# Party Unity and the Effective Constituency in Distributive Politics

Robert J. Franzese, Jr.*
Karen Long Jusko†
Irfan Nooruddin‡

April 19, 2007§

Abstract: Democratic policymakers respond to pressures from their constituents; however, what comprises the constituency to which policymakers respond varies. We propose conceiving the bases of representation as a continuum from the interests of the policymaker's geographic constituency, her electoral district, $\mathtt{d}$, to those of her partisan constituency, her party's supporters $\mathtt{p}$; and we explain how party unity, $\mathtt{u}$, provides the weight on the partisan extreme in the resulting convex combination giving the *effective constituency*, $\mathtt{nec}$, to which policymakers respond: $\mathtt{nec} = \mathtt{u} \cdot \mathtt{p} + (1 - \mathtt{u}) \cdot \mathtt{d}$. Although we emphasize the fluidity of the basis of democratic representation in a somewhat different way from others who have addressed this topic before us, our main contribution lies in our investigation of the effects of shifting bases of representation on public policy: We evaluate the implications of our argument against postwar histories of public spending and distributive politics in the United States.

*Associate Professor of Political Science, University of Michigan, Ann Arbor, franzese@umich.edu, http://www.umich.edu/ franzese

†PhD Candidate in Political Science, University of Michigan, Ann Arbor, and Center for the Study of Democratic Politics, Princeton University, kjlong@umich.edu

‡Assistant Professor of Political Science, The Ohio State University, nooruddin.3@osu.edu, http://polisci.osu.edu/faculty/nooruddi

§We thank Chris Achen, Andrea Bassanini, Carles Boix, Carew Boulding, Steve Casper, Michael Cohen, Dan Corstange, Fred Cutler, John Ferejohn, Barbara Geddes, Holly Goerdel, Peter Hall, Rick Hall, John Huber, Eric Juenke, Ken Kollman, Margaret Levi, Skip Lupia, José Maravall, Ken Meier, Autumn Payton, Eric Reinhardt, Nita Rudra, Ken Shepsle, Heidi Sherman, Rob van Houweling, and Anne Wren for helpful discussions, comments, criticisms, and/or suggestions over the long gestation of this project, in some cases offered without realizing or expecting we might use some benign remark in this way. Various previous versions of this paper were presented as Franzese and Nooruddin at APSA (1998, 2002), MPSA (2002, 2003), WPSA (2003, 2004), ECPR (2003), and at Michigan, Yale, Columbia, NYU, Texas A&M, and the Juan March Institute in Madrid. Franzese and Jusko have been supported in part in this research by NSF Grant No. SES-0340195; the authors and not the NSF are solely responsible for the content.

## Introduction

The effect of electoral and partisan incentives on provision of publicly funded goods is well-established (see, *e.g.*, Franzese & Jusko 2006; Hibbs 2006): Legislators and political parties provide benefits to valuable constituencies, with the expectation that voters will reward them in electoral competition. Conventional accounts of distributive spending emphasize incentives structured by the timing of elections (*e.g.*, Nordhaus 1975; Tufte 1978), partisan alternation in government (*e.g.*, Hibbs 1977), and electoral rules. Over-time variance in spending on specific categories is attributed to the different incentive structures of those moving in and out of leadership positions.

/INSERT FIG 1 ABOUT HERE/

These explanations, however, offer little help in understanding long-term patterns in distributive public spending– patterns that hold across a variety of spending categories. Consider Figure 1: Water resources is a spending category typically associated with distributive benefits, as it includes, for example, the activities of the Army Corps of Engineers, which was the focus of Ferejohn's (1974) study, *Pork Barrel Politics*.[1] (These data will be described in more detail in the discussion that follows.) The initial increase, and then slow decline in spending in this category cannot be attributed to electoral or partisan cycles. Further, as this wide hump-shaped pattern, generally peaking in the early 1960s (with the exception of a few outlying data-points) and declining towards the end of the time series, is seen in a wide variety of spending categories that are typically associated with pork-barrel politics — agricultural research and services, ground transportation, community development, and miner and railroad retirement — it seems unlikely that this pattern reflects changes in the composition of congressional leadership (see Figure 2).[2] What, then, explains this temporal variance in distributive spending?

/INSERT FIG 2 ABOUT HERE/

Our explanation of distributive politics is based on the changing nature of representation over

[1]See Ferejohn (1974) and Hird (1991) for prominent statements on the role of water resources in constituency services.

[2]Notice that these series are plotted against different $y$-axis scales and that these differ in magnitude. Levitt and Snyder (1995), Adler (2000), Owens and Wade (1984), and Stratman and Baur (2002) identify agricultural services as an especially "porky" public spending category.

time. In particular, we argue that the inability of parties to serve their partisan constituents drives legislators to seek the support of their geographic constituents through distributive spending. Thus, in the American context, it is when party unity is lowest that we should see the highest levels of pork-barrel spending, and vice versa. Although we emphasize the fluidity of the basis of democratic representation in a somewhat different way from others who have addressed this topic before us, our main contribution lies in our investigation of the effects of this fluidity on public policy.

In the discussion that follows, we develop our concept of the *effective constituency*, and situate our discussion in the current political economics literature. Then, using U.S. budget allocations data, we evaluate how shifting bases of representation structure incentives for distributive spending. We find that, even when potentially confounding variables like aggregate economic conditions and policy mood are taken into account, distributive spending patterns reflect the balance of legislators' of geographic and partisan constituencies.

## The Logic of Distributive Spending

Weingast, Shepsle, and Johnsen (1981; henceforth *WSJ*) provide the now-conventional account of the logic of distributive spending: They stress the division of democratic polities into electoral districts, noting that democratic representation everywhere is based on "a districting mechanism that divides the economy into $\mathtt{n}$ disjoint political units called districts" (p. 643), and defining "*distributive policy* [as] a political decision that concentrates benefits in a specific geographic constituency and finances expenditures through generalized taxation" (p. 644; we use this definition of distributive spending throughout this discussion). They thus isolate geographic location as the distinguishing characteristic of distributive policies and politics: "Programs and projects are geographically targeted, geographically fashioned, and may be independently varied" (p. 644). Given these definitions, and assuming legislators follow some log-rolling or universalistic norm, *WSJ* demonstrate that overemphasis on distributive policies, *i.e.*, overspending on pork-barrel (district-targeted) projects, is an increasing function of the number of electoral districts.

To be precise, first, index the $\mathtt{n}$ electoral districts $\mathtt{i} \in [1 \ldots \mathtt{n}]$. Then, assume benefits, $\mathtt{B}$, of any particular pork-barrel project concentrate in district $\mathtt{i}$ (for analytic clarity: entirely so) and

increase with the size or cost of the project, $B_i = f(C)$, which, with diminishing returns, gives $f' < 0$ and $f'' < 0$ as usual. By definition of a distributive policy, the costs accrue more uniformly across all $n$ districts (for analytic clarity: entirely so): $C_i = \frac{C}{n}$. The individual district then faces a utility-maximization problem, $Max_c f(C) - \frac{C}{n}$, for which the solution is simply $f'(C) = \frac{1}{n}$. The optimal project-size from the individual district's view thus increases in the number of districts.

If legislatures decide democratically, without log-rolling, universalist norms, or side-payments, then all pork-barrel projects lose legislative votes $(n-1) \rightarrow 1$ because only receiving districts derive net benefits, $f(C) - \frac{C}{n}$, while others only pay costs, $\frac{C}{n}$. *WSJ* argue, contrarily, that legislators could adopt a universalistic norm where all legislators vote for distributive bills ("I'll vote for yours; you vote for mine"), implying the legislature passes the district-by-district optimal, leaving pork-barrel spending proportional to the number of districts. Riker (1962) shows, however, that optimal coalition-building strategies in majority-rule legislatures involve side-payments sufficient to induce bare-majority support (*minimum-winning coalitions*) for distributive projects, meaning $\frac{(n-1)}{2}$ other legislators must receive $\frac{C}{n} + \varepsilon$, which also implies overemphasis on pork proportional to the number of districts, albeit more marginally so. Specifically, under universalism, all projects with $B > \frac{C}{n}$ pass, whereas under majority-rule with side-payments, only projects with $B > [\frac{(n+1)}{2n}] \cdot C$ pass. [3]

Thus, distributive spending increases with the number of districts, especially when as legislative

[3]Later scholarship, though, deduced several reasons super-majoritarianism may indeed govern legislative decision-making. Shepsle and Weingast (1981), *e.g.*, note that, given uncertainty over membership of minimum-winning coalitions, legislators prefer super-majorities to insure against their omission. Luebbert (1986) and Strom (1990) argue similarly regarding parliamentary government formation that, with uncertainty over legislative support, which, *e.g.*, secret balloting or lack of party discipline may induce, coalition builders would seek super majorities. Others stress that legislative procedures affect optimal-coalition size. Carrubba and Volden (2000) show that, in fact, all coalitions from minimum-winning to universal may form depending on amendment openness and other procedural rules. For example, Baron (1991) finds universalism on distributive bills unlikely yet over-provision still prevails to a degree mitigated by procedural openness (see also Volden and Wiseman 2007). Similarly, McCarty (2000) and Bradbury and Crain (2001) argue that, respectively, presidents or second chambers dampen without eliminating the $\frac{1}{n}$ effect by we infer adding a legislative step in which veto or amendment may occur.

To these considerations, we would add that, if voters are rationally ignorant, $\frac{C}{n}$ may be too small for non-receiving-district voters to notice even while receiving-district voters readily appreciate their much larger

behavior tends more universalistic and less minimum-winning. The logic of accounts of distributive spending that emphasize the number of electoral districts are analytically attractive.[4] Nevertheless, these accounts can offer no explanation of changes in distributive spending when the number of electoral districts remains fixed, as in the case of U.S. water resource spending in the post-war period.

## The Number of Effective Constituencies

Here, we build on the logic of distributive politics, as presented in *WSJ* and described above, but incorporate an understanding of representation more in keeping with the work of democratic theorists, and scholars in American politics.

Notice that in WSJ's account, the relevant constituency for legislators is geographically defined. Pitkin too, in her classic analysis of representation, also emphasizes a geographic understanding of representation: "[W]riters disagree on the appropriate role or conduct for a representative: should he act on his own judgment of what is in the national interest, or should he be a faithful servant of his constituency's will?" (1969: p. 7). Other analysts, however, have emphasized a model of *partisan* representation in which legislators represent partisans residing in their district only insofar as they conform to the national distribution of party support, as well as partisans who are

net benefit, $f(C) - \frac{C}{n}$. Thus, with rationally ignorant voters, legislators could more easily forge universalist log-rolls or other super-majoritarian agreements to support each other's pork barrel requests via some co-operative solution to their iterated-prisoners-dilemma game. Such cooperation is especially likely because legislators number relatively few, have relatively homogenous interests in this regard, and interact repeatedly and indefinitely (Axelrod 1984). Furthermore, voters' rational ignorance also facilitates the side-payment arrangements that forge super-majorities behind distributive policies because legislators will demand smaller payments to support others' distributive proposals the greater is their voters' ignorance. In the limit, rational ignorance revives universalist scenarios wherein distributive projects maximize pork-barrel benefits district-by-district. Moreover, the total size of distributive inefficiencies or side-payment excesses about which voters may rationally remain ignorant also rises with the number of districts over which such costs distribute.

[4]Recent advances following such institutional approaches for textbook compilation of some of which see, *e.g.*, Persson and Tabellini (2000) likewise emphasize the number of electoral districts (*inter alia*) and produce similar (although broader) theoretical intuitions.

in the minorities of other electoral districts (*e.g.*, Weissberg 1978). In this partisan understanding of democratic representation, the broadest constituency-interest a representative might serve thus reflects a partisan (*i.e.*, still partial) conception of the national interest.[5]

Following a strong tradition in American politics, we recognize that legislators' incentives may be structured by the need to appeal to more than one constituency. While other analysts have emphasized the competing influences of constituencies within a legislator's district, here we argue that legislators face incentives to be responsive both to geographically-defined constituencies and to their larger partisan constituency. We propose, further, that these incentives vary with the nature of contemporaneous party competition: Incentives to be responsive to geographic or partisan constituencies likely vary with district- and national-level electoral competitiveness, partisan polarization, and other features of specific elections as well as of more permanent features of electoral and party systems (see, e.g., Franzese 2004). In the U.S. context, we concentrate on party unity, or the degree to which parties are able to act as strategic units and receive their electoral support as units. Thus, a policymaker's effective constituency is a combination of her geographically-defined electoral district and her party's supporters, with the weight of the latter increasing with the degree of party unity.

To see the importance of party unity in structuring the relevant, effective constituency for legislators and its effect on distributive spending, consider the degree to which policymakers receive electoral support as members of a particular party or as legislators representing a particular district. When partisan interests dominate, voters may respond sufficiently to the party label, such that individual representatives have less incentive to demand or to initiate and pass district-targeted policies in an attempt to generate particularistic support. In this case, party leaders few incentives to support distributive policies, and may resist the fragmentation of the party's more general appeal. Alternatively, when party labels are less useful to legislators as a means of generating electoral support – i.e., in times of low party unity – legislators have incentives to provide their

[5]Partisan representation, for our purposes here at least, may also subsume interest, ideology, and identity-group representation. As such, our argument here corresponds well to the literature in American politics on the variation in effects of responsible party government versus government in a candidate-centered era when parties are less important (see, for example, Brady 1988, Bullock and Brady 1982, and Fiorina 1980).

geographic constituency with targeted, distributive benefits. Under these circumstances, party leaders may use distributive projects as side-payments to legislators for their votes on broader general- or partisan-interest legislation (Evans 2004). Thus, as party unity (discipline, coherence) increases, legislators' partisan constituencies become a viable source of electoral support, and, as unity declines, the salience of geographic constituencies for a legislator's electoral success increases.

To clarify the intuition behind this contention, imagine that the House of Representatives operated in isolation, and under varying degrees of party unity.[6] As we've suggested above, the more apt is a unitary-actor characterization of the political parties, the more an individual Representative's legislative behavior is given by her party label.[7] When party unity is complete, party labels will be more meaningful to voters than the attributes of their individual Representatives. As a consequence, individual Representatives have little to gain by making localistic appeals within their electoral districts, and partisan constituencies interests dominate their policy-making. Conversely, as the independence of Representatives as legislative actors increases, the party label becomes less meaningful. Absent meaningful party-labels, both as electoral draws and as prescriptions for legislative behavior, the individual Representatives' electoral districts become more relevant to them and constituency service (including distributive projects) becomes more important to them and their supporters. Thus, the 435 electoral-district constituencies become more dominant.

Therefore, the House of Representatives' number of effective constituencies ($\mathtt{nec}$) lies between $\mathtt{nec} = 435$ and $\mathtt{nec} = 1$, with the extremes reflecting perfect party-disunity (*i.e.*, legislative and electoral irrelevance of party label) and perfect party-unity (*i.e.*, legislative and electoral irrelevance of any individual Representative or district characteristics). More fully, the number of effective constituencies lie on a continuum from pure partisan- to pure geographic-representation, therefore

[6]For ease of illustration, we consider the House of Representatives exclusively in much of what follows, but will incorporate the Senate and Presidency later on in our discussion.

[7]We will be using party unity as an empirical summary statistic, so we need neither assume it nor endogenize it theoretically here. Party cohesion scores have a long history in political science; for a recent review, see Desposato 2005. Franzese (2004) distinguishes *strategic party unity*, the degree to which the party is able to act as a unit in its collective interests, from *representative party unity*, the degree to which members gain votes by virtue of their party label. Insofar as the two have different policy effects, the present discussion stresses representative party unity exclusively.

can be well-represented by a convex combination of the numbers of governing parties, $p$, and electoral districts, $d$. As we suggest, the relative weight of $p$ increases with the degree of party unity, $u$, characterizing that system. We adopt the simplest possible convex-combination, a linear weighted-average: $nec = u \cdot p + (1-u) \cdot d \quad with \quad u \in [0 \ldots 1]$.[8] Given any two sessions of Congress, therefore, more (fewer) effective constituencies exist in the system with lesser (greater) party-unity.

Applying our concept of effective constituency to the logic of distributive politics is straightforward: First, following *WSJ*, suppose distributive policies are those that concentrate benefits within a single effective constituency but spread costs more evenly across all constituencies. (Recall the categories of spending we considered above: water resources, agricultural research and services, ground transportation, community development, and miner and railroad retirement.) Then, we would expect "distributive overemphasis and pork-barrel overspending" to increase with the number of effective constituencies. Holding constant the numbers of parties and of electoral districts then, as we suggest above, distributive politics and spending decrease with party unity.

## Empirical Exploration: U.S. Budgetary Policy & Party Unity, 1951-2001

The *Policy Agendas Project*[9] collects data on annual budgetary allocations to all government subfunctions from 1947 to 2003.[10] Our interest is in those categories that can be argued to target their benefits narrowly.

To guide us in identifying such categories, therefore, we consult existing literature on distributive politics and "pork-barrel" spending in relation to the Policy Agendas Project code book descriptions of these subfunctions. We settle on five categories of spending that jointly comprise the dependent variable in this analysis:

1. Water Resources (Subfunction 301): This category is a classic focus of studies of distributive spending (Ferejohn 1974; Crain 1999; DelRossi and Inman 1999; McCubbins and Thies 1997;

[8] In these convex combinations, $u = f(\cdot)$ could be specified empirically as the logit (i.e., $[1 + e^{-X\beta}]^{-1}$) or probit (i.e., cumulative normal: $\Phi(X\beta)$) function to ensure $0 \leqslant f(\cdot) \leqslant 1$.

[9] Data are available at http://www.policyagendas.org.

[10] We thank John Ferejohn for (long ago) suggesting U.S. historical data as a test-bed for our ideas.

Hird 1991). It includes the activities of the Army Corps of Engineers, which "is charged with conducting studies, investigating, maintaining, and constructing projects for U.S. rivers, harbors, flood control, shore protection (beach erosion), and related areas" (True 2005: 9). It also includes similar activities conducted by the Bureau of Reclamation and the Department of Agriculture.

2. Agricultural Research and Services (Subfunction 352): Like water resources, agricultural subsidies have traditionally been seen as prototypical distributive policies (Levitt and Snyder 1995; Adler 2000; Owens and Wade 1984; Stratmann and Baur 2002). This subfunction includes extension services, research and inspection programs, cooperative forestry, and experimental stations with land-grant universities (True 2005: 12)

3. Ground Transportation (Subfunction 401): This category includes funding for highways, mass transit, railroads, and the former Interstate Commerce Commission (Crain 1999; Stratmann and Baur 2002; Lee 2003).

4. Community Development (Subfunction 451): This subfunction includes a variety of small urban and rural development grants (True 2005: 16). Studies using a version of such community development spending as a measure of distributive policy include Limosani and Navarra (2001), Denemark (2000) and Taylor (1992).

5. Miner and Railroad Retirement, excluding Social Security (Subfunction 601): Our final category is a subfunction allocating funding for benefits to retired railroad workers as well as special benefits for disabled coal miners (True 2005: 21).

The choice of these spending categories, therefore, reflects consensus in the literature about the types of policies that may be especially manipulable and targetable by legislators, for their electoral advantage.[11]

Following *WSJ*'s emphasis on overspending, then, we focus on the share of the budget or of GDP spent on distributive projects. We jointly estimate a system of ten seemingly unrelated

[11]Note that the results reported and discussed below are robust to omitting any of the five categories of spending. Results available from the authors.

regression equations (SURE models), each regressing the federal government budgetary allocations for each category listed above, as shares of total budgetary allocations and of GDP, on several control variables and our measure of the number of effective constituencies. This strategy, even in the absence of cross-equation restrictions on estimated coefficients, increases the efficiency of the estimation by allowing cross-equation residual-correlation. (This strategy is effective is at least one regressor differs across equations, which the lagged values of the dependent variables do.) [12] We use a simple partial-adjustment (or lagged dependent variable) model, which accommodates serial correlation and allays unit-root concerns adequately. [13] Under this specification, coefficients represent the *first-period* effects of unit increases in the independent variables on the dependent variable, while the long-run, cumulative effects of *permanent* unit increases in the independent variables are given by $\frac{\beta}{1-\rho}$ where $\beta$ is the coefficient on the independent variable of interest and $\rho$ is the coefficient on the lagged dependent variable. Since we expect most of the independent

[12]The Beck-Katz (1995, 1996) warning regarding the Parks procedure for estimating equations from pooled time-series-cross-section data applies here also; one should not attempt to estimate too many residual variance-covariance parameters relative to degrees of freedom. For Parks procedure, by their simulations, $T$ should comfortably exceed twice $N$. We will effectively have 10 time-series equations estimated in parallel. However, with 10 equations and 54 observations each, $T$ here is 5.4 times the equivalent to $N$; alternatively considered, we have 540 total observations with which to estimate the 90 ($N(N-1)$) cross-equation residual-covariances (*i.e.*, 6 times as many observations as parameters). Thus, feasible generalized least squares, in this case SURE, should provide *bona fide*, not misleading, smaller standard-errors according to Beck and Katz's simulations.

The results presented below are robust to several alterations in the specification of the system. They hold if we specify the dependent variables as shares of total budgetary allocation, of GDP, or in constant dollar terms. The results are also robust to SURE systems using any two of these three measures.

[13]We also analyzed these data using richer dynamic specifications, including an error-correction framework in which changes in the dependent variable are regressed on (i) the lagged level of the dependent variable and lagged changes to account for serial correlation, (ii) lagged changes and levels of the independent variables as suggested by theory. Our results are robust to the wide variety of dynamic-model specifications we considered. Since the series chosen for analysis appear overwhelmingly stationary, and since the simple partial-adjustment model suffices to eliminate or virtually eliminate any residual serial-correlation, we report the simplest of these models.

variables to have their effect through the policymaking process, the independent variables enter in lagged levels to allow a sufficient time-lag from impetus to response. The economic-performance measures are the only exceptions, as explained below.

To help insure against spurious results, we estimate this model with and without the inclusion of several relevant control variables. Obviously, public spending will respond to economic conditions regardless of constituency conditions fostering distributive politics. Thus, we control for real GDP *per capita* growth (Growth) and levels (GDPpc), CPI inflation rates (Inflation), size of the federal deficit (Deficit), and unemployment rates (UE). Indeed, much of the effects of economic performance would accrue *via* immediate, quasi-automatic responses in the numerator or denominator of the dependent variable, so growth and unemployment enter contemporaneously, the latter entering in contemporaneous changes and lagged levels as most previous work finds unemployment movements at least as strongly related to economic policy as are levels. All economic data are drawn from the U.S. Bureau of Economic Analysis. As reviewed above, spending may respond to government ideology (Hibbs 1977), its majority status, and/or to incentives to manipulate economic policy for electoral purposes (Tufte 1978), so we also include an indicator for whether the Democratic Party is the majority party in the House (HseMajor)[14], whether there is divided government (Divided)[15], and an indicator for whether the current is an election year (ELE).[16] Finally,

[14]As an alternative indicator, we used a "center-of-gravity" partisanship measure using "expert" codings of the left-right positioning of parties available from Appendix B to Laver and Schofield (1990) to measure the partisan position of the average government member. A left-right code for each party is obtained by rescaling the several source indices from 0 ≡ extreme-left to 10 ≡ extreme-right and then averaging available indices for each party. The Democrats are 4.8213 and Republicans 7.61 in this scale. These party scores are then used to calculate the government's partisan position as the average of the party positions of the governments members. The U.S. government's position is assumed to be 1/3 the President's, 1/3 the average Senator's, and 1/3 the average Representative's. Our results do not differ substantively when we use this measure.

[15]With both houses of Congress not controlled by the President's party, Divided = 1; with one house controlled by the President's party, Divided = 0.5; with both houses controlled by the President's party, Divided = 0.

[16]We also tried Franzese's (2002) more-detailed electoral indicator, which considers the President and each house as 1/3 the government, and only 1/3 of the Senate faces election each congressional election-year.

we include a measure of *Public Policy Mood* (Mood) derived by Erikson, MacKuen, and Stimson (2001) to control for the possibility that some pattern in the evolution of societal preferences over economic policy explains the observed patterns in distributive spending (Soroka and Wlezien 2005; Stimson 1999). Higher values of the Mood variable correspond to a public preference for 'liberal' policy, while lower values correspond to 'conservative' public preferences. Accordingly, we would expect Mood to be positively correlated with increased government spending.

In partial-adjustment form, then, each seemingly-unrelated-regression equation (SURE) specifies:

$$\begin{aligned} \mathsf{GS}_{i,t} &= \beta_{i,0} + \beta_{i,1}(\mathsf{GS}_{i,t-1}) + \beta_{i,2}(\mathsf{NEC}_{i,t-1}) + \beta_{i,3}(\mathsf{Growv}_{i,t}) \\ &\quad + \beta_{i,4}(\mathsf{GDPpc}_{i,t-1}) + \beta_{i,5}(\mathsf{Inflation}_{i,t-1}) + \beta_{i,6}(\mathsf{Deficit}_{i,t-1}) \\ &\quad + \beta_{i,7}\Delta(\mathsf{UE}_{i,t}) + \beta_{i,8}(\mathsf{UE}_{i,t-1}) + \beta_{i,9}(\mathsf{HseMajor}_{i,t-1}) \\ &\quad + \beta_{i,10}(\mathsf{Divided}_{i,t-1}) + \beta_{i,11}(\mathsf{Mood}_{i,t-1}) + \beta_{i,12}(\mathsf{ELE}_{i,t}) + \varepsilon_{i,t} \end{aligned} \tag{1}$$

where subscripts $t$ and $i$ indicate year and equation. $\mathsf{GS}_i$ is the measure of government spending used in equation 1 and NEC is our measure of the number of effective constituencies ($n_{eff}$) in the U.S. that year. That measure is the core of our empirical exercise, and we expect, following our augmented *WSJ* model, that its coefficients will be positive in each equation. By measuring the number of effective constituencies before and outside estimation of these empirical models, we set

Thus, House and Presidential elections rate 1/3, and Senate elections $(1/3) * (1/3) = (1/9)$. Finally, all elections are assumed to occur November 7, so the indicator in the election year is $\mathsf{ELE} = [(1/3) * \mathsf{P} + (1/3) * \mathsf{H} + (1/9) * \mathsf{S}] * [311/365]$ where $\mathsf{P}(\mathsf{H}, \mathsf{S}) = 1$ if there is a presidential (House, Senate) election that year, and 311/365 is the proportion of the year past by election-day. The year prior to an election thus equals $[(1/3) * \mathsf{P} + (1/3) * \mathsf{H} + (1/9) * \mathsf{S}] * [1 - \mathsf{M}/12 + (\mathsf{d}/\mathsf{D})/12]$. This produces a pre-electoral indicator that cycles [.0491, .2843, .1145, .6633], with the last being the presidential-election year. We considered this election-year indicator contemporaneously and both contemporaneously and with a lag, the lag indicating the year *after* an election, which Franzese (1999, 2002, 2003) has repeatedly found at least as significantly distinct from other years in economic policies as the pre-election year indicated by the contemporaneous entry. Signs of such post-election effects emerged only inconsistently here. Using this ELE indicator, with or without the lag, does not alter any important result substantively.

the null hypothesis as that this measure relates (positively) to spending and as alternative merely that it does not.[17]

### Measuring the Number of Effective Constituencies

As we suggest above, we think of the effective constituency to which a particular legislator responds as a convex combination of the salience of her broader partisan constituency and of her geographically-defined electoral constituency. Generalizing from here to the number of effective constituencies represented by many legislators, *i.e.*, summing over all representatives in all branches of government, we might measure number of effective constituencies in the U.S., at a specific point in time, according to the following expression:

$$\begin{aligned} NEC = 0.5 \cdot [U_{HD} \cdot 1 + (1 - U_{HD}) \cdot N_d^h + U_{HR} \cdot 1 + (1 - U_{HR}) \cdot N_r^h] \\ 0.5 \cdot [U_{SD} \cdot 1 + (1 - U_{SD}) \cdot \frac{N_d^s}{2} + U_{SR} \cdot 1 + (1 - U_{SR}) \cdot \frac{N_r^s}{2}] \end{aligned} \quad (2)$$

Here, $U_{JK}$ represents party unity within the House or Senate ($J = H, S$), and among Democrats or Republicans ($K = D, R$), and $N_k^j$ reports the number of House or Senate Democrats or Republicans.[18] This expression reflects as assumption that the House and Senate are equally important in policymaking, and that the president's number of effective constituencies is fixed and so may

[17] A more direct and revealing test would allow the data to adjudicate whether numbers of governmental parties and of electoral districts affect spending in the manner hypothesized, *i.e.*, in a convex combination with weight a function of party unity, against a stronger alternative that these factors might affect spending linearly additively or not at all (as, *e.g.*, Franzese 1999, 2002, 2003 do in monetary-policy contexts). However, as noted, U.S. electoral-district numbers do not vary and governmental parties numbers hardly vary in our sample, offering very little empirical leverage for such more-direct and -powerful empirical evaluation of our argument. It remains a promising avenue for future research.

[18] We use the party unity scores calculated and published by *The CQ Almanac*. Accordingly, party unity is measured as "the percentage of *Party Unity Votes* on which a representative voted 'yea' or 'nay' in agreement with a majority of her party," where a *Party Unity Vote* is a vote in the Senate or House that splits the parties, a majority of voting Democrats opposing a majority of voting Republicans. See Desposato 2005 for a recent review of the use of this measure of party cohesion.

be ignored.[19] Thus, the numbers of effective constituencies in the House and Senate average to produce the number of effective constituencies in the U.S. political system.

We thus divide U.S. effective constituencies into 4 sets: effective House Republican and Democrat, and Senate Republican and Democrat constituencies. For each legislator, the level of party unity serves to weigh the degree to which her district- or her partisan-constituents' interests is reflected in her behavior. As we suggest above, when party unity is high, legislators appeal to more broadly-based ideological constituencies, and the number of effective constituencies is low. Alternatively, when parties are unable to provide a coherent partisan message, legislators have strong incentives to cultivate a personal constituency within their district, and the number of effective constituencies will be quite large.

/INSERT FIGURE 3 ABOUT HERE/

Figure 3 reports our measure of the number of effective constituencies for post-war period, NEC. Although the numbers of parties and electoral districts rarely change in this period, the bell-shaped pattern reflects a decline then rise in legislative party-unity. Peak party-disunity and so peak effective-constituency numbers occur in the early 1970s, which corresponds to the period of re-alignment in American politics. The 1950 levels of NEC and party unity are regained by 1990. The recently-commented increased cohesion of the two major parties is documented by the steadily decreasing number of effective constituencies over the last decade. If our re-conceptualized *WSJ* model is correct, distributive politics and spending should similarly rise then decline.

## Results and Analysis

Tables 1 and 2 summarize the estimation results of our analysis. In all equations, the coefficient on the lagged level of the NEC variable is positive, as hypothesized, and the relationship is significant at minimally the $p < 0.088$ level, which minimum occurs in the ground-transportation-

[19] Although senators number two per state, each delegation represents only one constituency (i.e., the state), so the number of senators for each party divided by two is the number of constituencies represented. In future work, presidents may enter NEC by weighted-averaging equation (2) with another term representing the number of presidential constituencies (to be determined) and a weight given by the policy efficacy of the president.

as-a-share-of-GDP equation, and at the $p < 0.05$ level for all the other equations. Further, there is remarkable consistency in the magnitude of the coefficients estimated for the effect of NEC across model specifications: With a few exceptions (*e.g.*, spending on ground transportation as a share to total spending), there is little evidence that the effect of the number of effective constituencies is confounded by aggregate economic and political conditions.

/INSERT TABLE 1 ABOUT HERE/

Few other political-institutional variables do contribute, nevertheless, to spending in these categories. For example, as Table 2 reports, only the *Policy Mood* variable has estimated coefficients that consistently reach or approach conventional levels of statistical significance. As hypothesized, Mood is positively related to government spending. The identity of the Party in control of Congress or whether partisan control of government is divided are found not to have significant effects on any of these measures of spending, with partisanship coming close in equations 6 and 7 and Divided coming close in 3 and 4. Pre-election effects are not consistently found across all the spending categories, but significant cycles may exist in spending on miner and railroad worker retirement (excluding social security) both as shares of GDP and of the budget, in agricultural research and services as shares of the budget, and in ground transportation and community development as shares of GDP. Overall, this gives fair support for the existence of U.S. electoral cycles in at least some distributive-spending categories.

/INSERT TABLE 2 ABOUT HERE/

Turning our attention to the economic control variables, we find that changes in unemployment result in increased spending on community development, miner and railroad worker retirement, water resources, and agricultural services, though only the effect of changes emerges consistently across models. The lagged level of unemployment is positively related to miner and railroad worker retirement, but has no significant effect on any of the other measures. The only other economic factor to have consistent effects in the hypothesized direction is the size of the federal deficit, which is found to have a negative effect on four of the five measures of spending: The only category apparently immune to larger deficits is Community Development (CDev).

Table 3 presents Wald joint hypothesis tests of the significance of the NEC variable in the full specification, across pairs of equations. These joint significances are also very impressive, with the

effects jointly significant minimally at the $p < 0.088$ level, which occurs in the test for the coefficient in models 7 and 8, and at the $p < 0.05$ level or better for all other pairs of equations.[20] Finally, the Wald test for the joint hypothesis test across all equations yields $p \approx 0.0000$. Thus, we can be quite confident that as the increased salience of legislators' geographical constituencies,is associated with increased distributive spending. Conversely, periods that are characterized by salient, coherent partisan constituencies, demonstrate lower levels of distributive spending. These patterns hold even when controlling for an array of economic conditions, the partisan, electoral, and majority-status indicators, and societal *Policy Mood*.

/INSERT TABLE 3 ABOUT HERE/

To analyze the substantive magnitude of the estimated effects of the number of effective constituencies, we use the relationship estimated in model 2 in Table 2, which regresses agricultural services as a share of total spending ($\mathsf{AG-TS}$) on the number of effective constituencies.[21] Figure 4 plots the estimated response of $\mathsf{AG-TS}$ to the actual path of the number of effective constituencies 1951-2003. The simulation assumes $\mathsf{AG-TS}$ was in long-run equilibrium at its 1950 level of 0.26% of total budgetary allocations, and that all other variables remain constant. The actual path of $\mathsf{AG-TS}$ is plotted on the same graph against the right axis for comparison. Generally, the estimated response tracks the peaks and troughs of government spending on agricultural spending quite well, and the downward trend since about 1971 seems to have coincided with a rise in party-unity over that time and the corresponding decline in the number of effective constituencies. Moreover, these data suggest that over a quarter ($\frac{.045}{.175} \approx 25.7\%$) of the rising-then-falling path of U.S. agricultural research and services spending may be attributable to a parallel path in the number of effective constituencies, which, in turn, stemmed from a mirror-image decline then rise in party unity.

/INSERT FIGURE 4 ABOUT HERE/

[20] In the discussion that follows, model numbers correspond to those in Table 2. See the note to that table for information about the relevant dependent variable in each model.

[21] We use Model 2 as it is the most precisely estimated of the models reported in Table 1 with an estimated RMSE of 0.021.

## Conclusion

At the core of our discussion is the use of a broader conception of constituency: Legislators may simultaneously feel the pull of their geographic and their partisan constituencies, and the extent to which either constituency dominates may be determined by contemporaneous partisan politics. Of course, the idea that legislators must balance competing constituencies is not new. Nevertheless, our contribution lies in applying this more fluid understanding of representation to the analysis of distributive politics. Thus, we argue that when the basis of support is narrowly concentrated, *i.e.* when the geographic basis of representation weighs more heavily on U.S. legislators than does their partisan basis of representation, their incentives to target benefits narrowly is likewise accentuated. Conversely, when broad partisan constituencies provide the basis of representation, incentives to distribute narrowly targeted benefits diminish in favor of more broadly targeted redistribution to those partisan constituencies. As our empirical analysis demonstrates, incorporation of fluidity in the basis of representation in this manner may account for otherwise puzzling patterns in U.S. public-spending policies.

The effective constituency concept, which we think of as a convex combination of a legislator's geographic and partisan constituencies, may prove useful in thinking about the bases of representation more generally. Imagine, for example, incorporating an analysis of the influence exerted by industrial interests as a third node among the possible bases of representation, perhaps adding the degree of corporatism, competitiveness, polarization, and features such as district magnitude to party unity as determinants of the relative weight of these alternative bases of representation. Similarly, the concept of the number of effective constituencies might readily expand to incorporate the distribution of power in federal polities. In any case, investigating how the character and intensity of partisan and electoral competition determines not only the magnitude of legislators' incentives toward responsiveness but also the nature of the constituencies toward which legislators show that degree of responsiveness may prove very fruitful.

Our discussion seeks to return the study of representation from an emphasis on the congruence of legislative acts and constituents' interests to the prior question: In the interests of which of their many possible constituencies do legislators act? Recognizing that legislators' bases of rep-

resentation are more fluid and perhaps, more manipulable than the literature usually presumes effectively expands the critical question about the relative *quality* of accountability provided by alternative designs for democracy to include the equally critical question of the relative accountability *to whom*, *i.e.*, to which groups of society, to society divided on what bases. Moreover, as we demonstrate in this discussion, these *shifting* societal bases of democratic representation have important consequences for distributive policies, and so, likely, for distributional outcomes as well.

# References

Adler, S. 2000. "Constituency Characteristics and the 'Guardian' Model of Appropriations Subcommittees, 1959-1998," *American Journal of Political Science*, 44(1): 104-14.

Axelrod, R. 1984. *The Evolution of Cooperation*. New York: Basic Books.

Baron, D.P. 1991. "Majoritarian Incentives, Pork Barrel Programs, and Procedural Control," *American Journal of Political Science*, 35(1): 57-90.

Beck, N., and J. Katz. 1995. "What To Do (and Not to Do) with Time-Series-Cross-Section Data in Comparative Politics," *American Political Science Review*, 89 (3): 634-47.

Beck, N., and J. Katz. 1996. "Nuisance vs. Substance: Specifying and Estimating Time-Series-Cross-Section Models," *Political Analysis*, 6: 1-36.

Berger, S., ed. 1981. *Organizing Interests in Western Europe*. Cambridge: Cambridge University Press.

Bradbury, J.C., and M. Crain. 2001. "Legislative Organization and Government Spending: Cross-Country Evidence," *Journal of Public Economics*, 82(3): 309-325.

Brady, D. 1988. *Critical Elections and Congressional Policymaking.* Palo Alto, CA: Stanford University Press.

Bullock, C.S., and D. Brady. 1982. "Party Constituency and Roll-Call Voting in the US Senate," *Legislative Studies Quarterly*, pp. 29-43.

Carey, J.M., and M.S. Shugart. 1995. "Incentives to Cultivate a Personal Vote: A Rank Ordering of Electoral Formulas," *Electoral Studies*, 14(4): 417-39.

Carrubba, C.J., and C. Volden. 2000. "Coalitional Politics and Logrolling in Legislative Institutions," *American Journal of Political Science*, 44(2): 261-277.

Chang, E.C.C. 2001. "Electoral Budget Cycles Under Alternative Electoral Systems," paper presented at the Annual Meetings of the American Political Science Association, San Francisco.

Cox, G.W., and M.D. McCubbins. 1993. *Legislative Leviathan: Party Government in the House.* Berkeley: University of California Press.

Crain, W.M., 1999. "Districts, Diversity, and Fiscal Biases: Evidence from the American States," *Journal of Law and Economics*, 42(2): 675-98.

DelRossi, A., and R. Inman. 1999. "Changing the Price of Pork: The Impact of Local Cost Sharing on Legislators' Demands for Distributive Public Goods," *Journal of Public Economics*, 71(2): 247-73.

Denemark, D. 2000. "Partisan Pork Barrel in Parliamentary Systems: Australian Constituency-Level Grants," *Journal of Politics*, 62(3): 896-915.

Desposato, S.W. 2005. "Correcting for Small Group Inflation of Roll-Call Cohesion Scores," *British Journal of Political Science*, 35: 731-744.

Drazen, A. 2000. *Political Economy in Macroeconomics.* Princeton: Princeton University Press.

Drazen A. 2001. "The Political Business Cycle After 25 Years." *NBER Macroeconomics Annual 2000.* Cambridge MA: MIT Press.

Erikson, R.S., M.B. MacKuen, and J.A. Stimson. 2001. *The Macro Polity.* Cambridge: Cambridge University Press.

Evans, D. 2004. *Greasing the Wheels: Using Pork Barrel Projects to Build Majority Coalitions in Congress.* New York: Cambridge University Press.

Fenno, R.F. 1978. *Home Style: House Members in Their Districts.* Longman Publishing Company.

Ferejohn, J.A. 1974. *Pork Barrel Politics: Rivers and Harbors Legislation, 1947-1968.* Stanford: Stanford University Press.

Fiorina, M. 1974. *Representatives, Roll Calls, and Constituencies.* Lexington, MA: D.C. Heath.

Fiorina, M. 1980. "The Decline of Collective Responsibility in American Politics," *Daedalus*, (Summer): 25-45.

Franzese, R.J. 1999. "Partially Independent Central Banks, Politically Responsive Governments, and Inflation," *American Journal of Political Science*, 43(3): 681-706.

Franzese, R.J. 2002. *Macroeconomic Policies of Developed Democracies*. Cambridge: Cambridge University Press.

Franzese, R.J. 2003. "Multiple Hands on the Wheel: Empirically Modeling Partial Delegation and Shared Monetary-Policy Control in the Open and Institutionalized Economy," *Political Analysis*, 11(4): 445-74.

Franzese, R.J., with I. Nooruddin. 2004. "The Effective Constituency in (Re)Distributive Politics: Alternative Bases of Democratic Representation," Unpublished: http://www-personal.umich.edu/ franzese/EffectiveConstituencies.BasesRepresentation.041404.pdf.

Franzese, R.J. and K.L. Jusko. 2006. "Political-Economic Cycles." In *Oxford Handbook of Political Economy*, D. Wittman and B. Weingast, eds. Cambridge: Oxford UP.

Frey, B.S., and F. Schneider. 1978a. "An Empirical Study of Politico-Economic Interaction in the United States." *Review of Economics and Statistics*, 60: 174-83.

Frey, B.S., and F. Schneider. 1978b. "A Politico-Economic Model of the United Kingdom." *Economic Journal*, 88: 243-53.

Gallagher, M., M. Laver, and P. Mair. 1995. *Representative Government in Modern Europe*, 2nd ed. New York: McGraw-Hill.

Hibbs, D. 1977. "Political Parties and Macroeconomic Policy," *American Political Science Review*, 71: 1467-87.

Hill, K.Q., and P.A. Hurley. 1999. "Dyadic Representation Reconsidered," *American Journal of Political Science*, 43(1): 109-138.

Hill, K.Q., and P.A. Hurley. 2003. "Beyond the Demand-Input Model: A Theory of Representational Linkages," *Journal of Politics*, 65(2): 305-326.

Hird, J. 1991. "The Political Economy of Pork: Project Selection at the U.S. Army Corps of Engineers," *American Political Science Review*, 85(2): 429-456.

Lane, J.-E., and S. Ersson. 1994. *Politics and Society in Western Europe*. London: Sage.

Lee, F. 2003. "Geographic Politics in the U.S. House of Representatives: Coalition Building and the Distribution of Benefits," *American Journal of Political Science*, 47(4): 714-728.

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

Lijphart, A. 1975. *The Politics of Accomodation: Pluralism and Democracy in the Netherlands*. Berkeley: University of California Press.

Lijphart, A. 1977. *Democracy in Plural Societies: A Comparative Exploration*. New Haven: Yale University Press.

Lijphart, A. 1984. *Democracies: Patterns of Majoritarian and Consensus Government in Twenty-One Countries*. New Haven: Yale University Press.

Limosani, M., and P. Navarra. 2001. "Local Pork-Barrel Politics in National Pre-election Dates: The Case of Italy," *Public Choice*, 106 (3-4): 317-26.

Long, K. 2003. "Electoral Rules and the Targeted Provision of Goods: A Research Proposal." Mimeo. University of Michigan.

Luebbert, G. 1986. *Comparative Democracy: Policy Making and Governing Coalitions in Europe and Israel*. New York: Columbia UP.

McCarty, N. 2000. "Presidential Pork: Executive Veto Power and Distributive Politics," *American Political Science Review*, 94(1): 117-129.

McCubbins, M.D. and M. Thies. 1997. "As a Matter of Factions: The Budgetary Implications of Shifting Factional Control in Japan's LDP," *Legislative Studies Quarterly*, 22(3): 293-328.

Nordhaus, W. 1975. "The Political Business Cycle," *Review of Economic Studies*, 42 (1): 169-90.

Owens, J., and L. Wade. 1984. "Federal Spending in Congressional Districts," *Western Political Quarterly*, 37(3): 404-423.

Persson, T., and G. Tabellini. 2000. *Political Economics: Explaining Economic Policy.* Cambridge, MA: The MIT Press.

Peterson, P. E. 1990. *Welfare Magnets: A New Case for a National Standard.* Washington, D.C.: Brookings Institution.

Pitkin, H.F. 1969. "The Concept of Representation." In *Representation*, H. Pitkin, ed. New York: Atherton Press: 1-23.

Riker, W. 1962. *The Theory of Political Coalitions.* New Haven: Yale University Press.

Schneider, F., and B.S. Frey. 1988. "Politico-Economic Models of Macroeconomic Policy: A Review of the Empirical Evidence." In *Political Business Cycles: The Political Economy of Money, Inflation, and Unemployment*, edited by T.D. Willett TD, Durham, NC: Duke University Press, pp. 239-75.

Sharpe, L.J. 1988. "The Growth and Decentralization of the Modern Democratic State," *European Journal of Political Research*, 16:365-80.

Shepsle, K.A., and B.R. Weingast. 1981. "Political Preferences for the Pork Barrel: A Generalization," *American Journal of Political Science*, 25(1): 96-111.

Soroka, S.N., and C. Wlezien. 2005. "Opinion-Policy Dynamics: Public Preferences and Public Expenditure in the United Kingdom," *British Journal of Political Science*, 35: 665-689.

Stimson, J.A. 1999. *Public Opinion in America: Moods, Cycles, and Swings*, 2nd edition. Boulder, CO: Westview Press.

Stratmann, T., and M. Baur. 2002. "Plurality Rule, Proportional Representation and the German Bundestag: How Incentives to Pork-Barrel Differ Across Electoral Systems," *American Journal of Political Science*, 46(3): 506-14.

Strom, K. 1990. *Minority Government and Majority Rule.* Cambridge: Cambridge UP.

Taylor, M. 1992. "Formal versus Informal Incentive Structures and Legislator Behavior: Evidence from Costa Rica," *Journal of Politics*, 54(4): 1055-73.

True, J.L. 2005. *Tracking the Purposes of Government: National Government Spending From Fiscal Year 1947 to Fiscal Year 2004.* Lamar University.

Tufte, E. 1978. *Political Control of the Economy.* Princeton: Princeton UP.

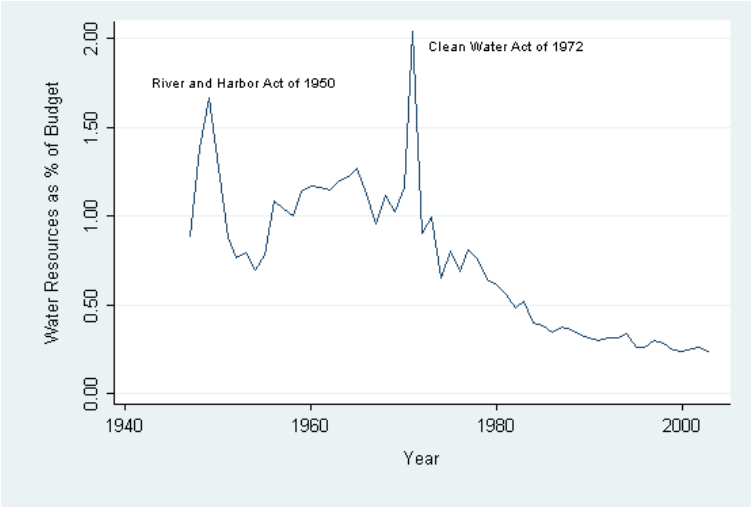
Volden, C., and A.E. Wiseman. 2007. "Bargaining in Legislatures over Particularistic and Collective Goods," *American Political Science Review.*

Weingast, B.R., K.A. Shepsle, and C. Johnsen. 1981. "The Political Economy of Benefits and Costs: A Neoclassical Approach to Distributive Politics," *Journal of Political Economy*, 89(41):642-64.

Weissberg, R. 1978. "Collective versus Dyadic Representation in Congress," *American Political Science Review*, 72(2):536-47.

Wright, G.C. 1989. "Policy Voting in the U.S. Senate: Who is Represented?" *Legislative Studies Quarterly*, 14: 465-86.

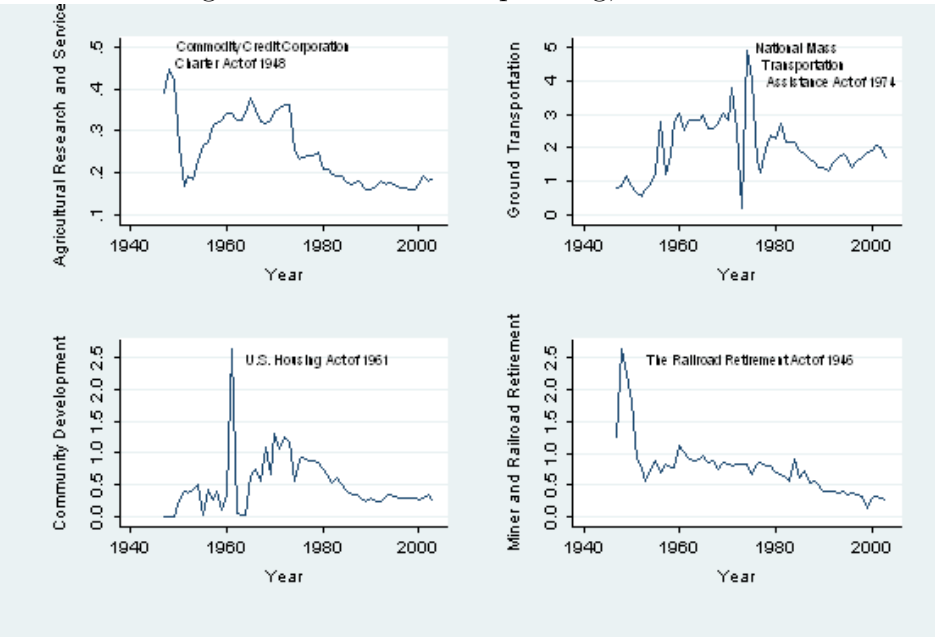
Figure 1: Spending on Water Resources, 1950-2000




NOTE. This Figure reports the percentage of the federal budget allocated to the "Water Resources" spending category. This category includes funding for the Army Corps of Engineers.

SOURCE. Policy Agendas Project.

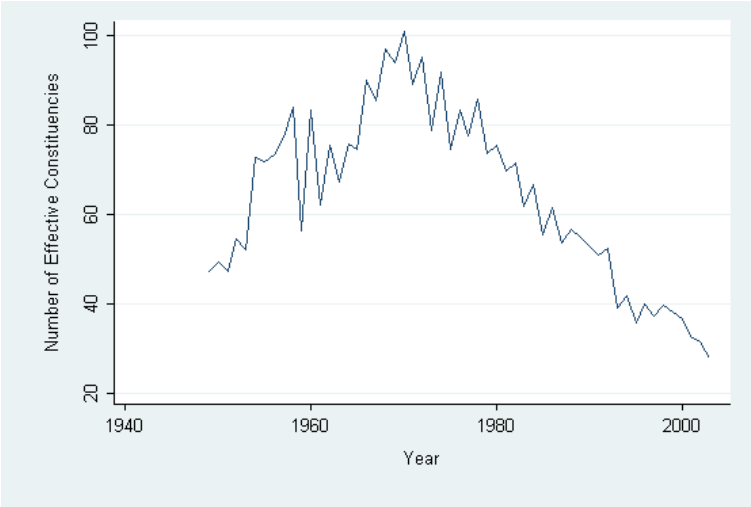
Figure 2: Distributive Spending, 1950-2000




NOTE. This Figure reports the percentage of the federal budget allocated to other distributive spending categories. Details of these spending categories are reported in the section entitled "Empirical Exploration: U.S. Budgetary Policy & Party Unity, 1951-2001."

SOURCE. Policy Agendas Project.

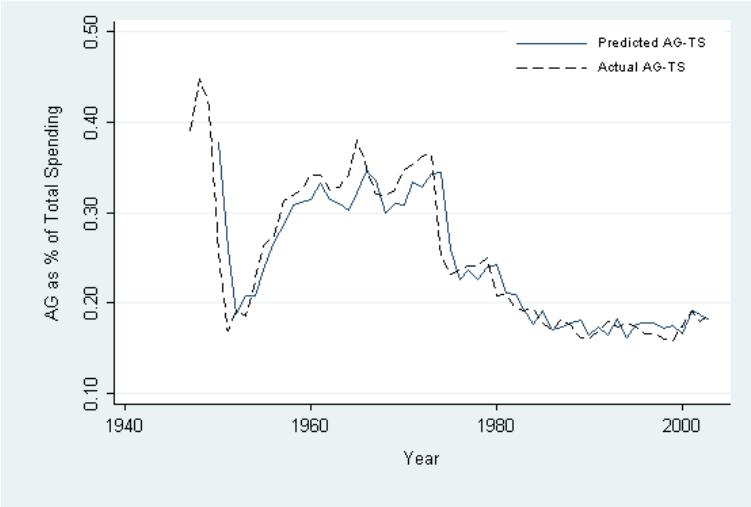
Figure 3: The Number of Effective Constituencies in the United States from 1949-2003




NOTE. This Figure reports the number of effective constituencies, as estimated by (2).

SOURCE. Estimation based on data reported in *The CQ Almanac*.

Figure 4: Estimated Response of AG-TS to the Actual Path of AG-TS, 1951-2003.




NOTE. This Figure reports the predicted amount of spending on Agricultural Research and Services, as a percentage of total spending, using the historical number of effective constituencies, and for comparison, actual spending levels.

Table 1: Government Spending in the U.S. 1952–2001 (Reduced Model)

| | Spending Category | $NEC_{t-1}$ | Lagged DV | Constant | Adj. $R^2$ | RMSE |
|---|---|---|---|---|---|---|
| *Share of Total Budget Allocations* | | | | | | |
| 1 | Water | **0.007** (**.001**)$^{.00}$ | **0.532** (**.041**)$^{.00}$ | -0.161 (.095)$^{.09}$ | 0.746 | 0.204 |
| 2 | AgRe | **0.001** (**.000**)$^{.00}$ | **0.582** (**.034**)$^{.00}$ | 0.018 (.014)$^{.20}$ | 0.832 | 0.030 |
| 3 | Ground | **0.015** (**.005**)$^{.01}$ | **0.311** (**.060**)$^{.00}$ | 0.421 (.359)$^{.24}$ | 0.292 | 0.757 |
| 4 | CDev | **0.009** (**.002**)$^{.00}$ | **0.281** (**.075**)$^{.00}$ | -0.259 (.170)$^{.13}$ | 0.261 | 0.374 |
| 5 | MinR | **0.004** (**.000**)$^{.00}$ | **0.532** (**.063**)$^{.00}$ | 0.042 (.031)$^{.50}$ | 0.769 | 0.137 |
| *Share of GDP* | | | | | | |
| 6 | Water | **0.142** (**.032**)$^{.00}$ | **0.568** (**.042**)$^{.00}$ | -2.821 (2.046)$^{.17}$ | 0.717 | 4.331 |
| 7 | AgRe | **0.022** (**.003**)$^{.00}$ | **0.637** (**.039**)$^{.00}$ | **0.445** (**.218**)$^{.04}$ | 0.887 | 0.450 |
| 8 | Ground | **0.319** (**.118**)$^{.01}$ | **0.343** (**.058**)$^{.00}$ | 8.644 (7.864)$^{.27}$ | 0.301 | 16.525 |
| 9 | CDev | **0.208** (**.054**)$^{.00}$ | **0.289** (**.074**)$^{.00}$ | -5.235 (3.547)$^{.14}$ | 0.282 | 7.743 |
| 10 | MinR | **0.066** (**.019**)$^{.00}$ | **0.614** (**.035**)$^{.00}$ | 1.134 (1.306)$^{.37}$ | 0.769 | 2.836 |

NOTES. 1. Water: Water Resources; AgRe: Agricultural Research and Services; Ground: Ground Transportation; CDev: Community Development; MinR: Miner and Railroad Workers Retirement; 2. Equations estimated by seemingly unrelated regressions (SURE) in Stata 8.2; 3. Each equation has 49 observations and 1 independent variables; 4. Standard errors reported in (parentheses) with p-levels from 2-sided t-tests $^{\text{superscripted}}$

Table 2: Government Spending in the U.S. 1952–2001 (Complete Model)

| | *Share of Total Budget Allocations* | | | | | *Share of GDP* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | Water | AgRe | Ground | CDev | MinR | Water | AgRe | Ground | CDev | MinR |
| $NEC_{t-1}$ | **0.008** | **0.001** | **0.003** | **0.123** | **0.004** | **0.154** | **0.027** | **0.436** | **0.388** | **0.083** |
| | (**.003**)$^{.00}$ | (**.0003**)$^{.00}$ | (**.012**)$^{.04}$ | (**.006**)$^{.00}$ | (**.002**)$^{.01}$ | (**0.059**)$^{.01}$ | (**0.006**)$^{.00}$ | (**0.255**)$^{.09}$ | (**0.119**)$^{.00}$ | (**0.033**)$^{.01}$ |
| GDP Growth | 0.032 | 0.001 | -0.141 | 0.063 | -0.020 | **0.983** | 0.068 | -1.97 | 1.49 | -0.308 |
| | (.024)$^{.18}$ | (.003)$^{.58}$ | (.097)$^{.15}$ | (.049)$^{.20}$ | (.013)$^{.11}$ | (**0.495**)$^{.05}$ | (0.044)$^{.12}$ | (2.16)$^{.36}$ | (0.996)$^{.14}$ | (0.276)$^{.27}$ |
| $GDPpc_{t-1}$ | **-0.421** | **-0.046** | 0.586 | **0.605** | **-0.309** | **-5.72** | -0.115 | 18.729 | **13.105** | **-3.57** |
| | (**.139**)$^{.00}$ | (**.015**)$^{.00}$ | (.557)$^{.29}$ | (**.284**)$^{.03}$ | (**.074**)$^{.00}$ | (**2.88**)$^{.05}$ | (0.251)$^{.65}$ | (12.314)$^{.13}$ | (**5.73**)$^{.02}$ | (**1.59**)$^{.03}$ |
| $Inflation_{t-1}$ | -0.012 | -0.002 | 0.017 | **-0.095** | 0.001 | -0.114 | -0.034 | 0.968 | **-1.67** | 0.093 |
| | (.024)$^{.61}$ | (.003)$^{.37}$ | (.099)$^{.86}$ | (**.051**)$^{.06}$ | (.013)$^{.96}$ | (0.502)$^{.82}$ | (0.044)$^{.42}$ | (2.21)$^{.66}$ | (**1.03**)$^{.10}$ | (0.279)$^{.74}$ |
| $Deficit_{t-1}$ | -0.001 | **-0.0001** | **-0.004** | 0.00004 | -0.0003 | **-0.013** | **-0.003** | **-0.083** | 0.0004 | **-0.001** |
| | (.0004)$^{.12}$ | (**.00004**)$^{.01}$ | (**.002**)$^{.01}$ | (.001)$^{.96}$ | (.0002)$^{.13}$ | (**0.001**)$^{.10}$ | (**0.001**)$^{.00}$ | (**0.034**)$^{.02}$ | (0.016)$^{.98}$ | (**0.004**)$^{.06}$ |
| $\Delta UE_t$ | 0.055 | -0.001 | -0.132 | **0.249** | **-0.053** | **2.165** | **0.197** | 0.942 | **5.669** | -0.564 |
| | (.053)$^{.30}$ | (.006)$^{.91}$ | (.218)$^{.55}$ | (**.249**)$^{.03}$ | (**.028**)$^{.06}$ | (**1.10**)$^{.05}$ | (**0.010**)$^{.05}$ | (4.84)$^{.85}$ | (**2.25**)$^{.01}$ | (0.620)$^{.36}$ |
| $UE_{t-1}$ | -0.016 | 0.001 | 0.153 | 0.017 | **0.038** | -0.255 | 0.006 | 3.78 | 0.502 | **0.956** |
| | (.027)$^{.56}$ | (.003)$^{.83}$ | (.109)$^{.16}$ | (.055)$^{.76}$ | (**.014**)$^{.01}$ | (0.555)$^{.65}$ | (0.049)$^{.23}$ | (2.41)$^{.12}$ | (1.12)$^{.66}$ | (**0.309**)$^{.00}$ |
| $HseMajor_{t-1}$ | 0.075 | -0.009 | 0.006 | 0.186 | -0.065 | 3.19 | 0.308 | 3.97 | 4.35 | 0.042 |
| | (.106)$^{.48}$ | (.012)$^{.42}$ | (.434)$^{.99}$ | (.222)$^{.40}$ | (.057)$^{.26}$ | (2.21)$^{.15}$ | (0.197)$^{.12}$ | (9.59)$^{.68}$ | (4.48)$^{.33}$ | (1.26)$^{.97}$ |
| $Divided_{t-1}$ | 0.014 | -0.004 | -0.316 | 0.147 | -0.030 | -0.008 | -0.116 | -7.89 | 2.69 | -0.664 |
| | (.055)$^{.80}$ | (.006)$^{.52}$ | (.225)$^{.16}$ | (.115)$^{.20}$ | (.029)$^{.30}$ | (1.14)$^{.99}$ | (0.102)$^{.25}$ | (4.98)$^{.11}$ | (2.32)$^{.25}$ | (0.643)$^{.30}$ |
| $Mood_{t-1}$ | **0.013** | **0.003** | **0.079** | **-0.032** | 0.005 | 0.244 | **0.062** | **1.54** | **-0.676** | 0.112 |
| | (**.008**)$^{.09}$ | (**.001**)$^{.00}$ | (**.032**)$^{.01}$ | (**.016**)$^{.04}$ | (.004)$^{.18}$ | (0.158)$^{.12}$ | (**0.014**)$^{.00}$ | (**0.695**)$^{.03}$ | (**0.319**)$^{.04}$ | (0.009)$^{.20}$ |
| $ELE_t$ | 0.003 | 0.004 | 0.195 | 0.118 | **0.065** | -0.261 | 0.046 | 2.834 | 2.172 | **1.407** |
| | (.049)$^{.95}$ | (.006)$^{.44}$ | (.201)$^{.33}$ | (.102)$^{.25}$ | (**.026**)$^{.01}$ | (1.026)$^{.80}$ | (0.092)$^{.62}$ | (4.439)$^{.523}$ | (2.067)$^{.294}$ | (**0.567**)$^{.014}$ |
| Lagged DV | **0.161** | **0.444** | 0.033 | **0.123** | **0.317** | **0.196** | **0.456** | 0.024 | **0.114** | **0.372** |
| | (**.054**)$^{.00}$ | (**.045**)$^{.00}$ | (.056)$^{.95}$ | (**.065**)$^{.06}$ | (**.058**)$^{.00}$ | (.053)$^{.00}$ | (**.047**)$^{.00}$ | (.056)$^{.67}$ | (**.065**)$^{.08}$ | (**.052**)$^{.00}$ |
| Constant | **3.456** | **0.337** | **-10.389** | **-5.076** | **2.786** | 41.755 | -2.02 | **-280.023** | **-111.097** | **26.985** |
| | (**1.401**)$^{.01}$ | (**.153**)$^{.03}$ | (**5.652**)$^{.07}$ | (**2.872**)$^{.08}$ | (**.749**)$^{.000}$ | (29.046)$^{.15}$ | (2.54)$^{.43}$ | (**125.016**)$^{.03}$ | (**58.072**)$^{.06}$ | (**16.189**)$^{.10}$ |
| Adj. $R^2$ (RMSE) | .84 (0.18) | .94 (.02) | .43 (.75) | .45 (.38) | .86 (.10) | .82 (3.84) | .95 (0.34) | .43 (16.56) | .49 (7.70) | .84 (2.13) |

NOTES. 1. Water: Water Resources; AgRe: Agricultural Research and Services; Ground: Ground Transportation; CDev: Community Development; MinR: Miner and Railroad Workers Retirement; 2. Equations estimated by seemingly unrelated regressions (SURE) in Stata 8.2; 3. Each equation has 49 observations and 12 independent variables; 4. Standard errors reported in (parentheses) with p-levels from 2-sided t-tests $^{\text{superscripted}}$

Table 3: Joint Hypothesis Tests of the Significance of NEC

| | Null Hypothesis: $\beta_{nec} = 0$ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | .004 | | | | | | | | | |
| 2 | .000 | .001 | | | | | | | | |
| 3 | .007 | .000 | .042 | | | | | | | |
| 4 | .001 | .000 | .000 | .001 | | | | | | |
| 5 | .001 | .001 | .003 | .001 | .006 | | | | | |
| 6 | .004 | .001 | .015 | .000 | .001 | .009 | | | | |
| 7 | .004 | .001 | .042 | .001 | .006 | .009 | .000 | | | |
| 8 | .008 | .000 | .021 | .001 | .005 | .020 | .088 | .088 | | |
| 9 | .000 | .000 | .001 | .001 | .001 | .000 | .001 | .001 | .001 | |
| 10 | .001 | .000 | .007 | .001 | .006 | .0020 | .012 | .013 | .001 | .012 |

NOTES. 1. Models correspond to those in Table 2. See the note to that table for information about the relevant dependent variable in each model; 2. Diagonal elements are p-values from t-tests from each equation in Table 1; 3. Off-diagonal cell entries are p-values from joint hypothesis tests for corresponding pair of equations.