extent to which legislators engage in particularistic activities, such as constituency service and pork barreling, across different political systems. Comparisons of the U.S. Congress and the U.K. Parliament show that representatives in single-member district, presidential systems do more constituency service than those in Westminster (single-member district, parliamentary) systems (Cain, Ferejohn & Fiorina 1987). Studies of U.S. state legislatures show that representatives do less work specifically geared towards their district or constituency in multi-member districts than in single-member districts (Welch & Studlar 1990, Jewell 1982). Differences have also been noticed between different multi-member district systems. In particular, U.S. multi-member districts seem to produce low levels of local public goods, while other types of multi-member districts (such as that which existed in Japan) appear to lead to high levels of local public goods provision (Hirano 2002).

Several institutional theories have been advanced that link the comparative patterns in constituency service with similar patterns in party strength, based on the claim that strong parties actively limit their members' constituency service activities (we will refer to such theories, generally, as *purely institutional models*). Strong parties, the argument goes, can solve a collective action problem in the legislature: legislators, as a group, want to engage in activities that build support for the party but cannot trust themselves, as individuals, not to divert time, resources, and political capital to pork barreling and casework instead (Cox & McCubbins 1993, Carey & Shugart 1995, Persson, Roland & Tabellini 1997, Persson, Roland & Tabellini 2000). As Cox and McCubbins argue:

it is not difficult to understand why legislators undertake activities—such as pork barreling and casework—that enhance their own reputations. In contrast, the party's reputation, based on its record..., is a public good for all legislators in

the party. This means that party reputations may receive less attention than they deserve (Cox and McCubbins, 123).

This suggests that institutions which support strong parties, such as parliamentary forms of government, will also lead to relatively low levels of constituency service.

Cain et al. (1987) find empirical evidence that supports this theory: members of the United States Congress (with its relatively weak parties) do more constituency service than do members of the British parliament (with its relatively strong, disciplined parties). Furthermore, they argue that differences in constituency service actually reinforce the differences in party strength, since legislators who build a personal vote through constituency service are better positioned to resist party leaders (p. 197). They conclude:

Decrease the level of the personal vote, and congressional institutions will change to accommodate the decrease, party cohesion will increase, and policy making will become more centralized.

These purely institutional theories also posit a causal link between constituency service and the incumbency advantage. In particular, the incumbency advantage is seen as a product of the personal vote, which exists precisely because legislators provide for their constituencies. As such, the purely institutional models predict that strong parties, which limit constituency service, will also attenuate the size of the incumbency advantage. This is consistent with comparative empirical findings (Gelman & King 1990, Katz & King 1999).

The last several decades have seen an increase in party strength—Congressional voting has become more cohesive (Aldrich 1995, Rohde 1991) and party organizations have become more assertive in policymaking (Shepsle 1989, Rohde 1991). Surprisingly, in light of the purely institutional models, House members actually do much *more* constituency service today than

they did forty years ago (Shepsle 1989) and the incumbency advantage is stronger (Gelman & King 1990, Ansolabehere & Snyder 2002). This over-time relationship between party strength, on the one hand, and constituency service and the incumbency advantage on the other, is precisely the opposite of the cross-sectional relationship that gave rise to the purely institutional models.

This empirical finding does not falsify the institutional model of constituency service. Indeed, it is entirely plausible that, had parties not become stronger in the last several decades, constituency service and the incumbency advantage would have increased *even more* than they have. Nonetheless, to explain the increases in constituency service and the incumbency advantage during a period of strengthening parties, one must appeal to factors beyond party strength.

In this and other work (Ashworth and Bueno de Mesquita 2003a,b), we account for these empirical patterns with a model of comparative legislative and electoral politics. We identify two distinct causal mechanisms: institutional variation and changes in the competitiveness of elections. Institutional variation, in our model, affects legislative and electoral outcomes in two ways: (1) it changes the amount of information voters get about their representatives and (2) it alters the weight that voters optimally place on local concerns versus national-policy concerns. Changes in the competitiveness of elections affect legislative and electoral outcomes by altering the probability that legislators can swing pivotal voters in their favor either through a disciplined approach to national policy or constituency service. In our account, then, party discipline, the incumbency advantage, and constituency service are functions of both the institutions and the distribution of preferences in the electorate. Institutional changes lead to a negative relationship, as observed in the comparative data, while changes in competitiveness lead to a

positive relationship, as observed in U.S. history.

Space constraints make it impossible to present a full model encompassing party formation, elections, and constituency service in a single paper. Instead, the current paper focuses on the implications of our model for constituency service under a variety of legislative and electoral configurations. As such, the model presented in this paper does not include parties. As already discussed, this does not present a significant theoretical problem because party strength, in our account, does not exert a causal influence on the level of constituency service. Later, we informally discuss how the causal mechanisms identified in this paper also affect party strength and the incumbency advantage. (This is modeled formally in Ashworth and Bueno de Mesquita 2003a,b.)

We use the first consequence of institutional variation mentioned above—the level of information revelation—to explain differences between single-member and multi-member district presidential systems. Single-member district presidential systems (SMPs) allow for more learning about the ability of legislators than do multi-member district presidential systems (MMPs), since voters in multi-member district systems do not know which of their representatives to credit for benefits provided to the district. Consequently, voters place more weight on individual characteristics in single member district systems. This gives single member district incumbents greater incentive to provide constituency service and strengthens the incumbency advantage, consistent with empirical findings (Cox & Morgenstern 1995, Katz 1986).

We use the second consequence of institutional variation—the weight voters endogenously place on national policy versus local concerns—to analyze differences between Britain and the United States. We study a parliamentary system with first-past-the-post elections in single member districts. We abbreviate this as WST (for Westminster), since this system is used

in the United Kingdom. In a Westminster system, the legislature determines national policy on its own, unconstrained by an independent executive. As a result, Westminster voters care more than do presidential voters about the national policy views of their representative and less about their representatives' abilities to provide local public goods. Consequently, parliamentary systems have more disciplined parties (thereby providing greater certainty about the policy views of representatives), less constituency service, and smaller incumbency advantages, consistent with the empirical results that gave rise to the purely institutional models.

Changes over time in the U.S. are driven not by institutional variation, but rather by changes in the distribution of preferences in the electorate. For much of the 20th century, most Congressional districts were relatively uncompetitive. The south was solidly Democratic, while the non-urban parts of the north and west were solidly Republican. This pattern reversed in the 1960s, due to both the debate over civil rights and redistricting following the *Baker v. Carr* decision (Cox & Katz 2002). As a result, districts became, on average, more competitive. When elections are more competitive, the decisive voter in each district is more likely to be swayed by increased constituency service or increased certainty about the ideological position of a candidate. Consequently, the marginal expected benefit that legislators derive from constituency service and from party discipline increase. Our causal story thereby predicts, consistent with American history, that when elections become more competitive, party discipline, constituency service, and the incumbency advantage all increase.

Careful observers of American politics will note that, while state level competitiveness has increased since the 1960s, some individual districts have become *less* competitive because gerrymandering has created "safe" seats. However, the decline of the solidly Democratic south and Republican north and west implies that, even if there was an increase in the number of safe

seats, *on average* elections became more competitive. As will become clear, it is this notion of an increase in competitiveness that is needed for our analysis.

The paper proceeds as follows. In the next section we present the basic model and solve for the equilibrium levels of constituency service under three institutional structures. Section 3 contains our analysis of the effects of increased competitiveness, which allows us to address over-time changes in the United States. Section 4 provides micro-foundations for the model, section 5 considers empirical challenges to our model, and the final section concludes with an informal discussion of our model of party discipline and the incumbency advantage.

## 1 The Model

There are two periods. At the beginning of the game, each of  $n$  districts has an incumbent representative who is equally likely to be from either of the two parties.<sup>1</sup> In period 1, incumbent legislators work to provide local public goods and set national policy. Each voter observes the level of local public goods provided to his district. In period 2, legislators stand for reelection and those elected once again provide local public goods and set national policy.

### 1.1 Policy Making

There are a left ( $L$ ) and a right ( $R$ ) party, with fixed policy platforms in the one-dimensional policy space. We denote these platforms by  $\mu_p \in \mathbb{R}$ , where  $p \in \{L, R\}$ . To keep the model as symmetric as possible, we assume that  $\mu_L = -\mu_R$ .<sup>2</sup>

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<sup>1</sup>We could have a first-round election. However, since all politicians are *ex-ante* identical and no information has been revealed prior to period 1, this election would simply involve voters choosing randomly.

<sup>2</sup>In our companion paper, candidates are not perfect agents of parties, so the voter believes that a party  $p$ 's candidate's policy preference is a random variable. To make the link between the papers, interpret  $\mu_p$  as the

The representative voter in a district has ideological preferences represented by the expectation of  $-(x^* - x)^2$ , where  $x$  is a policy and  $x^*$  is the voter's ideal point. The candidates do not know  $x^*$ ; their common belief is that  $x^* \sim \mathcal{N}(0, \sigma_{x^*}^2)$  for each district, and that these ideal points are mutually independent.<sup>3</sup>

The legislature sets national policy, which is a point on the ideological dimension. Rather than attempt to model the complex politics of bargaining in a legislature, we follow Grossman & Helpman (1999) by adopting a reduced form representation. In particular, we assume that national policy is determined by the average of the individual legislators' ideal points, denoted  $x_{\text{leg}}$ . An important implication of this approach is that policy is responsive to a change in any legislator's ideology. Consequently, voters care about their representatives' ideological positions.

In the Westminster system, national policy is fully determined by the decision of the legislature. In a presidential system, the legislature must bargain with the president to determine national policy. We will work with a reduced form description of this bargaining as well. Following Alesina & Rosenthal (1995), we assume that policy in a presidential system is a weighted average of the legislature's proposal and the president's ideal point, with weight  $\beta$  on the legislative proposal:  $x = \beta x_{\text{leg}} + (1 - \beta)x_{\text{pres}}$ .

## 1.2 Local Public Goods Provision

In addition to setting national policy, legislators provide local public goods to their constituents. Our conception of local public goods provision includes both the performance of constituency service and casework as well as the procuring of pork barrel projects for the constituency. What is important is that, in expectation, members of a district benefit from having a representative

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voter's certainty equivalent of this random variable.

<sup>3</sup>Section 3 relaxes the assumption that districts are *ex-ante* identical.



who is skillful at providing such goods. It is obvious why political pork constitutes a local public good. The reason why constituency service is a *public* good is slightly more subtle. While any individual act of constituency service or casework only benefits a small number of constituents, any voter may require such services in the future. As such, constituency service is a local public good in expectation. Being represented by a legislator who is skillful at providing constituency service benefits the entire constituency in much the same way that being represented by a legislator who is skillful at procuring political pork does.

Our model of local public good provision is based on Holmström's (1999) career concerns model.<sup>4</sup> Each representative,  $i$ , provides her district with local public goods worth  $s_i = \theta_i + a_i + \epsilon_i$ , where  $\theta_i$  is the ability of legislator  $i$ ,  $a_i$  is the incumbent's level of effort, and  $\epsilon_i$  is noise. The legislator has opportunity cost  $c(a_i)$  for choosing a level of effort  $a_i$ , where  $c$  is increasing, convex, continuously differentiable, and  $\lim_{a \rightarrow \infty} c(a) = \infty$ .

The idea is that the legislator has to choose how much of her time, energy, and political capital to devote to providing for her constituents. Effort devoted to constituent-oriented activity cannot be invested in other valuable activities, such as working on policy issues, fund-raising, or party service. Later in the paper, we discuss several specific micro-foundational models that are consistent with this representation, including models of voting over the allocation of public spending between local pork-barrel projects and national public goods, and models of the allocation of staff resources to constituency service.

The voter in district  $i$  does not observe his representative's ability ( $\theta_i$ ) or effort ( $a_i$ ), but he does observe the amount of local public goods provided to the district ( $s_i$ ). To form his posterior beliefs about his representative's ability, the voter combines his observation of the amount of

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<sup>4</sup>Holmström's model has previously been applied to elections by Alesina & Tabellini (2003), Ashworth (2001), Lohmann (1998), and Persson & Tabellini (2000).

local public goods with both his prior belief about his representative's ability and his equilibrium expectations about the level of effort his representative will expend (this expectation is denoted  $a_i^*$ ). The prior distribution of candidate ability is  $\mathcal{N}(m, \sigma_\theta^2)$  for all candidates, and the noise,  $\epsilon$ , is also a normal random variable,  $\epsilon \sim \mathcal{N}(0, \sigma_\epsilon^2)$ . All of these random variables are mutually independent.

Standard results about normal learning (DeGroot 1970) imply that the posterior distribution of a legislator  $i$ 's ability, given a level of local public good provision  $s_i = \theta_i + a_i + \epsilon_i$ , is a normal distribution with mean

$$m_i'(s) = \lambda(s - a_i^*) + (1 - \lambda)m_i, \tag{1}$$

where

$$\lambda = \frac{\sigma_\theta^2}{\sigma_\theta^2 + \sigma_\epsilon^2}.$$

This updating formula is intuitive. The more certain the voter is in his prior beliefs (low  $\sigma_\theta$ ) the less weight he places on the new signal. The less noisy the signal is (low  $\sigma_\epsilon$ ) the more weight the voter places on the new signal.

### 1.3 The Election

In period 2, the voter chooses to return the incumbent or elect a challenger who is randomly selected from the opposition party. After the election, the winning legislators select policy and provides local public goods. A representative's payoff from being elected is  $B$ .

## 2 Equilibrium

The differences in local public good provision under various electoral regimes will depend on differences in voter responses to legislative effort directed toward the provision of local public

goods. In particular, voters learn about their representative's ability ( $\theta$ ) by observing the amount of local public goods provided to the district. Since voters benefit from local public goods, they care about having a high ability representative. Different systems give the voters different incentives to trade off policy and ability, and, consequently, different systems give the legislators different incentives for effort.

To see this formally, we have to find an equilibrium. Given the pivotal voter's strategy, which will depend on the electoral system, the incumbent can determine the probability that she will be reelected given the level of effort she exerts in providing local public goods. Call this probability  $\Pr(\text{reelection} \mid a)$ . Of course, this probability is a function of the voter's behavior and the electoral system. The incumbent determines how much effort to devote to providing local public goods by solving the following maximization problem:

$$\max_a \Pr(\text{reelection} \mid a)B - c(a).$$

To study this problem, we begin by deriving the voter's reelection rule, since this will pin down the probability in the incumbent's objective. The voter chooses which candidate to select by comparing his expected utility from each choice. To do this, he must predict the level of effort the winner will provide. At the final date, it is obvious that no legislator will choose  $a > 0$ . Thus, total local public goods provision in a district  $i$  in this final round is  $s_i = \theta_i + \epsilon_i$ .

When casting his vote, the voter considers both the ideology of the candidates and his beliefs about their abilities to provide local public goods. In particular, his total second period payoff is  $\mathbb{E}(-(x^* - \tilde{x}_W)^2 + \theta_W + \epsilon)$ , where  $W$  is the winner of the election and  $\tilde{x}_W$  is the random variable representing national policy when  $W$  wins the election in the voter's district.

Without loss of generality, we will focus on the case where the incumbent is from party  $L$ .

A voter votes for  $L$  if and only if

$$\mathbb{E}(-(x_L - x^*)^2 + \theta_L + \epsilon) \geq \mathbb{E}(-(x_R - x^*)^2 + \theta_R + \epsilon).$$

Take expectations and rearrange terms to see that this is true if

$$-\mathbb{E}(\tilde{x}_L - x^*)^2 + m'_L \geq -\mathbb{E}(\tilde{x}_R - x^*)^2 + m_R.$$

Assume that each voter believes that the voters in the other districts will reelect their incumbents if and only if that incumbent's posterior ability is greater than  $m$  (the prior mean). We will show that a voter who makes this assumption will also elect an incumbent if and only if her ability is greater than  $m$ , so this will be an equilibrium. We say that such an equilibrium is *neutral*, since neither party is favored *ex-ante*.

In a neutral equilibrium, the voter believes that each other district votes  $L$  with probability  $1/2$ , and that these probabilities are independent. Thus the reelection condition reduces to

$$x^* \leq \frac{m'_L - m_R}{(2/n)(\mu_R - \mu_L)}.$$

This decision rule is intuitive. The greater is the incumbent candidate's expected ability (high  $m'_L$ ) or the lower the challenger's expected ability (low  $m_R$ ) the more likely the voter is to vote for the incumbent. Also notice that the voter puts less weight on the expected ability of the candidates when the parties are polarized ( $\mu_R - \mu_L$  large). This is because policy looms large relative to local concerns when the parties are polarized.

Now we will consider the two comparisons of systems in turn. We begin by comparing SMPs to the Westminster system. Then we compare SMPs to MMPs.

## 2.1 Presidential versus Westminster

Given the voter's strategy, we can solve for the incumbent's optimal level of local public good provision in the first round. Let  $a^*$  be the voter's belief about the incumbent's effort. In equilibrium this belief will be correct. However, in order to determine the equilibrium we have to consider what would happen were the legislator to deviate. To do this, we hold the voter's beliefs fixed at  $a^*$  while we let the incumbent choose the actual  $a$ . The signal from which the voter learns about the legislator's ability is the level of local public goods provided ( $s$ ).

For a given amount of local public good provision ( $s$ ), the incumbent in a Westminster system is reelected if and only if

$$x^* \leq \frac{m'_L(s) - m_R}{(2/n)(\mu_R - \mu_L)},$$

or

$$m'_L(s) \geq (2/n)(\mu_R - \mu_L)x^* + m_R. \quad (2)$$

Define  $\eta^{WST} = (2/n)(\mu_R - \mu_L)x^*$ . Then  $\eta^{WST}$  is normally distributed with mean 0 and variance  $\sigma_{\eta^{WST}}^2 = (4/n^2)(\mu_R - \mu_L)^2\sigma_{x^*}^2$ .

Note that because  $R$  is the challenger, the voter has no information with which to update his beliefs about  $R$ 's ability. Consequently,  $m_R = m$ . Thus, we can combine equations (1) and (2) to implicitly define the voter's reelection rule in a Westminster system by

$$m'_L(s) - m = \lambda(s - a^* - m) > \eta^{WST}.$$

$\eta^{WST}$  represents ideological influences on the voter's decision. Equation (2) says that when a voter is more right-wing ( $\eta$  large), a left-wing incumbent has to be particularly successful at providing local public goods in order to be reelected. Since the incumbent is uncertain of the ideology of the voter, from the incumbent's perspective this is a stochastic voting rule.

We can rewrite the voter's reelection rule as

$$s - \left(\frac{1}{\lambda}\right)\eta > a^* + m,$$

and write  $\bar{s} = a^* + m$ .

The incumbent takes this reelection rule as given, and chooses an effort level. If she chooses  $a$ , then  $s - \eta/\lambda \sim \mathcal{N}(m_L + a, \sigma^2)$ , where  $\sigma = \sqrt{\sigma_\theta^2 + \sigma_\epsilon^2 + (1/\lambda)^2 \sigma_\eta^2}$ . This implies that the probability of reelection is  $(1 - \Phi(\frac{\bar{s} - m_L - a}{\sigma}))$ , where  $\Phi$  is the cdf of the standard normal distribution.

The incumbent's expected utility is

$$\left(1 - \Phi\left(\frac{\bar{s} - m_L - a}{\sigma}\right)\right) B - c(a).$$

The incumbent chooses  $a$  to maximize this expected utility. The optimal choice of effort is characterized by the following first-order condition:

$$\frac{B}{\sigma} \phi\left(\frac{\bar{s} - m_L - a}{\sigma}\right) = c'(a). \quad (3)$$

This implies the following result.

**Lemma 1** *If  $a^*$  is a neutral equilibrium action, then  $a^*$  satisfies*

$$\frac{B}{\sigma} \phi(0) = c'(a_{SMP}^*).^5 \quad (4)$$

**Proof** Equation (3) characterizes optimal behavior for the incumbent, and, in equilibrium, the voter's belief about effort is correct:  $a = a^*$ . Together, these imply that equation (4) must hold. Finally, notice that the voter's *ex-ante* probability of reelecting the incumbent is  $1/2$ , validating our initial conjecture. Putting all of this together yields a neutral equilibrium.  $\square$

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<sup>5</sup>The lemma establishes that at any equilibrium, the condition is satisfied. To prove that an equilibrium exists, we would need to ensure that the incumbent's objective function is quasiconcave. This issue is thoroughly discussed in Ashworth (2001), whose results imply that a sufficient condition for quasiconcavity is that the voter's uncertainty about the incumbent's ability is large relative to the incumbent's benefit from reelection.

The equilibrium condition in equation (4) has a straightforward intuition. Consider a small increase in effort,  $\Delta a$ . This change is unexpected by the voter, so he attributes the higher levels of local public good provision to the incumbent's ability. This shifts up the distribution of the voter's posterior beliefs by  $\lambda\Delta a$ . The change in the probability the incumbent wins is just the amount of probability mass moved across zero by this shift. This probability mass is approximately  $\lambda\Delta a$  times the density of the standard normal at 0. Thus the marginal benefit of effort is the left-hand side of the equilibrium condition. The comparisons of local public good provision in various systems will follow from the observation that anything which increases the left-hand side of the equilibrium condition increases the equilibrium level of effort.

The voter's reelection rule in a SMP system is similar to his rule in a Westminster system. However, the diminished effect of the legislature on national policy due to the role of the president affects the voter's calculus. In particular, in an SMP system, the incumbent is reelected given a level of local public good provision ( $s$ ) if and only if

$$x^* \leq \frac{m'_L(s) - m_R}{(2\beta/n)(\mu_R - \mu_L)}$$

or

$$m'_L(s) \geq (2\beta/n)(\mu_R - \mu_L)x^* + m_R. \quad (5)$$

We define  $\eta^{SMP} = (2\beta/n)(\mu_R - \mu_L)x^*$ . Then  $\eta^{SMP}$  is normally distributed with mean 0 and variance  $\sigma_{\eta^{SMP}}^2 = (4\beta^2/n^2)(\mu_R - \mu_L)^2\sigma_{x^*}^2$ . Again recalling that the voter's posterior belief about the challenger's ability has mean  $m_R = m$  we can combine equations (1) and (5) to implicitly define the voter's reelection rule in a SMP system by

$$m'_L(s) - m_R = \lambda(s - a^* - m) > \eta^{SMP}.$$

Comparing  $\eta^{WST}$  to  $\eta^{SMP}$  provides the basic intuition for the difference between West-

minster and presidential systems. The presence of the  $\beta$  term in the SMP model reflects the fact that the voter does not put as much weight on national policy issues in SMP legislative elections because the legislature has relatively less power in the SMP than in the WST system. The voter's focus on local public good provision in SMPs means that a marginal increase in local public good provision has a greater affect on the probability of reelection than it would in a Westminster system. This implies that legislators in SMPs will invest more costly effort in local public good provision than will those in Westminster systems.

To see this formally, recall that a legislator chooses to invest a level of effort in the provision of local public goods to solve

$$\max_a \Pr(\text{reelection} \mid a)B - c(a).$$

The voting strategy defined in equation (2) can be used to deduce the probability with which the incumbent believes that she will be reelected in a Westminster system for any given level of effort, just as in the analysis of presidential systems above. In particular, this probability is simply the likelihood that the posterior belief about the incumbent's ability, which is determined by the level of local public goods provided (which is a function of effort, ability, and random noise), is greater than the  $\eta^{WST}$ . As before, this probability can be expressed in terms of the standard normal distribution. Substituting this probabilities into the maximization problem above and solving for the first-order conditions shows that the equilibrium level of effort in a Westminster system is implicitly defined by

$$\frac{B\phi(0)}{\sigma_{WST}} = c'(a_{WST}^*) \tag{6}$$

The level of local public good provision in the two systems can be compared by examining the left-hand sides (marginal benefits) of equations (4) and (6). Since  $\sigma_{WST} > \sigma_{SMP}$ , and the



marginal cost is increasing, the left-hand side of the equilibrium condition is greater for SMP systems. This gives us:

**Proposition 1** *The level of local public good provision in SMP systems ( $a_{SMP}^*$ ) is greater than the level of local public good provision in WST systems ( $a_{WST}^*$ ).*

This result is consistent with comparative empirical evidence showing that, for instance, there is more constituency service in the United States than in the United Kingdom (Cain et al. 1987).

## 2.2 Single-member versus Multi-member Presidential Systems

Now consider the *multi-member presidential* (MMP) case in which the voter is represented by two legislators at each date and can cast a vote for each seat, so that the two incumbents are not running against one another (this corresponds to the system in the United States Senate). Since information is not lost over time, the staggered nature of Senate elections does not affect the analysis of the current model. As such, we model the two elections as occurring simultaneously. The behavior of voters would not change if they were to cast votes on each representative at different times.

The voters observe the total amount of local public goods provided to the district, but not the amount produced by individual legislators. This creates a free-rider problem in MMPs that does not exist in SMPs. As in the previous section, the voter uses the information he gains by observing local public good production to update his beliefs regarding his representatives' skill levels and consequently, expected future local public good production. The voter's updated beliefs regarding candidate ability dictate his reelection decisions. This provides incentives for politicians to produce. However, in MMPs each representative receives credit only for a share

of her effort, and she receives some credit for local public goods produced by the other member of her delegation as well, creating an incentive to free-ride. In an SMP, this problem does not exist, as all local public goods are credited to the sole representative. Thus, the model predicts that legislators in MMPs invest less effort in local public good provision than legislators in SMPs.

To see this formally, assume that the voter observes the total amount of local public goods produced. This observation takes the form of a signal  $s = a_i + a_j + \theta_i + \theta_j + \epsilon$ , where  $a_i$  is officeholder  $i$ 's action and  $\theta_i$  is officeholder  $i$ 's ability, and similarly for  $j$ . In this case, the voter can replace either (or both) of the representatives between periods.

The analysis of the MMP case is similar to that of the SMP case. The voter's posterior belief about an incumbent  $i$ 's ability is normally distributed with mean

$$m'_i(s) = \lambda^{MMP}(s - a_i^* - a_{-i}^* - m_{-i}) + (1 - \lambda^{MMP})m_i,$$

where

$$\lambda^{MMP} = \frac{\sigma_\theta^2}{2\sigma_\theta^2 + \sigma_\epsilon^2}.$$

Repeating the analysis done in the previous subsection, we get an implicit reelection rule for the voter in an MMP system given by

$$\lambda^{MMP}(s - a_i^* - a_j^* - m_j - m) > \eta^{MMP}.$$

Notice that  $\eta^{MMP}$  and  $\eta^{SMP}$  have the same distribution (unlike  $\eta^{SMP}$  and  $\eta^{WST}$ ) because they are both presidential systems. The difference between the two systems is that  $\lambda^{MMP} < \lambda^{SMP}$ . This means that a MMP voter puts less weight on the level of local public goods when forming his updated beliefs. This is because the existence of a second legislator producing local public goods for the district effectively adds noise to the voter's observation of the first

legislator’s ability. Consequently, legislators benefit less from the effort they exert in MMP systems.

Recall from equation (4) that the equilibrium level of effort for an SMP was

$$\frac{B\phi(0)}{\sigma_{SMP}} = c'(a_{SMP}^*).$$

Similarly, the equilibrium level of effort for an MMP is

$$\frac{B\phi(0)}{\sigma_{MMP}} = c'(a_{MMP}^*).$$

Since  $\sigma_{MMP} > \sigma_{SMP}$  and the marginal cost is increasing, SMP incumbents will exert more effort than MMP incumbents. This is summarized in the following proposition:

**Proposition 2** *All else equal, incumbent legislators from MMPs will exert less effort in providing local public goods than legislators from SMPs.*

Proposition (2) is consistent with the comparative, empirical observations of Welch & Studlar (1990) and Jewell (1982) who find that MMP legislators do less constituency related work than SMP legislators. In our model, this is because, within an MMP delegation, effort is a costly public good, leading to under provision.

### 2.3 Divided Delegations

Now we turn to a possible response to the free-rider problem posed by MMPs: divided delegations. Voters in a multi-member district have an incentive to elect representatives from two different parties, since this may “solve” the free-rider problem for their representatives.

A slight variation of the MMP model makes it possible to identify conditions under which voters will choose to elect a divided delegation. Assume that there are two different types of local public goods: conservative and liberal. Legislators affiliated with party  $R$  produce

conservative local public goods while legislators affiliated with party  $L$  produce liberal local public goods. For instance, in the United States, Republicans may be better able to procure political pork reflecting industry or military interests, while Democrats may be more successful procuring political pork that benefits public sector unions.

Let  $y_t^C$  be the amount of conservative local public goods produced in round  $t$ , and let  $y_t^L$  be the amount of liberal local public goods produced in round  $t$ . The voter has utility from local public goods in round  $t$  given by

$$u_t(y_t^C, y_t^L) = (1 - \psi(x^*))y_t^C + \psi(x^*)y_t^L,$$

where  $0 < \psi(x^*) < 1$  for all  $x^*$ ,  $\psi(\cdot)$  is strictly decreasing, and  $\psi(0) = \frac{1}{2}$ . Thus a voter's ideological preferences on national policy are correlated with his ideological preferences for local public goods.

If the voter chooses a divided delegation, she can properly assess the contribution of each legislator (up to the stochastic element of the production function), just as in an SMP, since the two different types of local public goods are distinguishable. In effect, the voter receives two signals. The amount of conservative local public goods constitutes a signal of legislator  $R$ 's ability while the amount of liberal local public goods constitutes a signal of legislator  $L$ 's ability. This has implications for the level of local public good provision in divided versus unified delegations. As an immediate consequence of Proposition 2, we have:

**Proposition 3** *Provision of total local public goods is greater in divided delegations than in unified delegations.*

Consider a voter who must choose whom to elect before date 1. From Proposition (3), we know that a divided delegation will produce more total local public goods for the voter's district

than will a unified delegation. However, a voter with an ideological preference (that is,  $x^* \neq 0$ ) faces a trade-off. On the one hand, if he chooses a divided delegation he will benefit from more local public good provision from his representatives. On the other hand, some of the public goods provided will be of the less desirable type, and national policy will be pushed away from his ideal point.

This trade-off implies that only more extreme voters will be willing to select unified delegations. Such voters are willing to forgo extra local public goods in exchange for securing both local and national policies that conform to their ideologies. Less ideological voters will be inclined to choose divided delegations in order to maximize the amount of local public goods procured for the district. This basic logic leads to the following proposition:

**Proposition 4** *In MMPs with the possibility of divided delegations, sufficiently moderate voters ( $x^*$  sufficiently close to 0) will choose a divided delegation, while extreme voters will choose their preferred type of unified delegation.*

**Proof** First, notice that a voter with  $x^* = 0$  has a strictly dominant strategy to elect a divided delegation. Furthermore, if  $x^* > 0$  then both  $R$  strictly dominates both  $L$  and if  $x^* < 0$  then both  $L$  strictly dominates both  $R$ . We will show that there is a critical value  $\bar{x}$  such that both  $R$  is optimal if  $x > \bar{x}$  and a divided delegation is optimal for  $\bar{x} > x > 0$ . A similar argument applies to voters with  $x^* < 0$ .

The incremental return from switching from a divided delegation to both  $R$  is

$$\begin{aligned} \Delta(x^*) &= -(x^* - \mu_R)^2 + (x^* - \mu_L)^2 + 2(1 - \psi(x^*))a_{MMP}^* - a_{SMP}^* \\ &= 2x^*(\mu_R - \mu_L) - (\mu_R^2 - \mu_L^2) + 2(1 - \psi(x^*))a_{MMP}^* - a_{SMP}^*. \end{aligned}$$

This is increasing in  $x^*$  since  $(\mu_R - \mu_L) > 0$  and  $\psi$  is decreasing. Thus if both  $R$  is optimal for  $x^*$  ( $\Delta(x^*) \geq 0$ ), then both  $R$  is the unique optimum for all  $x$  greater than  $x^*$ . Furthermore,

$\Delta(x^*)$  increases without bound as  $x^* \rightarrow \infty$ , so the inequality holds for some  $x^*$  great enough.

□

This extension of the model is consistent with the standard, intuitive view that more moderate voters prefer divided delegations while more extremist voters prefer unified delegations of their own ideological persuasion (Fiorina 1996). However, the logic differs from the standard intuition that voters might want divided delegations in order to cause gridlock. Rather, this model suggest that voters choose a divided delegation in order to encourage the provision of more local public goods for their constituency, trading this off against their ideological preferences.

### 3 Change over Time in the U.S.

We have seen that institutional factors within our model account for cross-sectional variance in the level of constituency service; now we turn to over-time changes in the level of constituency service in the United States. In the mid-1960s, congressional incumbents began devoting more time and resources to constituency service (Shepsle 1989). In order to address this over-time trend in the United States, we focus not on institutional variation, but on changes in the electorate.

For much of the 20th century, most Congressional districts were relatively uncompetitive. The south was solidly Democratic, while the non-urban parts of the north and west were solidly Republican. This pattern changed in the 1960s, due in part to the debate over civil rights. In addition, Cox & Katz (2002) show that redistricting in the wake of *Baker v. Carr* (decided in 1962) led to the end of many safe Republican districts in the north. As a result, elections

became more competitive *on average*.<sup>6</sup> Once our basic model is extended to allow for such over-time variations in competitiveness, we will be able to account for over-time empirical patterns in the U.S. with the same framework we used to compare the SMP, MMP, and Westminster systems.

A district becomes more competitive when the district's median voter's expected ideal point moves closer to the midpoint between the party platforms. For instance, since the 1960s, median voters in the south have shifted in the direction of the Republicans on average, and median voters in the north and west have shifted in the direction of the Democrats, on average. This decreased dispersion of district median ideal points implies that the decisive voter in each district is more likely to be nearly indifferent between the parties' policy platforms. As a result, an improvement in the incumbent's reputation is more likely to swing the median voter to the incumbent, so the marginal expected benefit that legislators derive from constituency service is greater. Hence, competitive elections imply an increase in constituency service. Now we develop this intuition formally.

Let district  $d$ 's median voter have ideal point distributed  $x^* \sim \mathcal{N}(\gamma_d, \sigma_{x^*}^2)$ , and assume that the  $\gamma$ s are distributed symmetrically around 0. A positive value of  $\gamma_d$  means that the district is biased toward the  $R$  party in the sense that the  $R$  candidate wins with probability greater than  $1/2$  when the voter's expectations of the candidates' abilities are equal. We will see that such a bias diminishes the incentives for local public goods provision. The increase in competitiveness that occurred in the 1960s can be interpreted as a decrease in the dispersion of the  $\gamma$ . That is, the median voters in districts became closer to indifferent between the two parties.

To develop the intuition more formally, we consider the incumbent's problem assuming that the voter ignores the affect of other districts on his optimal voting rule. This is not equilibrium

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<sup>6</sup>Recall the discussion of the creation of safe seats in the introduction.

behavior, but this exercise provides all the intuitions while avoiding technicalities. The basic technical complication from which we abstract away in the main body of the text is that one must consider how the policy preferences of other districts change when competitiveness changes and how this affects each voter's action (because the voter is concerned with over all national policy). These technical details do not, however, add to or change the intuitions. A complete proof is provided in the appendix.

As in the previous section, a  $L$  incumbent wins if and only if

$$x^* \leq \frac{m'_L - m_R}{2(\mu_R - \mu_L)},$$

or

$$\lambda(s - a^* - m) \geq \eta,$$

where  $\eta = 2x^*(\mu_R - \mu_L)$ . This stochastic cutoff is distributed  $\mathcal{N}(\gamma, \sigma^2)$ , where  $\sigma^2$  is as before. Analysis identical to that done above shows that the level of effort directed toward local public goods provision is implicitly defined by the following equilibrium condition:

$$\frac{B}{\sigma} \phi\left(\frac{\gamma}{\lambda\sigma}\right) = c'(a).$$

As the district becomes more partisan ( $\gamma$  moves away from 0 in either direction), the left-hand side of the equilibrium condition decreases, so the equilibrium level of constituency service decreases. This is quite intuitive—when the district is biased towards one party, a small increase in the posterior assessment of the incumbent's ability is less likely to swing the election. Consequently, increased competitiveness leads to an increase in constituency service. This finding is consistent with the historical evidence from the United States. Constituency service increased starting in the 1960s, coinciding with an increase in the competitiveness of congressional elections. The intuition just discussed is formalized in the following result.



**Proposition 5** *Local public good provision is greater the more competitive is the district (the closer  $\gamma$  is to 0).*

## 4 Micro-foundations

We have interpreted the effort expended by representatives in our model as either being the procurement of political pork or the provision of constituency service. We further assumed that in order to provide such local public goods, representatives had to bear opportunity costs. However, the impacts of effort on local public goods provision and opportunity costs were modeled in reduced form.

In this section we show that three different models of the underlying legislative trade-offs give rise to the reduced form that we employed in our earlier analysis. First, we consider a model in which legislators must collectively allocate resources between the provision of global public goods (which benefits the entire polity) and local public goods (which benefit only a single constituency). Second, we consider the trade-off individual representatives face between allocating staff resources to legislative policy issues and casework. Finally, we examine the possibility that politicians can misappropriate resources for personal consumption rather than investing them in the provision of local public goods. The results of our model are consistent with any of these micro-foundational interpretations.

### 4.1 Voting over the Composition of Spending

In the first model we consider, legislators must choose between providing public goods that benefit society as a whole and those that benefit only an individual's constituency.

Assume that, in addition to the national policy, there are two types of public goods. The

first is a global public good,  $G$ . Everyone receives a payoff  $u(G)$  from this good, where  $u$  is twice differentiable and  $\lim_{G \rightarrow \infty} u'(G) = 0$  and  $\lim_{G \rightarrow 0} u'(G) = \infty$ . In addition, there are local public goods  $g_i$ , one for each district  $i$ . Each resident of district  $i$  has linear utility for  $g_i$ .

There are total tax receipts  $T$  to be spent on public goods. The amount allocated to each district for the provision of local public goods is  $r_i$ . The total amount of public goods provided to a district  $i$  is a function of these resources as well as the skill and effort of the district's representative. That is, harder working or more skillful representatives convert resources into local public goods more efficiently. Thus, we assume that the total local public goods provided to district  $i$  are  $g_i = \theta_i + r_i + \epsilon_i$ .

The legislature decides on the composition of public spending by majority rule. Local public good spending is equal across districts, so a policy can be summarized by per-district local public good spending,  $r$ , with global public good spending following from the budget constraint  $G = T - \sum r_i$ .

The voter observes the local public goods before the election, the value of the global public good after the election, and never observes the actual budget allocations. We conceive of local public goods as short term benefits to the district, such as constituency service. These are immediately observable. Global public goods, on the other hand, include things such as long-term investment in infrastructure, defense, and basic research the benefits of which may not be observed by the voters for a long time. With this interpretation, the timing convention seems quite natural. Thus, an incumbent's preferences over budget allocations are represented by

$$\Pr(\text{reelect} \mid r)B + u(T - \sum r_i) + r_i.$$

An equilibrium will be a policy  $r^*$  such that (i) the voter updates his belief about the incumbent's ability correctly, given  $r^*$  and then votes appropriately, and (ii) no  $r \neq r^*$  increases the

payoff of a majority of incumbents given the implied relationship between  $g$  and reelection.

Write  $c(r) = r + u(T - nr)$ . Notice that the informational structure and objective functions for legislators are exactly as described in the model analyzed in the previous sections. Thus, the model can be interpreted as addressing the legislative trade-off between financing of national and local public goods.

Persson et al. (2000) use a similar model to study differences in fiscal policy between presidential and parliamentary regimes. Assuming that parties in parliamentary legislatures are more disciplined, they show that parliamentary parties are better able to coordinate on directing fiscal policy towards a broad coalition of voters. Parties in presidential systems, on the other hand, are less cohesive, and fiscal policy is thus targeted more toward the constituents of powerful members of the legislature. Our model has the same comparative statics for global versus targeted spending in presidential and parliamentary systems. However, since party discipline is not the causal force behind the comparison, we are also able to explain changes over time in the U.S.

## 4.2 Allocation of Staff to Constituency Service vs. Policy

We next explore an interpretation based on the trade-off between policy work and case work. Consider a model in which the incumbent has total resources  $R$  that she must divide between constituency service,  $a$ , and policy work,  $y$ . One can conceptualize these resources as staff time and effort. The incumbent's payoff for a period when she is in office and chooses the allocation  $(a, y)$  is  $B + u(y)$ . The benefit  $B > 0$  represents all of the non-policy benefits of holding office. The policy utility is increasing, continuously differentiable, strictly concave, and satisfies  $\lim_{y \rightarrow 0} u'(y) = \infty$ . That is, politicians enjoy serving in office more when they are actively pursuing their policy goals. The incumbent receives no direct utility from constituency

service—the benefit of constituency service is associated with increasing the probability of reelection.

Since adding the constant  $u(R)$  to these payoffs is an affine transformation, we can use the budget constraint ( $R = a + y$ ) to rewrite the incumbent's payoff as  $B - c(a)$ , where  $c(a) = u(R) - u(R - a)$  is the opportunity cost of devoting resources to constituency service. Our assumptions about  $u$  imply that  $c$  is increasing, continuously differentiable, strictly convex, and satisfies  $c(0) = 0$  and  $\lim_{a \rightarrow R} c'(a) = \infty$ .

Once again, the payoffs and informational structure under these assumptions are identical to those in the model. Thus, the micro-foundational interpretation based on a trade-off between policy work and case work is also consistent with our model.

### 4.3 Rent Extraction

Finally, we examine the possibility that politicians might misappropriate funds that they do not invest in the provision of local public goods. Consider a model in which an amount  $t$  is allocated to each district for spending on local public goods, but the incumbent and her cronies can steal some of this for private consumption. The amount stolen is called  $r_i$ . The value of local public goods to voters in the district is  $\theta + (t - r) + \epsilon$ . The incumbent values rents according to some concave, strictly increasing function  $u$ . As in the previous two examples, then, incentives and information are identical to those employed in the model.

## 5 Other Multi-Member District Systems

Our results about the relationship between multi-member and single-member district systems bear further comment. In particular, there are certain cases that seem to present an empirical

challenge to our claim that local public good provision will be lower in multi-member districts due to a free-rider problem. Below we consider two prominent cases and discuss why they are, in fact, consistent with our institutional account.

## 5.1 Japan

Carey & Shugart (1995) note that in multi-member district systems like that used in Japan prior to 1994, incumbents provided very high levels of local public goods. This fact seems to contradict our results. However, our model suggests an institutional explanation of the Japanese experience. In particular, the MMP incumbents in our model provide low levels of constituency service because of the free-rider problem discussed above. In Japanese multi-member districts this informational problem was mitigated by the institution of *koenkai*, or personal constituencies. Incumbents specialized in providing for their own *koenkai* (Hirano 2002).

This specialization leads to the same informational effect as SMPs or divided delegations. Voters within a politician's *koenkai* learn about that politician's ability without the free-rider problem because each incumbent specializes in providing local public goods to different sub-constituencies. This helps to explain the observed difference between multi-member district systems such as Japan and those such as the U.S. states. In Japan local public goods provision is high in part because the ubiquity of personal constituencies changes the informational environment and thereby eliminates incentives to free-ride. Thus the model highlights an important institutional subtlety for understanding comparative legislatures. What matters for local public good provision is not precisely whether the legislature has multi- or single-member districts, but rather the amount of information revealed as the result of institutional and strategic considerations.

Several explanations for the *koenkai* have been suggested in the literature. The primary argument is that because Japanese voters had only one vote for several seats, politicians from the same party needed to provide a coordination mechanism in order to ensure that, for example, all supporters of the dominant Liberal Democratic Party (LDP) did not vote for the same LDP candidate, leading to success for non-LDP candidates (Hirano 2002, Richardson 1988). The argument developed above about incentives to select divided delegations offers an additional potential contributing institutional factor: party strength.

A divided delegation, which is a voter response to the free-rider problem in multi-member districts, is bad for a dominant party because it means voters are selecting representatives from less popular parties to improve information revelation. We saw before that moderate voters will sometimes vote for their less preferred party to improve incentives. Dominant parties (like the LDP) want incumbents to take actions to attenuate the voters' incentives to choose divided delegations. Developing a personal constituency is one way that incumbents can alter voter incentives, because personal constituencies lead to SMP-style incentives for incumbents.

## 5.2 Costa Rica

Another seemingly contradictory case is Costa Rica. There, in the face of pure party list proportional representation and one-term term limits, legislators provide extensive local public goods (Carey 1996). Although the term limits bar only immediate reelection, Carey calculates that 87% of legislators serve only one term, and, as of 1996, *no one* had served three or more times.

The explanation for local public good provision is similar to that for Japan—parties recreate the incentives of a SMP system by creating bailiwicks, and good jobs in future governments go to legislators who provide good electoral performances from their bailiwicks. This is a sensible

procedure if effort from members of parliament helps convince the voters of the competence of the party in pork provision, and if parties are more concerned about this reputation than about policy work.

Our model also suggests a reason that Costa Rican parties are so concerned with pork provision. Carey argues that “the ideological difference between the dominant parties in Costa Rica is not dramatic.” We saw before that the electoral returns to a good reputation for local public good provision are greater when ideological differences are small.

## 6 Implications for Parties and the Incumbency Advantage

A prevalent view in the literature is that Westminster systems (which have strong parties) have less constituency service and smaller incumbency advantages than do presidential systems (which have weak parties) *because* parties play a critical role in determining the level of constituency service and size of the incumbency advantage (Cox & McCubbins 1993, Carey & Shugart 1995, Persson et al. 1997, Persson et al. 2000). However, as discussed above, evidence from United States history, while not falsifying this theory, demonstrates that other factors must also be at work. To address this empirical puzzle, we developed a model in which the relationship between separation of powers and the level of local public goods provided is *not* mediated by party discipline.

Our account of the causes of local public goods provision will be more convincing if it also addresses the relationship with the incumbency advantage and party discipline. That is, a key question for our model is: do the causal mechanisms identified in this paper also have implications for party discipline and the incumbency advantage that are consistent with empirical findings?

There are two essential empirical relationships that our causal story should address. First, there are the cross-sectional institutional findings: (1) multi-member district presidential systems have smaller incumbency advantages and less constituency service than single-member district presidential systems and (2) parliamentary systems have more disciplined parties, weaker incumbency advantages and less constituency service than do presidential systems. Second, there is the over-time finding in the U.S.: parties have become stronger in the United States Congress in the past several decades, even as constituency service has increased. In related work (Ashworth and Bueno de Mesquita 2003a,b), we demonstrate formally that the causal mechanisms that explain variance in constituency service in this paper (information revelation and separation of powers in the cross-section and increased competitiveness in the time series) also explain variance in the incumbency advantage and party discipline. In this section, we sketch the intuition of that argument.

Our model of the incumbency advantage hinges on the idea of electoral selection. Just as in our model of constituency service, voters learn about their incumbent's ability by observing local public goods provision. Over time, voters become rationally conservative about replacing their incumbents—the fact that the incumbents have won elections in the past means that voters assessed them to have high ability in the past. This rational conservatism on the voters part gives rise to an incumbency advantage. As such, any factor that decreases the amount of information the voters learn about their incumbent or decreases the extent to which voters care about their incumbent's ability will attenuate the incumbency advantage.

This intuition allows us to examine how our causal account address the first empirical relationship mentioned above: multi-member district presidential systems have less constituency service and smaller incumbency advantages. In this paper, the causal mechanism that decreased



constituency service in multi-member districts was the free-rider problem associated with credit claiming in the multi-member district environment. Voters do not learn as much about their representatives in multi-member districts because they do not know which of their multiple representatives to credit for local public goods. This causal mechanism also predicts that the incumbency advantage will be weaker in multi-member districts, since learning is diminished. This prediction is consistent with the empirical evidence (Cox & Morgenstern 1995, Katz 1986). Moreover, we argued that voters could solve the free-rider problem by selecting a divided delegation. This further suggests that the incumbency advantage should be stronger in divided than in unified delegations. And, indeed, Alesina, Fiorina & Rosenthal (1991) find precisely this relationship in United States Senate delegations.

Our model of party discipline builds on Snyder and Ting's (2002) model of informative party labels. We endogenize both the level of discipline and the ideological heterogeneity of the party. Parties use discipline to screen potential members. The more disciplined a party, the less likely a politician with policy preferences that diverge from that party's platform is to affiliate with that party. Consequently, more disciplined parties have less ideological variance, making them more attractive to risk averse voters.

Politicians face a trade-off when choosing the level of party discipline. On the one hand, an increase in discipline increases the probability of election because voters want to avoid uncertainty. On the other hand, an increase in discipline means that politicians are not as free to pursue their individual policy goals, which decreases the attractiveness of holding office.

Presidential and parliamentary parties strike different balances between these effects. In particular, as in this paper, voters put less weight on local concerns and more weight on uncertainty over candidate ideology in a parliamentary system. This is because an individual

legislator has less impact on national policy in a presidential system because policy is determined by both legislative decisions and presidential preferences. In a presidential system, by contrast, the president acts as a hedge against legislative extremism. Consequently, voters are more concerned about the possibility of an extreme legislature in a parliamentary system and less concerned about their legislators personal characteristics. This increases the marginal benefit to politicians of party discipline and decreases the incumbency advantage (since voters are paying less attention to personal characteristics). Thus, the same causal factor that accounted for the greater level of constituency service in Westminster systems—the relative weight voters endogenously place on national policy versus local concerns—also explains the fact that parliamentary systems have more disciplined parties and weaker incumbency advantages than presidential systems.

Our causal story is also consistent with the over-time trend in the U.S. Congress. This can be seen by considering the effect of an increase in competitiveness (a decrease in dispersion of district medians) on the optimal level of party discipline. The benefit of extra party discipline is to improve voter confidence in the national policy agenda that a candidate will pursue once in power. A candidate realizes this benefit only if the extra discipline actually persuades the pivotal voter in a district to vote for that candidate. Consequently, the marginal benefit of party discipline is proportional to the likelihood that an extra amount of discipline will swing the election. Discipline can only swing an election if the decisive voter is close to being indifferent between the two parties. This event is more likely when districts are more competitive, which implies that more competitive elections increase the marginal benefit of discipline, creating incentives for greater levels of party discipline. For similar reasons to those discussed above, the increased effect of personal reputation on election probabilities will strengthen the incumbency

advantage. Thus, the same causal factor that explained why constituency service has increased in the U.S. Congress—increased electoral competitiveness—also explains why party strength and the incumbency advantage have increased.

This argument is particularly important in comparing our model to the purely institutional models of parties. The purely institutional models explain the level of constituency service and the incumbency advantage using party strength as a causal factor: strong parties lead to low levels of constituency service. This is consistent with the cross-sectional relationship between parties, constituency service, and the incumbency advantage in the U.S. and U.K. However, in such a model, it is hard to rationalize the simultaneous increase in discipline, incumbency advantage, and constituency service that has occurred in the United States. By contrast, our model is consistent with both relationships and, further, it has implications for the relationship between MMPs and SMPs. We are able to do this because, in our model, party discipline does not cause the level of constituency service or the incumbency advantage. Rather, these political outcomes are jointly determined by underlying institutional and electoral causes.

## Appendix

### Proof of Proposition 5

Write  $x_d^* = \gamma_d + \nu_d$ , where  $\nu_d \sim \mathcal{N}(0, \sigma_{x^*}^2)$ . The incumbent in district  $d$  reelects the left-wing incumbent if and only if

$$x_d^* = \gamma + \nu_d \leq \frac{1}{2}(\mu_{leg|R} + \mu_{leg|L}) + \frac{m_L - m_R}{2(\mu_R - \mu_L)}.$$

Rewrite this as

$$\nu_d - \frac{m_L - m_R}{2(\mu_R - \mu_L)} \leq c_d \equiv \frac{1}{2}(\mu_{leg|R} + \mu_{leg|L}) - \gamma.$$

Assuming that the equilibrium is symmetric in the sense that  $\gamma_1 = -\gamma_2 \Rightarrow c_1 = -c_2$ , all terms in the averages cancel except those involving  $\gamma_d$  and  $-\gamma_d$ . Thus we can rewrite this as

$$c_d = \frac{1}{2} \Phi \left( (-c_d - \gamma) / \sigma' \right) (\pi_L - \pi_R) + \frac{\pi_R}{2} - \gamma,$$

where  $\sigma'$  is the standard deviation of  $\nu_d - (m_L - m_R) / (2(\mu_R - \mu_L))$ . The implicit function theorem implies that

$$\begin{aligned} \frac{\partial c}{\partial \gamma} &= \frac{-(1/2)\phi \left( (-c - \gamma) / \sigma' \right) (\pi_L - \pi_R) - 1}{(1/2)\phi \left( (-c - \gamma) / \sigma' \right) (\pi_L - \pi_R) + 1} \\ &= -1. \end{aligned}$$

Thus  $c_d$  is decreasing in  $\gamma_d$ . Since  $\gamma = 0 \Rightarrow c = 0$ , this implies that  $\gamma > 0 \Rightarrow c < 0$ .

Now we can mimic the earlier analysis. A  $L$  incumbent is reelected if and only if

$$m'_L \geq 2(\mu_R - \mu_L)(\nu_d - c_d) + m_R,$$

where  $\mu_{leg|P}$  is the expected legislative policy (the mean of the distribution) if the voter votes for party  $P$ . Define  $\eta_d = 2(\mu_R - \mu_L)(\nu_d - c_d)$ . Then  $\mathbb{E}\eta_d = -2(\mu_R - \mu_L)c_d$  and  $\sigma_{\eta_d}^2 = \sigma_{\eta}^2$ . Now we can rewrite the reelection rule as

$$s - \frac{1}{\lambda} \eta_d \geq \bar{s} = a_d^* + m.$$

Thus the incumbent solves

$$\max_a B \left( 1 - \Phi \left( \frac{\bar{s} - m - a + 2(\mu_R - \mu_L)c_d}{\sigma} \right) \right) - c(a).$$

Taking the first-order condition and imposing rational expectations yields

$$\frac{B}{\sigma} \phi \left( \frac{2(\mu_R - \mu_L)c_d}{\sigma} \right) = c'(a_d^*).$$

As  $\gamma$  moves away from 0, so does  $c_d$ , which implies that  $a^*$  decreases. □

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