NBER WORKING PAPER SERIES

PARTISAN REPRESENTATION IN CONGRESS AND THE GEOGRAPHIC DISTRIBUTION OF FEDERAL FUNDS

David Albouy

Working Paper 15224
http://www.nber.org/papers/w15224

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 2009

I would like to thank Alan Auerbach, Chris Berry, Bruce Cain, David Card, Ken Chay, Ernesto Dal Bo, Tatyana Deryugina, Michael Greenstone, David Lee, Ted Miguel, Marit Rehavi, Gerard Roland, Emmanuel Saez, Dan Silverman, Jeff Smith, and seminar participants at Michigan and UC Berkeley for their help, input, and advice. Any mistakes are my own. Please send comments to albouy@umich.edu. Please send comments to albouy@umich.edu. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

Partisan Representation in Congress and the Geographic Distribution of Federal Funds
David Albouy
NBER Working Paper No. 15224
August 2009, Revised May 2012
JEL No. H5,H77

ABSTRACT

In a two-party legislature, districts represented by the majority may receive greater funds if majority-party legislators have greater proposal power or disproportionately form coalitions with each other. Funding types received by districts may depend on their legislators' party-identity when party preferences differ. Estimates from the United States – using fixed-effect and regression-discontinuity designs – indicate that states represented by members of Congress in the majority receive greater federal grants, especially in transportation, and defense spending. States represented by Republicans receive more for defense and transportation than those represented by Democrats; the latter receive more spending for education and urban development.

David Albouy
Department of Economics
University of Michigan
611 Tappan Street
351C Lorch Hall
Ann Arbor, MI 48109-1220
and NBER
albouy@umich.edu

1 Introduction

Few researchers have examined whether a legislator's party membership may influence the kind or amount of government funds her district receives. Party membership is known to have a strong effect on the voting behavior of U.S. members of Congress (e.g. Lee, Moretti and Butler 2004; Albouy 2011), but it is unclear whether party membership influences actual funding, either because of ideological differences or because of power imbalances between parties. Existing theories of distributional politics give little theoretical guidance as to how or why funding might be influenced by party membership, and empirical studies have yet to find that party membership does make a difference at the federal level.

This paper investigates both theoretically and empirically how party membership of legislators in Congress may influence the distribution of federal funds in the United States. The theoretical investigation introduces two political parties to the game-theoretic legislative bargaining model of Baron & Ferejohn (1989) – henceforth ”BF” – enriching the model in a number of significant ways. First, majority status may confer greater proposal, or ”agenda-setting,” power to legislators, increasing their access to federal funds. Second, if legislators prefer to form voting coalitions with members of the same party, members of the majority can procure additional funding through a ”party-coalition” effect, which increases with the majority's size. Beyond the effects due to imbalances in bargaining power, differences in ideology, or "taste," between parties may mean that a district will receive a different assortment of funding types depending on the party-membership of its representatives. These taste differences may also explain why members of the same party prefer forming coalitions with each other.

The theoretical model is applied empirically using a panel data set of states containing information on congressional representation and federal funding. Because majority control of the Senate changed several times between 1980 and 2003, it is possible to identify separately the ”bargaining power” effect of having a Senator in the majority from the ”taste” effect of having either a Republican or Democrat Senator. Meanwhile, control of the House of Representatives only changed once over this period, making these effects harder to identify separately. Panel estimation techniques, which control for year and fixed state effects, should make estimates less prone to omitted-variable bias than simple cross-sectional estimates. Since party control of the majority is determined nationally, with each state's representative only having a small chance of affecting that control, changes in the majority status of legislators can be considered exogenous at the state level. Furthermore, variation in the size of majority over time help to disentangle agenda-setting effects, present with even the barest majority, from party-coalition effects, which increase with the majority's size. The taste effects of having a Democrat or Republican can be better identified using regression-discontinuity estimators, which rely on data taken from candidates who win elections by small margins. Since such elections are presumably determined with some randomness, these estimators have quasi-experimental properties.

Estimates reveal that members in the majority are able to procure higher levels of funding for their states. If a state sends a Senate delegation with both members in the majority, that state should receive about 2 percent more of government grants – including 5 percent more in transportation grants – than a state sending a delegation in the minority. Point estimates for the House are similar to the Senate, albeit less precise. Furthermore, there is some evidence that majority status may garner considerably higher defense funding. More delicate estimates for the Senate suggest these effects come more from party-coalition effects than from agenda-setting advantages. This result implies that so long as majorities in Congress are slim, the distribution of federal funding is only weakly influenced by party control of the House or Senate.

The data also provide some support for taste effects. Albeit imprecise, the estimates suggest that all-Republican delegation in either the House or Senate garners considerably more in defense funding, as well as in transportation, regardless of their majority-minority status. An all-Democrat delegation in either chamber procures additional grants for housing and urban development and possibly for education.

2 Theoretical and Empirical Background

There is already a rich theoretical literature on distributional politics, but little of it addresses the role of parties. Buchanan and Tullock (1962) and Riker (1962) predict that partyless legislators trying to pass spending bills will create minimum-winning coalitions to get these bills passed, distributing benefits to a bare majority of legislators who approve of the bill. This "majoritarian" prediction re-arises in BF's non-cooperative bargaining model, which also implies that the distribution of benefits can be highly skewed towards legislators with greater proposal power. In congressional politics, Cox and McCubbins (1993) argue that members of Congress in the majority hold much greater proposal powers. This argument, together with BF's theory, should predict that members of the majority will monopolize federal money in lieu of their greater proposal powers, so that their districts receive much higher funding than those represented by members of the minority.

This conclusion is at odds with the fact that most spending bills in Congress are passed by super-majorities with members of both parties, and that the actual distribution of federal funds is not obviously lopsided heavily towards areas represented by the majority (Mayhew 1974). Weingast (1979) explains this "universalistic" tendency as a result of legislators setting up legislative "rules of the game" to distribute funds evenly to effectively insure themselves against the risk of being left outside of any minimum-winning coalition. Thus, in a kind of "meta-game," legislators get what they expect from a bargaining situation. In the models of Riker and BF, where all legislators are *ex-ante* equal, federal money should be distributed equally.

When legislators come from different parties, they are not *ex-ante* equal – at least not after the uncertainty of party-membership has been resolved – as members of the majority party might expect to receive greater amounts of funding in a bargaining situation. Thus, the rules of the game may be set up to give majority members a larger fraction of funds to reflect the bargaining advantages they hold. This argument can justify using an amended bargaining model with parties, taking the expected distribution of funds across different party types as the predicted outcome, rather than the distribution resulting from a single game. Another dimension worth modeling is that legislators with different tastes or ideologies may demand different types of funding for their home district.

Although the effect of partisan representation on the distribution of federal funds is a subject of obvious interest, empirical evidence on it is scarce. ¿From cross-sectional estimates, Levitt and Snyder (1995) conclude that while Democrats held full power in Congress they were able to divert greater amounts of funds to congressional districts with greater numbers of Democratic voters, but they do not find that representation itself had a significant effect on the distribution of federal funds. Using fixed-effect panel estimates, Levitt and Poterba (1999) find that states with senior Democratic Representatives tended to have higher GDP growth rates than other states, but they are not able to find a link between representation and federal funding levels. Knight (2005) adds committees to a legislative bargaining model, and estimates from cross-sectional data that members of the House Committee on Transportation procure greater amounts of transportation funding for their districts, but does not find any independent effect of party-membership.[1]

3 A Legislative Bargaining Model with Political Parties

The model below provides two explanations of how legislators in the majority can receive greater funds. First, by having greater proposal powers; second, by banding together and excluding minority legislators from accessing available funds.

3.1 Set-up

Suppose that there are N legislators, indexed $i = 1, \ldots, N$, where N is a large, odd number. There are two parties, A and B, each with N_A and N_B legislators, and A holds the majority so that $N_A > N_B$. Denote the share of legislators in the majority party as $s \equiv N_A/N$, $s \in (1/2, 1]$. Take N to be fairly large so that integer concerns can be ignored – they contribute little – and s can be treated as a continuous variable. The legislature is entrusted with a fixed set of funds of

[1] Other papers of note include Calvert and Fox (2000), who consider how parties can form in a dynamic bargaining game, and Knight (2004), who looks at how greater bargaining power of Senators from small states affects the distribution of federal funds.

size N to distribute, normalized so that there is one unit of funds per legislator. For now, funds are homogenous. The objective of each legislator is to maximize the amount of funds for their district, y_i.

The legislative bargaining game starts with the recognition of a proposer who proposes an allocation of funds $(y_1, ..., y_N)$ to the legislature, with $\sum y_i \leq N$. For this allocation to be instituted, it must be approved by a majority of legislators. If the proposal does not receive majority approval, then the total amount of available funds is reduced by the discount factor $\delta \in [0, 1]$, and the game repeats itself with the choice of a new proposer. Control of the party by the majority is presumed to hold for the indefinite future, and s is assumed fixed, although similar results would hold if $E(s_{t+1}) = s_t$, where t is an index of how many rounds have been played.[2]

As with BF's model, the proposer is chosen randomly, except that members of different parties have different recognition probabilities. The odds of an A-member getting proposal rights relative to a B-member is given by $1 + \alpha$, $\alpha \in [-1, \infty)$, where $\alpha > 0$ implies that A-members have a greater recognition probability, giving them proposal or "agenda-setting" advantages. In the legislature as a whole, the odds that party A gets to propose over party B is $(1+\alpha)s/(1-s)$; when $\alpha = 0$ the relative odds simply reflect the ratio of A-members to B-members, $s/(1-s)$.

The proposer's goal is to secure enough votes to obtain passage of his proposal while allocating as much as possible to himself. Because each legislator voting for the allocation must prefer it to continuing on to the next round, each legislator in the coalition requires a minimum payment of δ times their continuation value, V. The proposer can always propose a passable allocation that gives her more than her continuation value, and so she will always make a proposal that gets majority approval. However, since buying votes is costly, the proposer will choose a minimum-sized coalition of $(N-1)/2$.

In that coalition, the proposer must decide how many legislators of the same party to include in her coalition. Let p denote the share of the coalition from party A if an A-member is the proposer, and q denote the share of the coalition from party A if a B-member is the proposer. If the proposer

[2] If elections are sufficiently independent, then a central limit theorem may hold so that the probability of party A losing the election is given by $\Phi((s_t - 1/2)/\sigma)$ for some σ, where Φ is the normal cumulative distribution function.

picks from both parties evenly, then the share of A-members in a coalition should equal their overall share: in other words $p = q = s$. If parties are perfectly cohesive, so that proposers always choose members of their own party over members of the other party, then A-proposers only choose A-members in their coalition, so $p = 1$; B-proposers include all B-members in their coalition, but must still include a minimum share of A-members to secure a majority of votes: this share of A-members is $q = 2s - 1$. I modelthe degree of party cohesiveness with a single party-coalition parameter $\phi \in [-1, 1]$, where $p = s + \phi(1 - s)$ and $q = s + \phi(1 - s)$, so that $\phi = 0$ corresponds to the case of no party cohesion and $\phi = 1$ corresponds to the case of perfect party cohesion. To simplify the exposition and empirical implementation of the model, the value of ϕ is an exogenous parameter, rather than an endogenous parameter shaped by more fundamental factors.

3.2 Solution

An attractive solution for this game is the symmetric stationary subgame-perfect Nash equilibrium (SSSPNE), as it is unique and depends on a strategy independent of history. Because of the folk theorem, there are many other non-stationary subgame-perfect Nash equilibria (see BF). Such solutions not only fail to provide a unique prediction, but depend on complicated history-dependent strategies, often obscuring the most plausible bargaining forces. The SSSPNE seems to reveal the most fundamental ways that party-membership can influence the distribution of funds in a bargaining context.

In the SSSPNE, the continuation values of each legislator type, V_A and V_B, are independent of time and depend only on the parameters s, α, δ, ϕ. Because payoffs depend only on the amount of funds received and are independent of time, the continuation values give what each legislator expects to receive on average from a given game, i.e., $E(y_A) = V_A$, or invoking the law of large numbers, how much each legislator should receive over many repeated games. Taking this into account and that there is one unit of available funds per legislator, the federal budget constraint is

$$sV_A + (1 - s)V_B = 1 \tag{1}$$

V_A is determined by a bargaining condition set by the structure of the bargaining process and the incentives of legislators when either type proposes:

- With probability $(1+\alpha)s/(1+\alpha s)$ an A-member proposes. In this case, A-members receive all funds except for the funds given to B-members, each of which receives δ times V_B to secure their vote. The number of B-members in the coalition, as a fraction of the legislature, is given by $(1-\phi)(1-s)/2$.

- With probability $(1-s)/(1+\alpha s)$ a B-member proposes. In this case the fraction of the legislature of A-members in the coalition is given by $[s-\phi(1-s)]/2$. For their vote, each A-member receives a payment of δ times V_A.

Adding these two situations together, the fraction of total funds that all members of party A may expect to receive collectively, sV_A, is determined by the equation

$$sV_A = \frac{(1+\alpha)s}{1+\alpha s}\left[1 - \frac{(1-\phi)(1-s)}{2} \cdot \delta V_B\right] + \frac{1-s}{1+\alpha s}\frac{s-\phi(1-s)}{2} \cdot \delta V_A. \tag{2}$$

Combining (2) with the budget constraint (1) and solving, the ratio of funds going to an A-member relative to a B-member is the product of two terms:

$$\frac{V_A}{V_B} = (1+\alpha) \times \frac{(2/\delta - 1) + \phi}{(2/\delta - 1) + \phi(1-s)/s}. \tag{3}$$

The first term, $(1+\alpha)$, refers to the amount of additional funds A-members procure because of their agenda-setting advantages. Since proposers always include themselves in their own coalitions, getting to propose more often entitles a legislator to more funds.

The second term, $[(2/\delta-1)+\phi]/[(2/\delta-1)+\phi(1-s)/s]$, refers to the amount of additional funds A-members procure because of party-coalition advantages. This advantage occurs because A-members tend to vote together and, because they are more numerous, spend less to buy the votes of B-members than B proposers spend to buy the votes of A-members. This party-coalition effect is increasing in ϕ and, if $\phi > 0$, decreasing in δ. It vanishes to one as s approaches $1/2$, as party B

has to buy fewer votes from party A. It also disappears as δ approaches zero, as it becomes costlier to delay approving a proposal, making votes cheaper to buy from the opposing party.

While the above derivation is heuristic, the solution corresponds to the distribution that arises when the proposer takes all the gains from proposal power for herself using a game-theoretic derivation presented in Appendix A. More generally, the result in (3) also applies if the gains to agenda-setting are split within the party, either uniformly, or within a group or committee within the party, so long as all agenda-setting gains are kept within the proposing party. Furthermore, this solution also applies to cases when the winning coalition is oversized – i.e. bigger than $(N-1)/2$ – if all additional coalition members belong to the proposing party. The results are robust so long as members of the non-proposing party in the coalition receive only δ times their continuation value V.

3.3 The Role of Tastes Over Funding Types

Party-specific ideology or ”taste” effects on the composition of funds can be modeled when funds come in different types, and A-members have different preferences for these types than B-members. Theories of electoral competition (e.g. Downs 1957) predict that legislators must procure the kind of funds preferred by the median voter of their district in order to get elected. This result can break down if they are unable to credibly commit to policies during an election (Alesina 1988) or find it more advantageous to appeal to their base supporters than to the median voters of their district (Cox and McCubbins 1988). With legislators liking different types of funding, the proposer will find it least costly to buy votes if she gives each coalition member the type they most prefer. This alone would produce differences in the allocation of funds across districts by party.

Asymmetries in funding types across parties can also occur if there are constraints on the types of funds that can be used in a proposal. Such constraints could be due to legislative protocol or indivisibilities in funded projects. For instance, say that a proposal must consist of only one type of funding, that the bargaining game is repeated a large number of times, and that the proposer chooses the type of funding for the proposal. If $\phi > 0$, then proposers will disproportionately choose members of their own party in their coalitions. Then, mechanically, funding in districts represented by the same party will be more similar than funding in districts represented by different parties. The stronger one party's taste for a certain type of fund, parametrized by, say, θ, the more one party should receive it relative to the other.

If tastes are correlated within parties, possibly for ideological reasons, taste differences can also explain why members of the same party form coalitions with each other in the first place. For example, if proposals must consist of the same kind of fund, then it becomes more "costly" to buy the votes of members of the other party: opposite-party members would rather wait in the hopes that a member of their own party gets to propose the type of funding they like more. In this case, the party-coalition parameter ϕ can become a function of the more fundamental taste parameter θ, where a higher value of θ supports a higher value of ϕ.[3] Unfortunately, formally modeling ϕ as a function of taste differences produces little additional insight at the cost of much lengthier and more opaque mathematics, and so no formal results are given here.[4]

3.4 Other Extensions

A number of other extensions may be added to the legislative model. First of all, the relative distribution of funds predicted by (3) could arise in a meta-game in the manner of Weingast (1979), whereby legislators set up the "rules of the game" so that they get the expected outcome of the bargaining game without actually playing it. Since in the actual game, some legislators are left out of the winning coalition and get no funds, risk-averse legislators would rather prefer a certain payoff over an uncertain one with the same expected value. In practice, this means that we need not observe actual legislators bargaining in the manner described above. Rather, the above model constitutes a "threat point" that legislators bear in mind when setting up their rules. If the rules

[3] Knight (2002) explains a related model with different tastes for public goods. If there are absolutely no taste differences, and proposers do not care at all about parties, then competition to be included in the proposer's coaltion should drive V_A down to the level of V_B. This means that ϕ is determined endogenously as a function of the parameters s , α,and δ, and takes a negative value, so that the right-hand side of equation (3) equals one.

[4] Jackson and Moselle (2002) propose an interesting model of legislative party formation due to heterogeneity in preferences over general- interest issues as well as distributional ones.

are broken, legislators could resort to this kind of aggressive bargaining situation. If the rules are followed, they will lead to similar outcomes on average, albeit through very different behavior.

Second, the framework here does not allow the proposal to be immediately amended before being up for vote: this amounts to what BF call a “closed rule.” BF show that adoption of an “open rule,” which allows other legislators to amend the proposal before it is subject to vote, reduces the inequality of funding between agenda-setter and others in the coalition, although those outside the coalition still receive zero. In a large legislature with no parties, winning coalitions still have minimum size, but the amount going to the proposer is much closer to what a typical coalition member receives.[5]

It is also assumed that party in the majority retains that status indefinitely. If the minority party B has some positive probability of gaining power in the future, this should raise the minority’s share, V_B, relative to the majority’s share, V_A. One could also imagine a dynamic game similar to Dixit et al. (2000) where parties can gain and lose majorities, and punish each other for breaking an implicit contract to be fair to each other. With smaller majorities, A-members may want to split funds more evenly with B-members for fear that if they lose the majority in the next election they will be punished by B-members for distributing funds unevenly. With larger majorities, A-members may distribute funds more unevenly, since they are less at risk of losing power and being punished. Such a scenario would mean that funds will be distributed more unevenly with a larger s, much as with party-coalition effects, possibly confounding the two effects empirically.[6]

[5] Modeling an open rule in a legislature with parties is quite complicated, although a plausible conjecture can be made. It seems that an open rule should reduce the majority party’s agenda-setting advantage, as expressed by $1 + \alpha$ in equation (3), if the party’s recognition probability in the amendment stage is lower than its recognition probability in the initial proposal stage.

[6] Certain gains from legislative bargaining may not actually take the form of distributed federal funds. For example, they could take the form of taxes or regulations which differentially benefit firms or workers in certain areas, or even general-interest legislation with strong local support.

4 Empirical Model

The effect of partisan representation on federal funding across states is modeled empirically using two different equations. The first takes on a log-linear form; the second, a structural form inspired by equation (3), that can be used to disentangle agenda-setting effects from party-coalition effects. Either equation can include a flexible control function for the vote-share going to the Republican (or Democratic) candidate, to produce regression-discontinuity, or "RD," estimates, which improve identification.

4.1 Simple Linear Model

To aid intuition, consider a log-linear equation for funds in a district with a single representative. Let the logarithm of some funds per capita y_{jt} in district j at time t depend on whether its legislator is in the majority, indicated by M_{jt}, is a Republican, indicated by R_{jt}, other observed variables X_{jt}, state effects μ_j, year effects ξ_t, and an error component ε_{jt}:

$$y_{jt} = \beta M_{jt} + \theta R_{jt} + X_{jt}\gamma + \mu_j + \xi_t + \varepsilon_{jt}, \tag{4}$$

where β is a reduced-form parameter summarizing the bargaining advantages conferred by majority power, and θ is a parameter indicating how strongly Republicans get this funding over Democrats, with $\theta > 0$ reflecting a Republican taste-effect, and $\theta < 0$, a Democratic one. Denote the share of Republicans as $r_t = (1/N)\sum_{i=1}^{N} R_{jt}$; then $\kappa_t = I(r_t > 0.5)$ indicates when Republicans control the majority. Majority status of a single legislator is then

$$M_{jt} = \kappa_t R_{jt} + (1 - \kappa_t)(1 - R_{jt}). \tag{5}$$

The Republican identity of the legislator from state j at time t is a function of the fraction of the two-party vote share won by the Republican candidate in the most recent election, v_{jt}:

$$R_{jt} = I(v_{jt} > 0.5) \tag{6}$$

This function is essentially deterministic as post-election party switches are very rare (Snyder and Ting 2002).

4.2 Identification and Regression Discontinuity

Several assumptions identify the parameters β and θ in a linear regression. First, assume that conditional on year effects, ξ_t, and other observables, the party holding the majority, indicated by κ_t, is mean independent of ε_{jt} so that the second equality below holds – the first equality holds from (5) –

$$\begin{aligned} E[\varepsilon_{jt}|M_{jt}, R_{jt}, W_{jt}, v_{jt}] &= E[\varepsilon_{jt}|\kappa_t, R_{jt}, W_{jt}, v_{jt}] \\ &= E[\varepsilon_{jt}|R_{jt}, W_{jt}, v_{jt}] \end{aligned}$$

where $W_{jt} = [X_{jt}, \mu_j, \xi_t]$. The rationale for the second equality is that the party holding the majority is determined nationally, not locally. After conditioning out the year effect, ξ_t, which controls for large national swings in spending due to power changes, it is safe to take κ_t as exogenous to ε_{jt}, especially as the probability of any one district determining majority control is very small. With this assumption, and absent collinearity problems, an unbiased estimate of β may be identified with a standard regression.

Since Republican status is a function of the observable vote share v_{jt} it follows automatically that

$$E[\varepsilon_{jt}|R_{jt}, W_{jt}, v_{jt}] = E[\varepsilon_{jt}|W_{jt}, v_{jt}] \tag{7}$$

In this case, θ can be estimated without bias using a control function for $E[\varepsilon_{jt}|W_{jt}, v_{jt}]$, which is assumed to take the additive form $W_{jt}\zeta + f(v_{jt})$, where ζ is a vector and f is a smooth non-linear function of vote-share. Including $f()$ in the regression equation amounts to adopting an RD estimator.[7] If a control function for vote-share is not included, identification of θ requires a stronger identification assumption that the error term is mean independent of R conditional on W:

$$E[\varepsilon_{jt}|R_{jt}, W_{jt}, v_{jt}] = E[\varepsilon_{jt}|W_{jt}] \tag{8}$$

This model correspond to the fixed-effects, or "FE," panel estimator, which is identified off of within-district correlations between representation and funding over time, controlling for W_{jt}.[8]

Although it requires fewer identification assumptions, the RD estimator does have some disadvantages. In the case where $f(v_{jt}) = 0$, the RD estimator is less efficient than the FE estimator since it puts more weight on legislators who win close elections. Second, districts with close elections may not represent all districts, such as if greater electoral competition induces representatives with weak reelection chances to seek funding different from representatives in safer seats.

4.3 Applying the Model to Congress

Generalizing the one-legislator-per-district model to the Congressional representation of states introduces complications. First, there are two chambers in Congress: the House of Representatives, representing congressional districts, and the Senate, representing states. To be enacted, legislation must get majority approval in each chamber. Theoretically, it is unclear how having two chambers should affect funding patterns. One possibility is that distributional differences may simply be added up cumulatively from two independent bargaining processes. Another possibility is that there are important interactions between the two parties that need to be modeled. Using a partyless, two-chamber legislative bargaining model, Ansolabehere et al. (2003) conclude that differences in

[7]This estimator has been used in several political applications, including the effect of incumbency on election chances (Lee 2006), how electoral competition affects the voting behavior of Congressmen (Lee, Moretti, and Butler 2004), and the effect of Congressional district size and tenure on the allocation of funds (Falk, 2005).

[8]In small samples, where the number of changes in κ_t is small, the RD estimator can also help in estimating β by better controlling for the taste effect in θ.

voting power in one chamber do not automatically translate into differences in expected payoffs, but this possibility requires putting strict restrictions on one chamber's proposal or amendment rights, restrictions which do not seem fitting when Congress determines funding across areas.

Another complication is that states each have two Senators, each of whom may be of different parties. Supposedly, if both Senators are of the same party, then their ideological as well as distributive interests should be aligned, and the Senators should vote together. If both Senators are of different parties, then it is plausible that party effects may cancel out. A natural generalization of the single-representative model is to instead use $\bar{M}^S_{jt}$, the share of state j's Senate delegation in the majority, and $\bar{R}^S_{jt} = \kappa_t \bar{M}^S_{jt}$, the share of the delegation that is Republican.[9]

Third, each district has only a single Representative, but most states contain multiple districts. As demonstrated in Appendix B, when funding data at the district level is aggregated at the state level, it is sensible to use the variables $\bar{M}^H_{jt}$ and $\bar{R}^H_{jt}$, denoting the shares of a state j's House delegation that are in the majority and Republican. The resulting equation, which allows effects to differ by chamber, provides a generalization of (4):

$$y_{jt} = \beta^S \bar{M}^S_{jt} + \theta^S \bar{R}^S_{jt} + \beta^H \bar{M}^H_{jt} + \theta^H \bar{R}^H_{jt} + f(v^{S1}_{jt}, v^{S2}_{jt}) + X_{jt}\gamma + \mu_j + \xi_t + \varepsilon_{jt} \tag{9}$$

where $f(v^{S1}_{jt}, v^{S2}_{jt})$ is a flexible polynomial in the vote share of each Senator, and thus consistent estimates for their effects depend on an identification assumption similar to (7). Because of data limitations, and the variable number of Representatives per state, vote shares for Representatives are not included, and thus estimates for θ^H require a stronger identification assumption, similar to (8). In practice, including Senate vote shares has only a small effect on the estimates, which suggests that (8) is an appropriate identification condition.[10]

[9]With a sufficiently large data set it would be possible to test for heterogeneous effects, whereby, say, the effect of having two majority Senators is different than twice the effect of having only one majority Senator. An interesting paper by Snyder et al. (2005) argues that when legislators have different voting weights – or equivalently vote in blocks – that one should expect a linear relationship between voting power and funds received, theoretically justifying the linear model used here.

[10]Additional terms, such as $\beta_I M_S M_H$, could be added to (9) to test for interaction effects between chambers through β_I, although this requires more of the data. Another term that can be included would interact party identity with majority status, e.g. $\rho M_S R_S$, in case majority effects are larger with one party than with the other. A more restrictive, but potentially more powerful model restricting $\beta_H = \beta_S$ and $\theta_H = \theta_S$ can also be estimated. This was

In addition, the specification considers how the President's party affects the allocation of federal funds. The President proposes a Budget to Congress, arguably giving her agenda-setting powers, has limited veto power over proposals passed by Congress. These powers could be used either to reduce or increase the dispersion of federal funds across areas. Presumably, a President may try to target funds to areas providing greater electoral support, to swing-vote areas, or to areas with Congressional representation in the same party (McCarty 2000). This latter possibility is accounted for by adding variables for the proportion of the Senate and House delegations that are of the same party as the President.

4.4 Structural Model of Majority Effects

If the theoretical model in section 3 describes congressional reality, then it is possible to estimate parameters describing agenda-setting and party-coalition effects that confer majority advantages. Assuming that legislators are very patient, i.e. $\delta = 1$, then from (3), $y_{jt} = M_{jt}\{\ln(1+\alpha)+\ln[(1+\phi)/(1+\phi(1-s_t)/s_t)]\}$. The non-linear term in brackets may be approximated by the linear term $M_{jt}[\alpha + \phi^*(s_t - 0.5)]$, where $\phi^* \equiv \phi(1+\phi)$, and $s_t - 0.5$ measures the degree of supermajority. Allowing for other variables to influence funding leads to a linear regression equation with an interaction term:

$$y_{jt} = \alpha M_{jt} + \phi^* M_{jt}(s_t - 0.5) + \theta R_{jt} + X_{jt}\gamma + \mu_j + \xi_t + \varepsilon_{jt}, \tag{10}$$

where the party-coalition effect is given by

$$\phi = \sqrt{1/4 + \phi^*} - 1/2. \tag{11}$$

When α and ϕ are both free, α is identified off of overall higher levels of funding in majority-represented districts, while ϕ is identified off of how much funding increases in those districts with the supermajority size $s_t - 0.5$. The case of $\phi = 0$, (10) reduces to the simple linear model in (4)

done in a previous draft, but is omitted here for brevity. Estimates are available from the author on request.

with $\alpha \approx \beta$.[11]

5 Data Description and Outcome Variables

The effect of majority status and party affiliation on funding is examined using state-level data on members of Congress and federal funds. Congressional elections data are from Congressional Quarterly and are available back to 1968 for the House, and 1914 for the Senate. Federal funding data are primarily from the Consolidated Federal Funds Report (CFFR), which begin with the 1983 fiscal year (abbreviated "FY"). The budget for a fiscal year is passed by the Congress in session in the preceding year. Thus, the FY1983 budget was passed in 1982 by members of Congress who were elected in 1980. Federal funding data on a few programs, such as transportation, are available back to 1971 from the Geographic Distribution of Federal Funds (GDFF), and defense spending data for contracts and salaries are available back to 1952 and 1959, respectfully, from the Statistical Abstracts of the United States. Other data on the characteristics of state population used for time-varying controls are from the U.S. Census yearly population counts. These include percent of the population that is female, 65 or over, 14 or under, black, other non-white, and living in an urban area. Decennial Census data on median income and median home value are interpolated linearly to produce yearly observations.

The level of observation used is the state. An advantage of using this level is that federal funding by state is cleanly measured. Federal funding by congressional district is much more subject to error as federal funds are less visible below the state level, especially at the sub-county level. This creates a serious problem since the boundaries of counties and of congressional districts often intersect. Changes in congressional district boundaries over time further complicate the problem of assigning funds at the district level. Partly for this reason, funding data by state for some programs are available further back than FY1983, while no such data exists for congressional

[11] In principle the non-linear model could be estimated using maximum likelihood techniques, such as non-linear least squares. Because of data limitations it is difficult to identify both δ and ϕ at the same time. Setting $\delta = 1$ makes the model highly linear, precluding the need for more complicated, and less numerically stable, non-linear estimation.

districts. In addition, some funding allocations within-state, such as for state capitals, is actually distributed by other areas in the state. A disadvantage of using state-level rather than district-level data is that there are far fewer states than districts.

As shown in Figure 1, majority control of the Senate changed five times between FY1982 and FY2004, allowing for majority effects to be identified separately from party taste effects rather well. In the House, majority control changed only once, from Democrat to Republican for FY1996 (after the 1994 election), making it more difficult to disentangle taste from majority effects. The period of frequent power changes in the Senate has been a period of small majorities, so that changes in s_t have not been large, making it difficult to identify α separately from ϕ with equation (10).

While the majority effect is identified off of national changes in who controls the majority, the taste effect on funding is identified off of changes in representation within states. These changes for the Senate are seen in Figure 2a, which documents how frequently Senate seats for a state have switched parties between FY1983 and FY2004, and Figure 2b, which documents whether the seats have become more Democratic or Republican. Similar changes for the House are shown in Figures 3a and 3b. Certain areas such as the South have grown more Republican, while the Pacific Coast and the Northeast have become more Democratic, although there is considerable variation even within region. Furthermore, changes in the House and Senate, while correlated, exhibit enough independence to allow separate identification of House and Senate effects.

Characteristics of federal funding per capita from the CFFR are given in Table 1. Column 1 reports total government spending, which includes government grants, salaries and wages of federal employees, procurement contracts, as well as direct payments to individuals, such as Social Security and Medicare coverage. Column 2 reports all spending on defense, mainly in the form of contracts, wages, and salaries. Column 3 refers to government grants, which are split into types in columns 4 through 8 according to the department handling them:

- Department of Transportation, e.g. Highway Planning & Construction, Airport Improvement Program, Urban Mass Transportation Capital Improvement Grants;

- Department of Education, e.g. Educationally Deprived Children-Local Educational Agencies, Handicapped-State Grants;
- Department of Housing and Urban Development, e.g. Lower Income Housing Assistance - Section 8); and
- Department of Health and Human Services, e.g. Medicaid, CHIP, Social Services Block Grant, Foster Care Title IV-E, Head Start.

Grants for remaining departments, including the Department of Agriculture, are grouped into the ”Other” category.

The first row shows how much the federal government spent per capita in each category in FY2004. Total defense spending took up 16.4 percent of spending, or $987 per capita, of which about 60 percent is in procurement contracts, and 40 percent in wages and salaries. Government grants accounted for 25 percent of federal spending, at $1,534 per capita, with $163 spent on transportation, $127 on education, $112 on urban development, and $902 on health and human services.

The next rows give more information about how these funding levels vary across years and states. It displays the standard deviation in real (CPI-deflated) funding per capita across states over time, both unadjusted, and after controlling for state and year effects, and time-varying demographic and income controls. The latter provides a gauge of how much remaining variation is potentially explainable by congressional representation. Defense spending exhibits substantial raw variation; although this series is fairly well predicted by the controls, its residual variation still leaves much to be explained. Total government grants are even better predicted by the controls, although transportation, and to a lesser extent housing and urban development, exhibit substantial residual variation.

6 Empirical Results

6.1 Testing Multiple Hypotheses

Before proceeding, it is scientifically important to hypothesize in advance what effects are expected in the empirical analysis. Failure to do so opens the analysis to the criticism that statistical significance levels are overstated when multiple hypotheses are tested at once — see Cook and Farewell (1996). The effect of majority status should be reflected by $\beta > 0$ in total defense spending and total grants, especially transportation grants, which are particularly apt to political manipulation (Crain and Oakley 1995). In American politics, Democrats have historically preferred federal involvement in education, urban development, and welfare spending (Kurian 1997a), and thus it is plausible to hypothesize $\theta < 0$ for those types of grants. Republicans, on the other hand, are known to support high levels of defense spending (Kurian 1997b), and thus it is most plausible to hypothesize $\theta > 0$. Fordham (2007) documents how this support has grown since the mid-1960s from Congressional Republican voting behavior.

As a second precaution, I report two sets of p-values: the first set of p-values consider each hypothesis in isolation, as is standard; the second set of p-values control for the false discovery rate for multiple tests, using the technique described in Benjamini and Hochberg (1995). A reported p-value of X, means that the hypothesis can be accepted (not rejected) if one is willing to allow X percent of true null hypotheses (of zero effect) to be rejected by accident. This method requires grouping the hypotheses together in families – for a related exercise see Kling et al. (2007). Majority effects and taste effects are separate hypotheses to be tested independently. With the available data, the Senate variables are expected to be more powerful and better-identified than the House variables, and should also be considered separately. Additionally, the two aggregate spending categories, defense and total grants are separated from the five disaggregated grant categories. Thus, four families of hypotheses are considered for majority effects, four for party effects, and an additional four for presidential effects.[12]

[12]To compute the Benjamini-Hochberg p-values, the single-hypothesis p-values are ranked $p_1 < p_2 < ... < p_K$, where K is the number of hypotheses in the family. The adjusted p-values are calculated recursively as $p^*_K = p_K$,

There are reasons to not be too conservative in interpreting the results. It is unlikely that funding adjusts instantaneously to changes in congressional power: most funding is determined by previous legislation, and current legislation may operate with a lag beyond the next fiscal year, and so finding any result is remarkable. Furthermore, each chamber provides a setting to test a given hypothesis, and when each chamber reinforces it, this provides considerably stronger evidence.

6.2 Estimates of the Linear Congressional Model

Using funding data from 1983 to 2004, Table 2 presents estimates using the linear model in (9) for total government grants in Panel A, and total defense spending in Panel B. All specifications include state and year effects, columns 2 and above include flexible polynomials in both Senators' vote shares, and column 3 adds interacted region-by-year effects, using the 4 Census regions, while column 4 adds interacted division-by-year effects, using the 9 Census divisions. Estimates in the first two rows of Panel A reveal that delegations in the majority increase the federal grants a state receives by approximately 2 percent; in 2004, this translates to about \$30 per capita per year for each full delegation in the majority. The effects are only highly significant for the Senate, and only until division-by-year effects are added in column 4. However, this set of controls is very conservative as it removes considerable variation from the data: it is remarkable that the point estimate is still closer to 2 percent than to zero.

In Panel B, the point estimates reveal positive majority effects on defense spending, although the effects are only significant for the House with region- or division-by-year effects. In the third and fourth rows of Panel B there is some evidence of large Republican taste effects on defense spending: although imprecise, the estimates are on the order of 9 percent per delegation, or \$90 per capita.

This presidential interaction appears to be quite important in the House for grants, where having a delegation of the President's party increases total grants by 4.5 percent, almost identical to the

$p_k^* = \min\{p_{k+1}^*, (K/k)p_k\}$ for $k = K-1, ..., 1$. As shown in Fernando et al. (2004), this test is robust to correlations among hypotheses.

effect found in Berry et al. (2009) using district-level data, albeit using a somewhat different measure of federal funds. The effects for the Senate remain uncertain, and no such effects for either house appear in defense spending.

Table 3 breaks down government grants by type using the favored specification controlling for vote share polynomials and interacted region-by-year effects. In column 1 with transportation grants, we see evidence of majority effects around 5 percent, or $8 per capita, in both the House and Senate, although only the latter is significant. Majority effects for other types of funds in the Senate appear largely insignificant, especially when multiple hypothesis p-values are used, except for urban development. Majority effects in the House are hard to detect since party control only changed once, but the estimate for Health & Human Services raises suspicions. It is worth noting that none of the point estimates of majority effects in Tables 2 or 3 are negative, and thus are somewhat supportive of majority effects.

The third and fourth rows of Table 3 show some evidence in favor of taste effects. In both the House and Senate, a Democratic delegation brings in roughly 13 percent more in housing and urban development grants, or $14 per capita. The Democratic effects on education grants are considerably weaker and less precise, but suggest an increase of 3 percent, or $4 per capita, per Democratic delegation. There is also considerable evidence for Republican taste effects for transportation grants, particularly in the House. There is also support for the hypothesis that House Republicans bring in more grants from the ”Other” category, which includes agricultural subsidies. Weaker evidence suggests that Senate Republicans may bring in more in terms of Health and Human Services grants, which is surprising as its main component, Medicaid, is generally thought of as a Democratic program.[13]

It is worth noting that the regression-discontinuity estimates in column 2 are not much different from the regular fixed-effect estimates in column 1. This stability gives additional credibility to the strong identification condition (8), in that assuming it does not lead considerable bias, while it makes more efficient use of the data than (7). Visual comparisons of the plain fixed-effect and

[13]No significant relationships are found for other funding variables such as Social Security and Medicare spending. This is reassuring for the empirical model since such spending is not easily manipulable across states year-to-year.

regression-discontinuity estimates are given in Figure 4, which graphs how defense and urban-development funding residuals, conditioning out the controls, vary with the vote-share going to the Republican candidate in the previous election.[14] To the left of the 50 percent vote share, the long-dashed lines represent the average for states represented by Democrats, and to the right, for Republicans. The difference between the two lines corresponds to the fixed-effect estimate. The short-dashed curve represents the quartic fit of residual funding on the vote-share. The difference at the 50 percent mark corresponds to the RD estimate. Besides indicating that the results are significant, the graphs show that once the controls are conditioned on, election vote shares predict little in terms of federal funding patterns away from the discontinuity.

As the data for transportation grants go back to 1971, the stability of the estimate for β over time can be examined by graphing how the fixed-effects estimates change as the sample period changes. Figure 5a does this using a 20-year moving window using a combined-chamber estimate, restricting $\beta^H = \beta^S$. It shows the the positive effect of majority status on transportation grants received is fairly stable over time, although is slightly stronger towards the beginning and end of the period. Defense-spending data is also available for this longer period: fixed-effect estimates of θ from a 20-year moving panel, shown in Figure 5b, reveal that this positive Republican effect has grown stronger and more significant over time — consistent with the rising Republican support of defense spending since the 1960s.[15] Viewed from the present, the Republican taste-effect estimates in Table 2 may be biased downwards as they average in earlier data from when this effect is weaker.

Overall, the evidence for majority and taste effects is only moderately strong, as the panel is of limited length, and the number of party-control changes are few. Yet, the fact that the point estimates are consistently in the right direction and sometimes significant, even when accounting for two-way clustering and multiple hypotheses, provide assurance that these effects may indeed be real.

[14] In Figure 5 the unit of observation is not the state, but the Senate seat, meaning that there are two observations per state.

[15] Results using the Senate only, possible because of longer elections data, reveal that the defense-spending effect was once positive for Democrats in the early 1960s.

6.3 Estimates of the Structural Model

Estimates for the linearized version of the structural model for majority effects in (10) are reported in Table 4. These are modeled for the Senate using total grants, transportation grants, and defense spending, where the linear estimates are significant and fairly precise. In all of the specifications, the estimated agenda-setting effects, α, are small and statistically insignificant, meaning that majority effects are small when control of the Senate is slight. The estimated party-coalition effects, ϕ – inferred from the coefficient on the degree of supermajority, ϕ^*, through (11) – are positive and generally significant, as funding gains for the majority grow with the degree of supermajority. According to the structural model, this is due to strong party-coalition effects, although other structural explanations, such as the one posited by Dixit et al. (2000), remain possibilities. Whatever the case, majority effects appear to be strong only when the degree of supermajority is large.

7 Conclusion

The case that members of Congress in the majority have advantages in procuring federal funds for their state has both theoretical and empirical support. The evidence is strongest in the case of the Senate, where majority-represented states receive, on average, \$180 million more in grants (using 2004 numbers), or \$90 million per Senator, of which \$50 million is in transportation grants. In the House, there is some evidence that majority delegations are able to procure around \$600 million in defense spending. Given that the House majority has greater party discipline and agenda-setting advantages (Cox and McCubbins 1993, 2005), perhaps future researchers will find majority effects are larger in the House when more data become available.

There is also empirical evidence for partisan taste effects on the distribution of funds for a number of categories. As might be expected given current partisan leanings, each Republican delegation procures roughly \$500 million extra spending in defense relative to its Democratic counterpart. In compensation, each Democratic delegation procures about \$80 million more for urban development and possibly \$20 million for education. The evidence that transportation and other grants go disproportionately towards areas with House Republicans is interesting and somewhat surprising. Given the novelty of these results, further research on these effects seems warranted; already, Reingeweitz (2011) has estimated the fiscal multiplier on state income from partisan effects, although using a notably different empirical model. It would also be worth analyzing whether or not it is efficient for voters for federal funds to respond to the party-membership of their legislative representation.

References

Albouy, David (2011) ”Do Voters Elect or Affect Policies? A New Perspective Using Evidence from the U.S. Senate.” *Electoral Studies* 30, pp. 162-173.

Alesina, Alberto (1988) ”Credibility and Policy Convergence in a Two-Party System with Rational Voters.” *American Economic Review* 78, pp. 796-805.

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

Atlas, Cary M.; Gilligan, Thomas W.; Hendershott, Robert J.; and Zupan, Mark A. (1995) “Slicing the Federal Government Net Spending Pie: Who Wins, Who Loses, and Why.” *American Economic Review*, June, 85, pp. 624-629.

Baron, David P. (1991) “Majoritarian Incentives, Pork Barrel Programs, and Procedural Control.” *American Journal of Political Science*, 35, pp. 57-90.

Baron, David P. and Ferejohn, John A. (1989) “Bargaining in Legislatures.” *American Political Science Review*, 83, pp. 1181-1206.

Benjamini, Yoav and Yosef Hochberg (1995) ”Controlling the False Discovery Rate: A Practical and Powerful Approach to Multiple Testing.” *Journal of the Royal Statistical Society. Series B (Methodological)*, 57, 289-300.

Berry, Christopher R., Barry C. Burden, and William G. Howell (2009) ”The President and the Distribution of Federal Spending.” The Harris School of Public Policy Studies, University of Chicago Working Paper #09.04. February.

Bickers, Kenneth M. and Robert M. Stein (1991) *Federal Domestic Outlays, 1983-1990: A Data Book.* Armonk, N.Y.: Sharpe.

Buchanan, James M. and Gordon Tullock (1962) *The Calculus of Consent.* Ann Arbor: University of Michigan Press.

Calvert, Randall and Justin Fox (2000) ”Effective Parties in a Model of Repeated Legislative Bargaining.” Presented at the annual meeting of the American Political Science Association.

Cameron, Colin A.; Jonas B. Gelbach; and Douglas L. Miller (2008) ”Bootstrapped-Baed Improvements for Inference with Clustered Errors.” *Review of Economics and Statistics* 90, pp. 414-427.

Crain, W. Mark and Lisa K. Oakley (1995) ”The Politics of Infrastructure.” *Journal of Law and Economics* 38, pp. 1-17.

Cook, Richard J. and Vern T. Farewell (1996) ”Multiplicity Considerations in the Design and Analysis of Clinical Trials” *Journal of the Royal Statistical Association* 159, pp. 93-110.

Cox, Gary W. and Matthew D. McCubbins (1988) ”Electoral Politics as a Redistributive Game.” *Journal of Politics* 48, pp. 370-89.

Cox, Gary W. and Matthew D. McCubbins (1993) *Legislative Leviathan: Party Government in the House*. University of California Press, Berkeley.

Cox, Gary W. and Matthew D. McCubbins (2005) *Setting the Agenda: Responsible Government in the House of Representatives.* Cambridge: Cambridge University Press.

Dixit, Avinish, Gene M. Grossman, and Faruk Gul (2000) ”The Dynamics of Political Compromise.” *Journal of Political Economy*, 108(3), pp. 531-568.

Downs, Anthony (1957) *An Economic Theory of Democracy* (New York: Harper and Row)

Falk, Justin (2005) ”The Effects of Congressional District Size and Representative’s Tenure on the Allocation of Federal Funds.” University of California, Berkeley, mimeo.

Fernando, R. L., D. Nettleton, B. R. Southey, J. C.M. Dekkers, M. F. Rothschild, and M. Soller. 2004. ”Controlling the Proportion of False Positives in Multiple Dependent Tests.” *Genetics* 166, pp. 611-619.

Fordham, Benjamin O. (2007) ”The Evolution of Republican and Democratic Positions on Cold War Military Spending: A Historical Puzzle” *Social Science History* 31, pp. 603-636.

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

Kling, Jeffrey R. Jeffrey B. Liebman, and Lawrence F. Katz (2007) ”Experimental Analysis of Neighborhood Effects.” *Econometrica* 75, pp. 83-119.

Knight, Brian (2002) ”Endogenous Federal Grants and Crowd-out of State Government Spending: Theory and Evidence from the Federal Highway Aid Program.” *American Economic Review* 92, pp. 71-92.

Knight, Brian (2004) ”Legislative Representation, Bargaining Power, and the Distribution of Federal Funds: Evidence from the U.S. Senate.” NBER Working Papers 10385, National Bureau of Economic Research.

Knight, Brian (2005) ”Estimating the Value of Proposal Power.” *American Economic Review,* 95, pp. 1639-1652.

Kurian, George Thomas, ed. (1997a) *Encyclopedia of the Democratic Party* Armonk, NY: Sharpe Reference.

Kurian, George Thomas, ed. (1997b) *Encyclopedia of the Republican Party* Armonk, NY: Sharpe Reference.

Lee, David S. (2008) ”Randomized Experiments from Non-random Selection in U.S. House Elections.” *Journal of Econometrics,* 142, pp. 675–697.

Lee, David S., Moretti, Enrico, and Butler, Matthew J. (2004) “Do Voters Affect or Elect Policies? Evidence from the U.S. House.” *Quarterly Journal of Economics*, 119, pp. 807-859.

Levitt, Steven D. and Poterba, James M. (1999) “Congressional Distributive Politics and State Economic Performance.” *Public Choice*, 99, pp. 185-216.

Levitt, Steven D. and Snyder, James M. (1995) “Political Parties and the Distribution of Federal Outlays.” *American Journal of Political Science*, 39, pp. 958-80.

Levitt, Steven D. and Snyder, James M. (1997) ”The Impact of Federal Spending on Election Outcomes.” *Journal of Political Economy*, 105, pp. 30-53.

Mayhew, David R. (1974) *Congress: The Electoral Connection*. New Haven: Yale University Press.

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

Reingewertz, Yaniv (2011) ”Identifying the Effect of Government Spending: Evidence from Political Variations in Federal Grants.” Hebrew University, mimeo.

Snyder, James M. and Michael M. Ting (2002) ”An Information Rationale for Political Parties.” *American Journal of Political Science*, 46, pp. 90-110.

Snyder, James M. and Michael M. Ting and Stephen Ansalobehere (2005) ”Legislative Bargaining Under Weighted Voting.” *American Economic Review,* 95, pp. 981-1004.

Weingast, Barry R. (1979("A Rational Choice Perspective on Congressional Norms." *American Journal of Political Science,* 23, pp. 245-262.

Appendix

A Formal Derivation of Equation (2)

The legislature contains N members indexed $i \in \{1, 2, ..., N\} = \mathcal{N}$. The parties are modeled as mutually exclusive and collectively exhaustive sets $\mathcal{A}$ and $\mathcal{B}$, $\mathcal{A} \cup \mathcal{B} = \mathcal{N}$ and $\mathcal{A} \cap \mathcal{B} = \varnothing$, with $|\mathcal{A}| = N_A$ and $|\mathcal{B}| = N_B$. The payoff a legislator receives from a distribution depends on her own share, and is discounted

$$U_i(y, t) = \delta^t y_i$$

where $\delta \in [0, 1)$ is a discount factor and $t \in \{0, 1, 2, ...\}$ is the number of periods which have elapsed. Continuation values for an individual i at time t is given by $V_i(g, t)$ where g is the subgame. As shown in BF, the number of possible subgame-perfect equilibria in this game is infinite. The focus here is on SSSPNE, so that continuation values do not vary with t or with g. Given that with two types of legislators, in a stationary game there should be two types of continuation values, one for A-members, V_A, and one for B-members, V_B: the only break in symmetry is with party affiliation.

The game begins by having nature randomly choose one member of the legislature as the proposer. The chance of a proposal going to an A-member is $s(1+\alpha)/(1+\alpha s)$. The proposal strategy in this case resembles very much that in BF, with members of the coalition receiving δ times their continuation value, those outside the coalition receiving nothing, and the agenda setter receiving the remainder of funds not given to others. In order to pass a winning allocation that procures himself the maximum funds, the agenda-setter proposes

$$\begin{aligned} y_i &= \delta V_A \text{ for } p\frac{N-1}{2} \text{ members of } A \\ &= \delta V_B \text{ for } (1-p)\frac{N-1}{2} \text{ for members of } B \\ &= N - \frac{N-1}{2}\delta\left\{pV_A + (1-p)V_B\right\} \text{ for the proposer} \\ &= 0 \text{ for other members of } A \text{ and } B \end{aligned}$$

When B-members propose, with probability $(1-s)/(1+\alpha s)$, the allocation looks identical except with q replacing p.

Taking these proposal strategies into consideration, and working out the proper probabilities, the continuation value for A-members is then

$$\begin{aligned} V_A = {} & \frac{s(1+\alpha)}{1+\alpha s}\left\{\frac{1}{N_A}\left[N - \frac{N-1}{2}\delta\left\{pV_A + (1-p)V_B\right\}\right] + \frac{N_A - 1}{N_A}\frac{p(N-1)/2}{N_A - 1}\delta V_A\right\} \\ & + \frac{1-s}{1+\alpha s}\left\{\frac{p(N-1)/2}{N_A}\delta V_A\right\} \end{aligned}$$

Substituting in $N_A = sN$ and simplifying

$$V_A = \frac{1}{s}\left\{\frac{s\,(1+\alpha)}{1+\alpha s}\left[1 - \frac{1-1/N}{2}\delta(1-p)V_B\right] + \frac{1-s}{1+\alpha s}\left[p(1-1/N)\frac{\delta}{2}V_A\right]\right\}$$

Taking the limit as $N \to \infty$ and multiplying by s

$$sV_A = \frac{s\,(1+\alpha)}{1+\alpha s}\left[1 - \frac{1}{2}\delta(1-p)V_B\right] + \frac{1-s}{1+\alpha s}p\frac{\delta}{2}V_A$$

Replacing $p = s + \phi(1-s)$ and $q = s - \phi(1-s)$ produces equation (2).

B Formal Derivation of Equation (9)

Letting j denote a state, d a district, and t a year, the full model can be written as

$$y_{jdt} = \beta^S \frac{M_{jt}^{S1} + M_{jt}^{S2}}{2} + \theta^S \frac{R_{jt}^{S1} + R_{jt}^{S2}}{2} + \beta^H M_{jdt}^H + \theta^H R_{jdt}^H + X_{jt}^S \gamma^S + X_{jdt}^H \gamma^H + \mu_j^S + \mu_{jd}^H + \xi_t + \varepsilon_{jdt}. \tag{A.1}$$

M_{jt}^{Sl} and R_{jt}^{Sl} refer to the majority and Republican status of Senator $l \in \{1,2\}$ in state j, where each Senator is assumed to have the same linear effects on state spending, $\beta^S/2$ and $\theta^S/2$, with no interaction. M_{jdt}^H and R_{jdt}^H refer to the majority and Republican status of the Representative of district d. X_{jt}^S and X_{jdt}^H refer to state and district-level time-varying covariates, μ_j^S and μ_{jd}^H to state and district-level fixed effects, and ξ_t to year effects. These last variables are condensed notationally into $W_{jdt} = \left[X_{jt}^S, X_{jdt}^H, \mu_j^S, \mu_{jd}^H, \xi_t\right]$.

Conditioning on all of the covariates, as well as the majorty status of the parties in each chamber, and the vote shares of each Senator in the last election, we have that

$$\begin{aligned} &E\left[\varepsilon_{jdt} | M_{jt}^{S1}, M_{jt}^{S2}, M_{jdt}^H, R_{jt}^{S1}, R_{jt}^{S2}, R_{jdt}^H, W_{jdt}, \kappa_t^S, \kappa_t^H, v_{jt}^{S1}, v_{jt}^{S2}\right] \\ &= E\left[\varepsilon_{jdt} | R_{jdt}^H, W_{jdt}, v_{jt}^{S1}, v_{jt}^{S2}\right] \end{aligned} \tag{A.2}$$

by the same arguments made in section 4.2 that majority status depends on party identification combined with exogenous party control (conditioning on time effects), and that party identification of a seat is a deterministic function of the vote share. Then the critical assumption we make is that

$$E\left[\varepsilon_{jdt} | R_{jdt}^H, W_{jdt}, v_{jt}^{S1}, v_{jt}^{S2}\right] = W_{jdt}\zeta + f\left(v_{jt}^{S1}, v_{jt}^{S2}\right) \tag{A.3}$$

which is a stronger assumption for the House than the Senate since we do not condition on vote shares for House seats. This equation motivates adding a flexible polynomial in Senate vote shares into the district-level equation (A.1). Averaging over districts by state, with $y_{jt} = (1/N_j)\sum_d y_{jdt}$, where N_j is the number of districts in state j, we get equation (9)

$$y_{jt} = \beta^S \bar{M}_{jt}^S + \theta^S \bar{R}_{jt}^S + \beta^H \bar{M}_{jt}^H + \theta^H \bar{R}_{jt}^H + f(v_{jt}^{S1}, v_{jt}^{S2}) + X_{jt}\gamma + \mu_j + \xi_t + \varepsilon_{jt},$$

where $\bar{M}_{jt}^S = (M_{jt}^{S1} + M_{jt}^{S2})/2$, $R_{jt}^S = (R_{jt}^{S1} + R_{jt}^{S2})/2$, $\bar{M}_{jt}^H = (1/N_j)\sum_d M_{jt}^H$, $\bar{R}_{jt}^H = (1/N_j)\sum_d R_{jt}^H$, $X_{jt} = [X_{jt}^S, \bar{X}_{jt}^H]$, $\gamma = [\gamma^{S\prime}, \gamma^{H\prime}]$, $\mu_j = \mu_j^S + (1/N_j)\sum_d \mu_{jd}^H$, and $\varepsilon_{jt} = (1/N_j)\sum_d \varepsilon_{jdt}$.

TABLE 1: CHARACTERISTICS OF FEDERAL SPENDING PER CAPITA ACROSS STATES

Federal Spending Category	Total Govt Spend (1)	Total Defense (2)	Total Govt Grants (3)	Type of Government Grant: Transportation (4)	Education (5)	Housing & Urban Dev. (6)	Health & Human Services (7)	Other (8)
Panel A: Per-Capita Spending Levels in 2004								
Mean	$7,107	$987	$1,534	$163	$127	$112	$902	$243
Fraction of Govt Spending	100.0%	16.4%	25.5%	2.7%	2.1%	1.9%	15.0%	4.0%
Panel B: Unadjusted Standard Deviations of Logarithms: Unweighted average of all states, 1983-2004								
Log Std. Dev	0.20	0.75	0.35	0.43	0.38	0.54	0.46	0.43
Panel C: Regression-Adjusted Standard Deviation of Logarithms								
Log Std. Dev	0.05	0.21	0.07	0.18	0.08	0.16	0.10	0.12
R^2 of Regression.	0.95	0.93	0.97	0.85	0.96	0.92	0.96	0.93

Federal spending data taken from the Consolidated Federal Funds Report and partitioned according to object and CFDA program code. Controls for regression adjustment include year and state fixed effects; log of population, level and squared; percent of population over 65, under 14, female, black, of other race, and in an urban area; median household income and home value. Real values calculated for standard deviation of logarithms using the CPI.

TABLE 2: EFFECT OF CONGRESSIONAL REPRESENTATION ON AMOUNT OF FEDERAL FUNDS TO STATES
ALTERNATIVE SPECIFICATIONS

Dependent Variable	Panel A: Total Govt Grants				Panel B: Total Defense			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
State Delegation in Congress								
Majority Share in Senate β^S	0.026	0.025	0.021	0.015	0.006	0.007	0.009	0.020
(std. error)	(0.010)	(0.010)	(0.010)	(0.010)	(0.024)	(0.023)	(0.025)	(0.025)
p -value single hyp.	0.01	0.01	0.03	0.16	0.80	0.76	0.72	0.42
p-value multiple hyp.	*0.02*	*0.02*	*0.06*	*0.31*	*0.80*	*0.76*	*0.72*	*0.42*
Majority Share in House β^H	0.024	0.016	0.021	0.018	0.073	0.086	0.127	0.138
(std. error)	(0.020)	(0.020)	(0.017)	(0.017)	(0.052)	(0.052)	(0.064)	(0.071)
p -value single hyp.	0.24	0.44	0.22	0.28	0.16	0.10	0.05	0.05
p-value multiple hyp.	*0.24*	*0.44*	*0.22*	*0.28*	*0.24*	*0.20*	*0.09*	*0.10*
Republican Share in Senate θ^S	0.004	0.009	0.021	0.017	0.077	0.127	0.092	0.092
(std. error)	(0.012)	(0.017)	(0.015)	(0.013)	(0.063)	(0.059)	(0.055)	(0.057)
p -value single hyp.	0.72	0.59	0.15	0.18	0.22	0.03	0.10	0.11
p-value multiple hyp.	*0.72*	*0.59*	*0.15*	*0.18*	*0.44*	*0.07*	*0.15*	*0.18*
Republican Share in House θ^H	0.024	0.027	0.024	0.018	0.129	0.165	0.066	0.091
(std. error)	(0.018)	(0.017)	(0.019)	(0.019)	(0.095)	(0.102)	(0.075)	(0.089)
p -value single hyp.	0.19	0.11	0.20	0.34	0.18	0.11	0.38	0.31
p-value multiple hyp.	*0.19*	*0.11*	*0.38*	*0.34*	*0.19*	*0.11*	*0.38*	*0.34*
Presid. Party Match in Senate	0.017	0.016	0.016	0.012	0.009	0.018	0.017	0.014
(std. error)	(0.010)	(0.011)	(0.010)	(0.010)	(0.037)	(0.037)	(0.038)	(0.037)
p -value single hyp.	0.10	0.14	0.11	0.22	0.81	0.64	0.65	0.70
p-value multiple hyp.	*0.19*	*0.29*	*0.22*	*0.44*	*0.81*	*0.64*	*0.65*	*0.70*
Presid. Party Match in House	0.046	0.045	0.042	0.036	-0.013	-0.011	0.001	0.016
(std. error)	(0.012)	(0.011)	(0.011)	(0.011)	(0.035)	(0.033)	(0.036)	(0.036)
p -value single hyp.	0.000	0.000	0.000	0.002	0.71	0.75	0.98	0.67
p-value multiple hyp.	*0.000*	*0.000*	*0.000*	*0.004*	*0.71*	*0.75*	*0.98*	*0.67*
State Fixed Effects	X	X	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X	X	X
Senate RD		X	X	X		X	X	X
Region-by-Year Effects			X	X			X	X
Division-by-Year Effects				X				X

Robust standard errors clustered by state and year in brackets. Sample consists of 50 states over 22 years for 1983-2004 for 1,100 total observations. All regressions include state dummies and year dummies; demographic controls: log of population, level and squared; percent of population over 65, under 14, female, black, of other race. and in an urban area; income controls: median household income and home value; tenure controls: average tenure of congressmen and average in second or later term (separately for House and Senate). Significance of multiple hypotheses determined using Benjamini and Hochberg (1995) method. Total grants and defense spending grouped as a family of hypotheses. "Senate RD" includes a quartic in the two-party vote share going to each Republican Senate candidate, with extra dummies for a vote share of zero and a vote share of one. Region-by-year effects interact 4 region dummies (Northeast, Midwest, South, West) with each year dummy. Division-by-year effects interact 9 division dummies (New England, Middle Atlantic, South Atantic, East North Central, West North Central, East Souch Central, West South Central, Mountain, and Pacific).

TABLE 3: EFFECTS ON TYPES OF GOVERNMENT GRANTS TO STATES:
REGRESSION-DISCONTINUITY MODEL WITH REGION-YEAR FIXED EFFECTS

	Type of Government Grant				
Dependent Variable	Transport-ation (3)	Educ-ation (4)	Housing & Urban Dev. (5)	Health & Human Services (6)	Other (7)
State Delegation in Congress					
Majority Share in Senate β^S	0.054	0.001	0.018	0.005	0.008
(std. error)	(0.021)	(0.008)	(0.012)	(0.016)	(0.016)
p -value single hyp.	0.01	0.91	0.11	0.74	0.59
p-value multiple hyp.	*0.05*	*0.91*	*0.28*	*0.91*	*0.91*
Majority Share in House β^H	0.045	0.002	0.016	0.043	0.008
(std. error)	(0.037)	(0.014)	(0.026)	(0.020)	(0.030)
p -value single hyp.	0.22	0.90	0.52	0.04	0.78
p-value multiple hyp.	*0.54*	*0.90*	*0.87*	*0.18*	*0.90*
Republican Share in Senate θ^S	0.025	-0.032	-0.155	0.047	0.014
(std. error)	(0.055)	(0.019)	(0.048)	(0.028)	(0.042)
p -value single hyp.	0.64	0.10	0.001	0.09	0.75
p-value multiple hyp.	*0.75*	*0.16*	*0.01*	*0.16*	*0.75*
Republican Share in House θ^H	0.120	-0.025	-0.128	0.011	0.093
(std. error)	(0.050)	(0.024)	(0.063)	(0.033)	(0.041)
p -value single hyp.	0.02	0.31	0.04	0.73	0.02
p-value multiple hyp.	*0.06*	*0.39*	*0.07*	*0.73*	*0.06*
Pres Party Match in Senate	0.017	0.009	0.006	-0.004	0.026
(std. error)	(0.019)	(0.009)	(0.018)	(0.018)	(0.019)
p -value single hyp.	0.36	0.32	0.74	0.82	0.18
p-value multiple hyp.	*0.60*	*0.60*	*0.82*	*0.82*	*0.60*
Pres Party Match in House	0.052	0.016	0.044	0.032	0.045
(std. error)	(0.020)	(0.013)	(0.033)	(0.017)	(0.024)
p -value single hyp.	0.01	0.22	0.18	0.06	0.06
p-value multiple hyp.	*0.06*	*0.22*	*0.22*	*0.10*	*0.10*

Standard errors clustered by state and year in brackets. All specifcations include polynomials in Senate vote shares and region-by-year fixed effects. See Table 2 for more details on the control variables and sample, which are the same as in column 3 of Table 2.

TABLE 4: STRUCTURAL MODEL OF MAJORITY EFFECTS
FOR SENATE DELEGATIONS

Dependent Variable	Total Grants (1)	Transport Grants (2)	Total Defense (3)
Share in Majority	-0.002	-0.035	-0.032
Proposal Power α^{S}	(0.012)	(0.030)	(0.032)
p -value single hyp.	0.90	0.25	0.33
Share in Majority	0.607	2.357	1.094
X Super-majority φ^{*S}	(0.466)	(1.061)	(0.957)
p -value single hyp.	0.19	0.03	0.26
Cohesion φ^{S}	0.426	1.114	0.659
(imputed)	(0.252)	(0.329)	(0.413)
p -value single hyp.	0.09	0.001	0.11

Robust standard errors clustered by state and year are shown in parentheses. Estimates are of the linearized model in equation (10), both with additional controls for the shares of House state delegations in the majority and Republican. Cohesion parameter inferred from majority share using equation (11) with standard errors calculated using the delta method. All specifcations include polynomials in Senate vote shares and region-by-year fixed effects. See Table 2 for more details on the control variables and sample.

Figure 1a: Partisan Control of the Senate

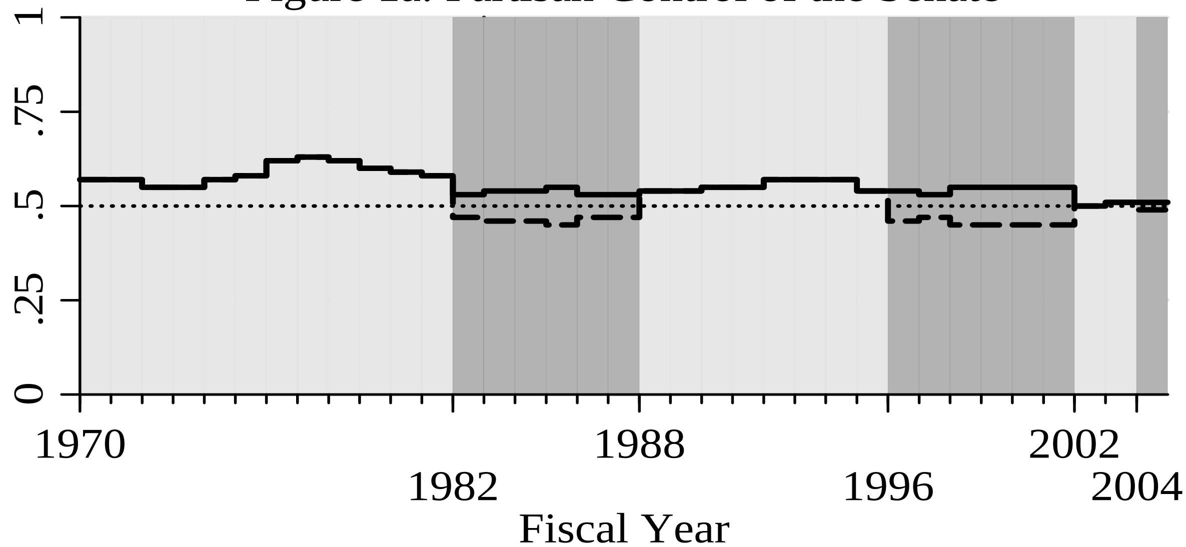
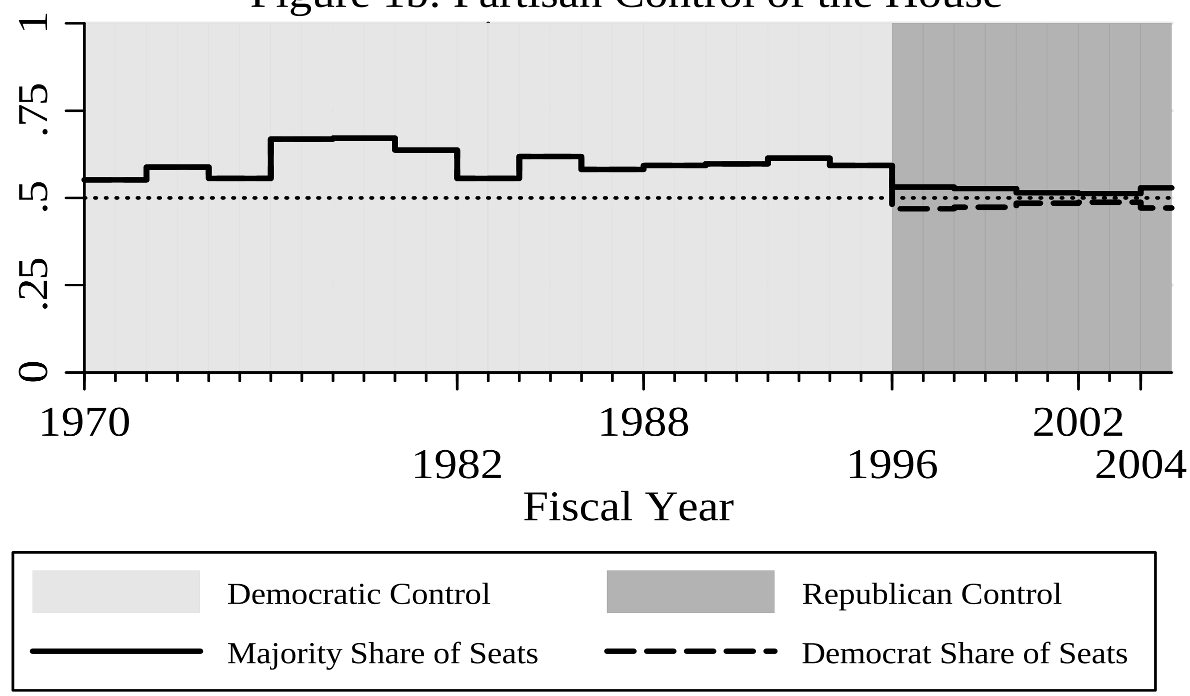


Figure 1b: Partisan Control of the House



The budget in a fiscal year is determined by the congress in session in the previous year. For example, the Congress elected in 1994 was in session in 1995 and 1996, and determined the budget in FY1996 and FY1997.

Figure 2a: Number of Times Senate Seats Changed Party by State: FY1983-2004

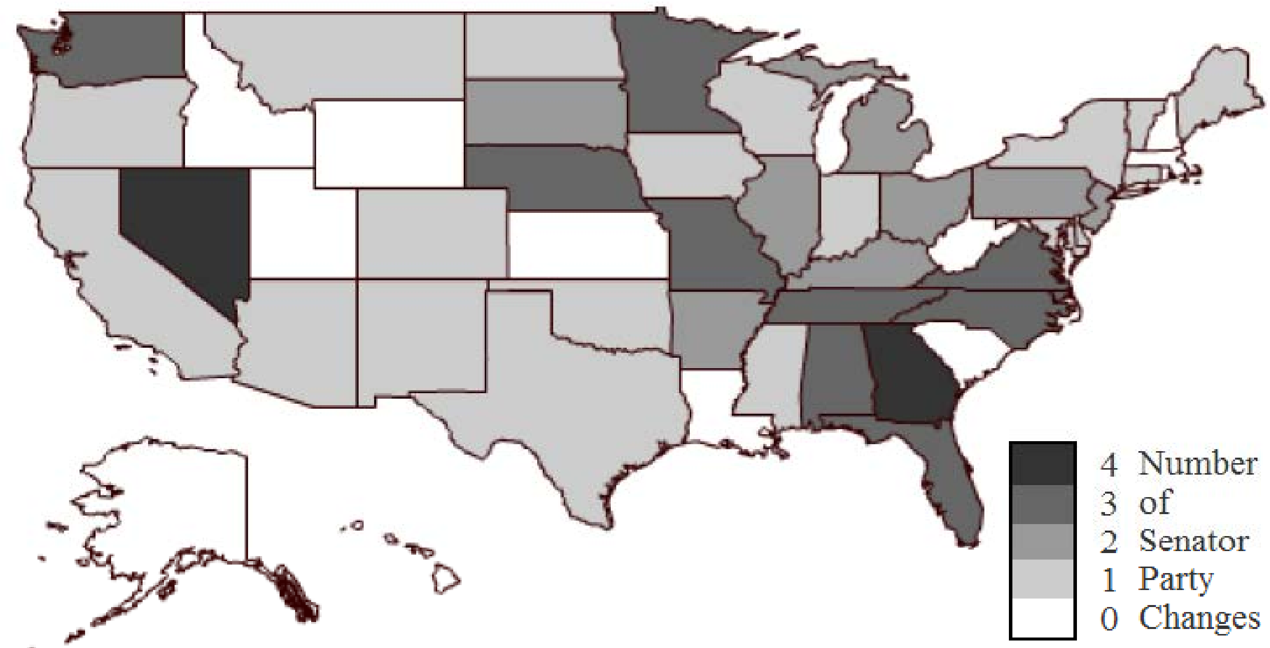


Figure 2b: Partisan Shift of Senate Delegations by State: FY1983-2004

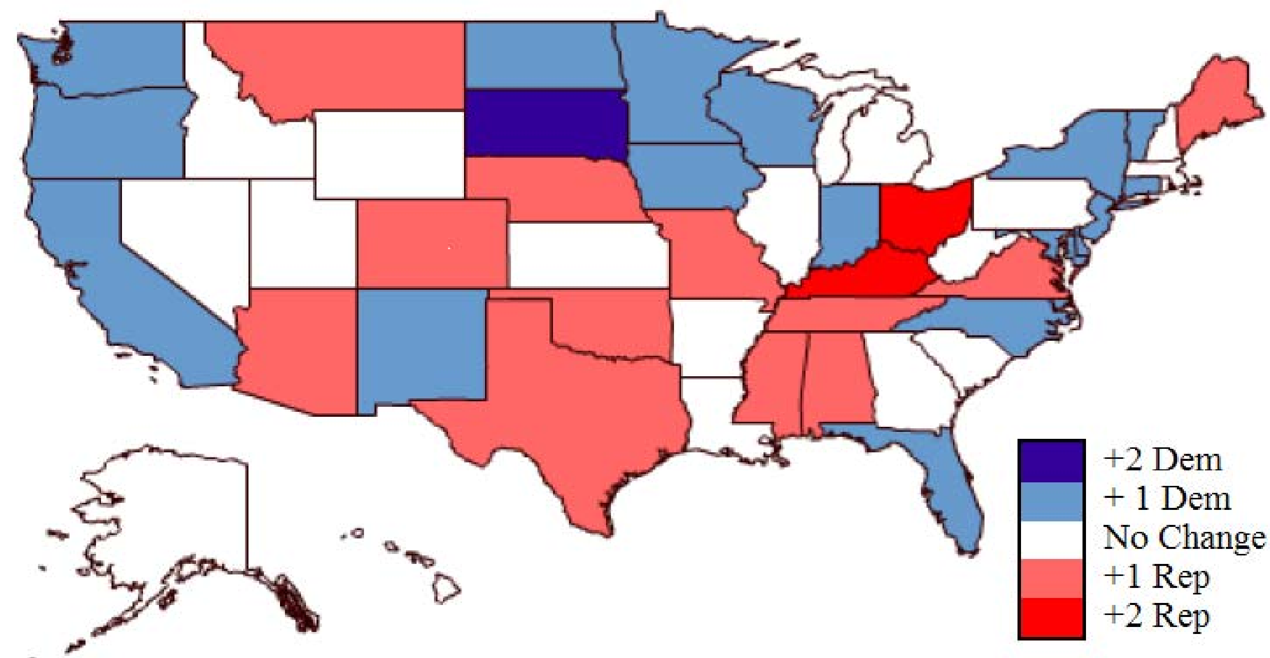


Figure 3a: Ratio of Party Changes to Number of Seats in House: FY1983-2004

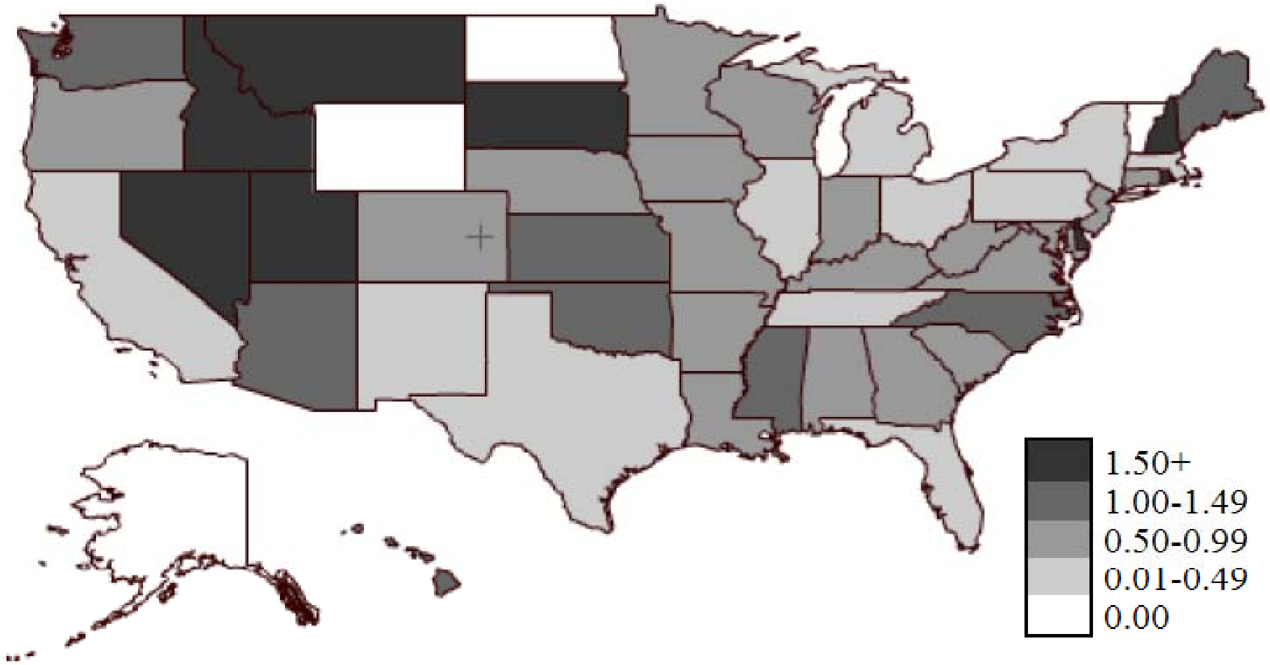


Figure 3b: Partisan Shift of House Delegation by State: FY1983-2004

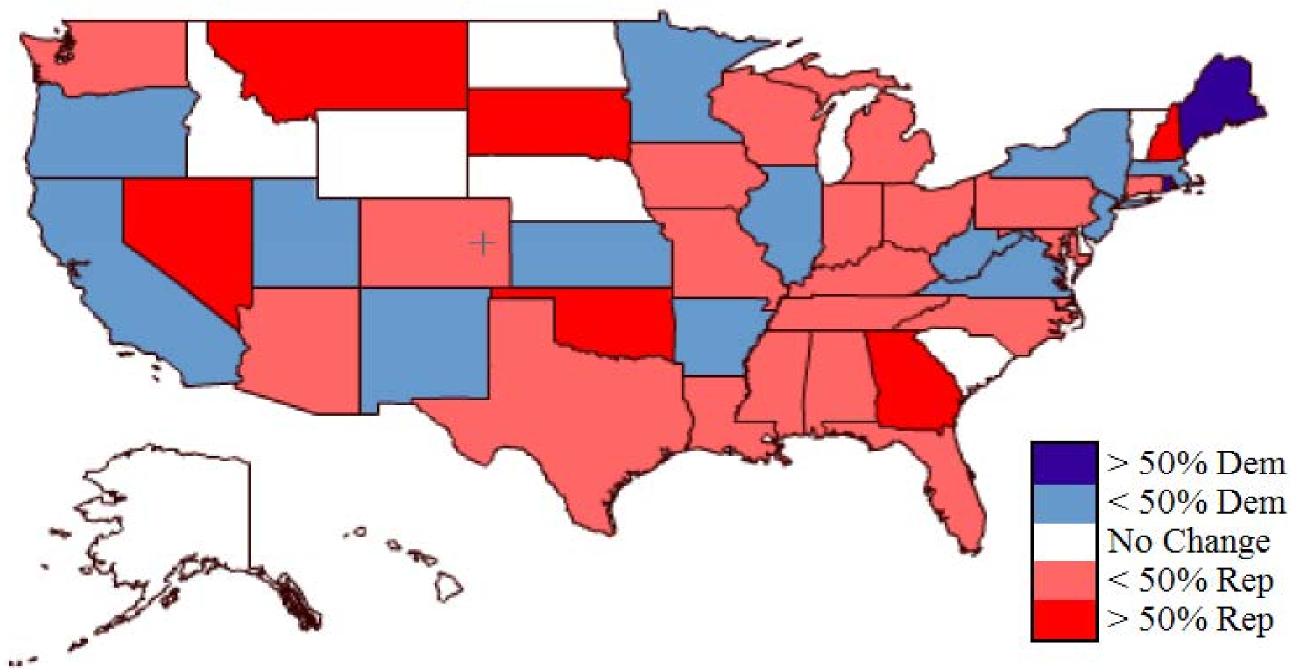


Figure 4: Estimates of Party-Taste Effects for the Senate

Fixed-Effect and Regression-Discontinuity Estimates Compared

Figure 4a: Republican Effect on Defense Spending

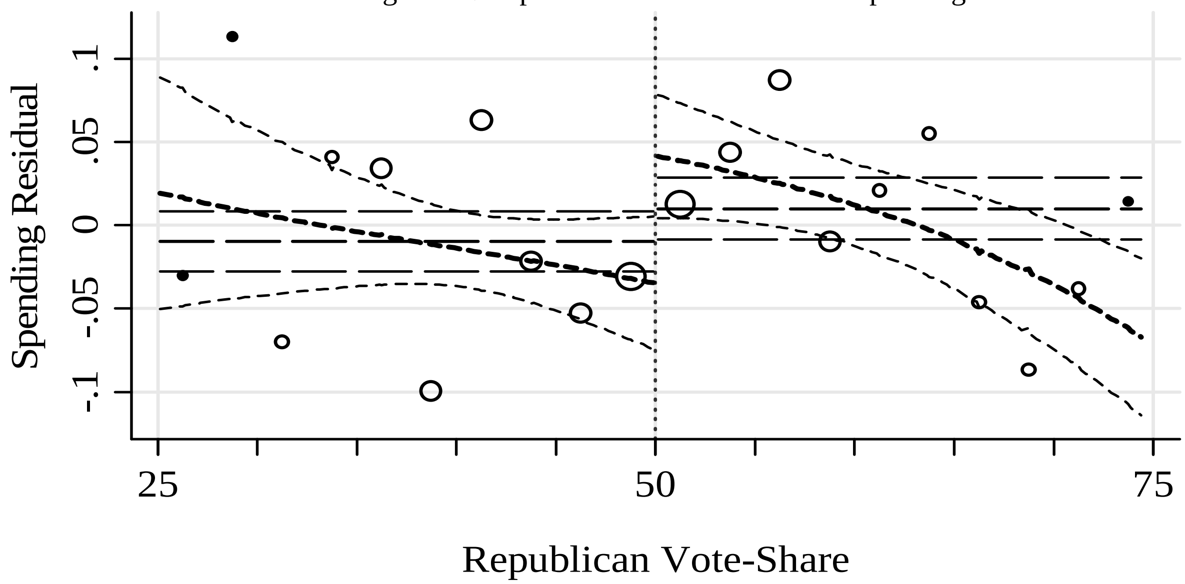
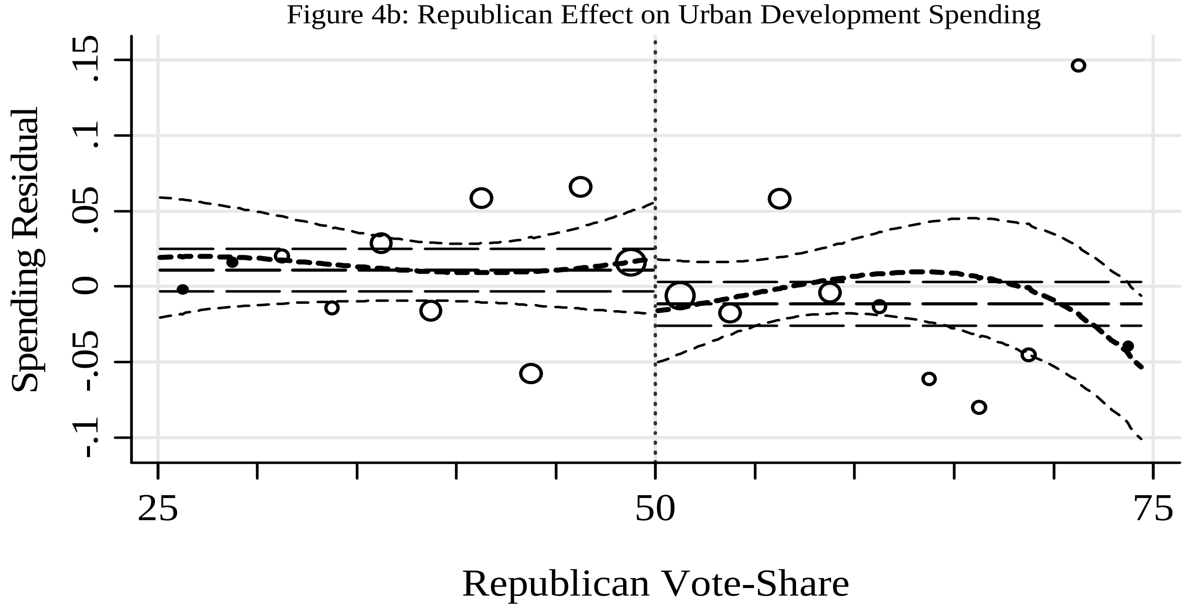
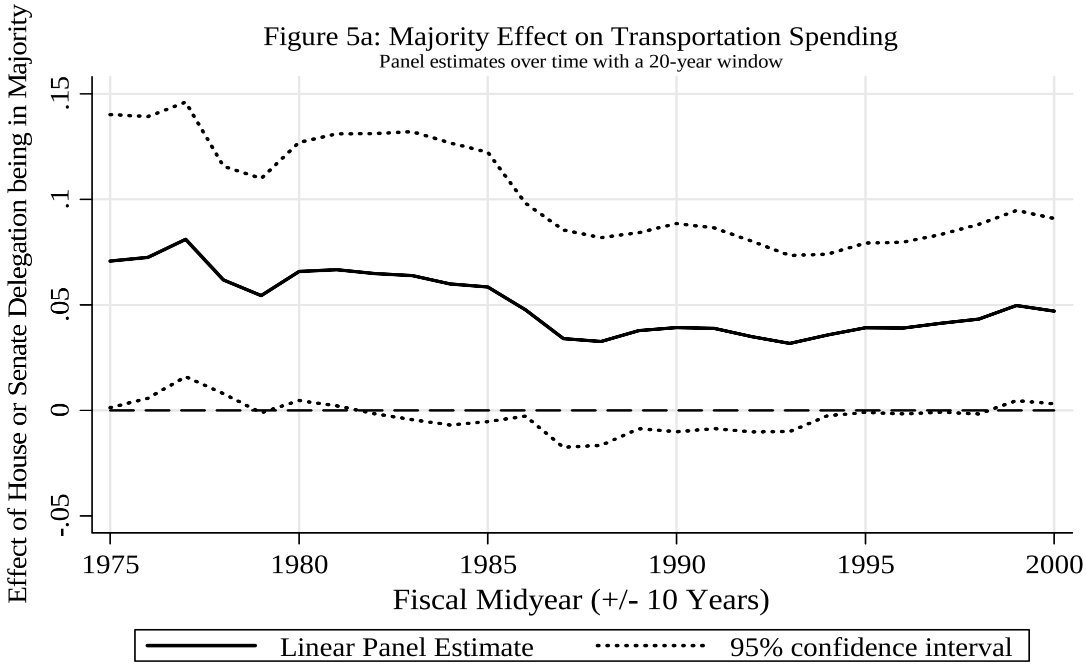


Figure 4b: Republican Effect on Urban Development Spending

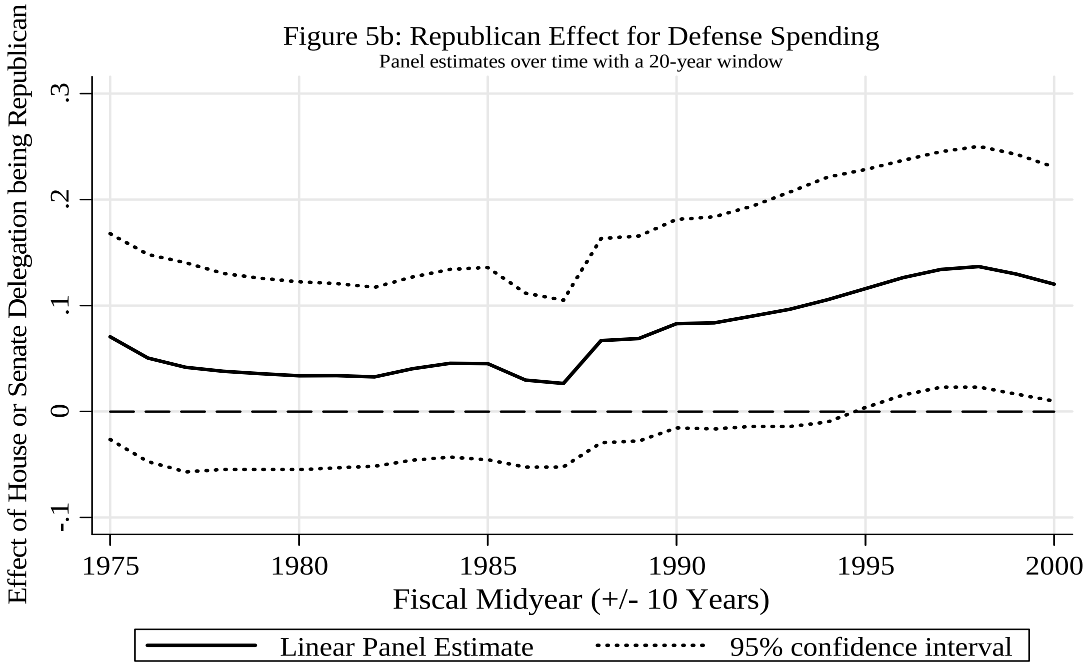


Long dashed lines give the spending averages, controlling for observables, for Democrats to the left of the 50 percent vote-share, and Republicans to the right. The difference at the 50 percent vote-share gives the fixed-effect estimate. The short-dash curve corresponds to the quartic fit of residual spending on the vote-share, with the difference at the 50 percent mark corresponding to the regression-discontinuity estimate. 95-percent confidence intervals given by the thinner dashed lines around the corresponding estimates. Circles give cell means with a cell width of 2.5 percent of vote share, with larger circles corresponding to a greater number of observations. A small dot has 1+ observations, small circle, 50+, medium circle, 100+, large circle, 200+.

Figure 5: Moving Panel Estimates for Longer Series



Effect from the linear model with share of Senate and House Majority representation combined.



Effect from the linear model with share of Senate and House Republican representation combined.