Measuring the Federal Budget

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Abstract

When estimating the political determinants of the federal budget, a standard assumption in political science scholarship is that measures of spending can be used as a proxy for the appropriations enacted by Congress. We examine the consequences of this assumption. In particular, we argue that spending data induce measurement error, which increases the likelihood of a null result and may produce biased estimates. We compare the spending data used in a recent study (Berry and Fowler 2016) with an original data set of military construction appropriations, which further allow us to disentangle congressional and presidential influences over the budget. While an analysis of the spending data produces a null result, the same analysis using the appropriations data provides strong evidence that House and Senate legislators use their committee positions to distribute pork. Our findings have broad implications for studies that use measures of spending in the congressional and presidency literatures.

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The allocation of budgetary resources is an essential feature of American government, and scholars have long been interested in the political determinants of this process. Work in this area tends to examine which legislators direct a disproportionate share of benefits to their districts or states. Substantial disagreements exist on who benefits and why. According to distributive theory, legislators organize Congress into committees to facilitate the flow of benefits to their districts (Weingast and Marshall 1988; Mayhew 1974), while party theories posit that majority party members are the main beneficiaries (Cox and McCubbins 2005; Kiewiet and McCubbins 1991; Rohde 1991). Informational theory, on the other hand, asserts that Congress is organized for informational efficiency, and legislators are less likely to engage in distributive activities (Krehbiel 1991).

Distributive, partisan, and informational theories all posit a relationship between legislative organization and the policy Congress enacts. Thus the quantity of interest when testing these theories should be enacted policy, which, in the case of the federal budget, is appropriations.[1] However, it has proven difficult to acquire appropriations data by location, and studies have focused on programmatic areas thought to be laden with pork, such as rivers and harbors (Ferejohn 1974), transportation (Lee 2003), federal research (Payne 2007), and academic earmarks (Balla et al. 2002). Apart from the congressional literature, scholars of the presidency use the federal budget to show that presidents use public appeals to influence appropriations decisions (Canes-Wrone 2006) and that legislators may defer to presidential preferences more during wartime than peacetime (Howell, Jackman, and Rogowski 2013).

In an effort to conduct comprehensive tests, a number of scholars have turned to widely available measures of spending. In the congressional literature, these studies examine the effect of committee position (Berry and Fowler 2016), gender (Anzia and Berry 2011), ideology (Alexander, Berry, and Howell 2015), and majority party status (Albouy 2013; Carroll

1. It may also be argued that spending matters most because it reflects where appropriations ultimately go. This point of view is bolstered by the fact that appropriations are largely program based, not location based. However, legislators wield the most influence over enacted policy, not policy outcomes, so appropriations should be the first place scholars look for legislative influence. Furthermore, if scholars are interested in how legislators influence outcomes after appropriations are enacted, then they should examine committee composition at the time spending occurs, not in the preceding year as most studies do.

and Kim 2010) on particularistic benefits, while studies in the presidency literature examine executive influence over the distribution of spending (Berry, Burden, and Howell 2010; Dynes and Huber 2015; Hudak 2014; Kriner and Reeves 2015).[2] The underlying source for much of this work is an impressive data set compiled by Bickers and Stein (1991, 2000). Using the Federal Assistance Award Data System (FAADS), the authors collect annual spending by program across congressional districts from FY1983 to FY1997, which others extend to FY2010 (Berry, Burden, and Howell 2010; Alexander, Berry, and Howell 2015). FAADS primarily records federal obligations, or the federal government's legally binding commitment to make payment in the future.[3]

A standard assumption in political science scholarship is that measures of spending can be used as a proxy for the appropriations enacted by Congress. In this paper, we examine the consequences of this assumption. In particular, we argue that spending data induce measurement error, which increases the likelihood of a null result and may produce biased estimates. We compare the spending data used in a recent prominent study (Berry and Fowler 2016) with an original data set of military construction appropriations covering the same time period. While an analysis of the spending data produces a null result, the same analysis using the appropriations data provides strong evidence that the pork barrel was alive and well during this period. Our findings have broad implications for studies that use measures of spending in the congressional and presidency literatures.

1 The Federal Budget Process

The federal budget process occurs in three distinct phases. In the first phase, the executive branch internally develops funding levels that comprise the President's annual budget request

2. For an overview of studies using spending measures, see Gordon and Kang (2015).

3. Many studies refer to FAADS data as outlays, not as obligations. However, the documentation for the FAADS database implies that agencies typically self-report in the form of obligations (e.g., see FAADS user guide books). In addition to FAADS, several of these studies use data compiled from the Consolidated Federal Funds Report (CFFR), which consolidates financial reports on defense, procurement, personnel, grants, and payments to state and local governments in the form of either obligations or outlays. The principal source of CFFR grants data is FAADS.

to Congress. In the second phase, congressional committees and their parent chambers consider this request, act upon its recommendations, and approve appropriations bills for the President's signature. In the third phase, the executive branch manages legislative appropriations and allocates funding within the authority provided by Congress. It is on this last phase, often called the budget execution process, that we focus our attention.

When Congress appropriates money to the executive branch, it is actually providing government agencies with *budget authority* to enter into obligations of a specified amount for specific purposes. When an agency takes any action using its appropriation that makes the government liable to make payment in the future, such as entering into a contract, it incurs an *obligation*. When an agency spends money on an obligation, such as paying a contractor, it *outlays* the funding. The rate at which an appropriation is obligated during a given year is the *obligation rate*, and the rate at which an appropriation is spent is the *outlay rate*. Funds may obligate and outlay over several years.

Table 1 presents estimated obligation and outlay rates for select appropriations accounts of the FY2009 Military Construction, Veterans Affairs, and Related Agencies appropriations bill.[4] The percentages shown signify how much an appropriation will be obligated or outlaid in each year, and we have divided the accounts into two categories: those that legislators historically earmarked from FY1984 through FY2010, which we label pork accounts, and those legislators did not, which we label non-pork accounts. We highlight that the majority of accounts do not obligate at 100%, that no account outlays at 100%, and that pork accounts seem to systematically spend at a lower rate, both in obligations and outlays, than non-pork accounts.

4. Obligation rates are estimated by the Department of Defense, and outlay rates are estimated by the Congressional Budget Office. We select the five-largest appropriations accounts for pork and non-pork programs, but all accounts are presented in the appendix in Table A.1. Military construction appropriations have a period of availability of five years, after which unobligated appropriations are returned to the Treasury. Thus no entries are provided for obligations beyond the fifth year. Appropriations may outlay for an additional five years after obligation, so the cumulative totals for outlays may not add to 100%.

Table 1: Obligation & Outlay Rates for FY2009 Military Construction Appropriations

		% Appropriations Spent by Fiscal Year						
Pork accounts		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Military Construction,	*Obligations*	84.0	8.0	4.0	3.0	1.0		
Army	*Outlays*	1.0	41.0	38.0	13.0	5.0	1.0	0.3
Military Construction,	*Obligations*	80.0	16.0	2.0	1.15	0.85		
Navy and Marines	*Outlays*	12.0	43.0	32.0	8.5	2.0	0.6	0.3
Military Construction,	*Obligations*	86.0	7.0	4.0	2.0	1.0		
Air Force	*Outlays*	12.0	43.0	32.0	8.0	2.5	1.0	0.2
Military Construction,	*Obligations*	65.0	19.0	9.0	4.0	3.0		
Defense-wide	*Outlays*	8.0	41.5	26.5	10.0	7.0	3.5	1.0
Military Construction,	*Obligations*	68.0	13.0	10.0	6.0	3.0		
Army National Guard	*Outlays*	5.0	38.0	30.0	15.0	7.0	3.0	1.5
Non-pork accounts		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Family Housing	*Obligations*	100.0	0.0	0.0	0.0	0.0		
Operations, Army	*Outlays*	73.0	19.0	5.0	1.0	0.8	0.2	0.5
Family Housing	*Obligations*	100.0	0.0	0.0	0.0	0.0		
Operations, Navy	*Outlays*	65.0	27.0	3.5	1.0	0.1	0.0	0.0
Family Housing	*Obligations*	100.0	0.0	0.0	0.0	0.0		
Operations, Air Force	*Outlays*	67.0	24.5	4.0	1.0	0.5	0.1	0.0
Family Housing	*Obligations*	71.0	13.0	9.2	4.8	2.0		
Construction, Army	*Outlays*	9.0	35.0	38.0	12.0	3.0	2.0	0.5
Base Realignment and	*Obligations*	100.0	0.0	0.0	0.0	0.0		
Closure, 2005	*Outlays*	20.0	30.0	25.0	10.0	5.0	2.0	2.0

Obligation and outlay rates vary greatly among appropriations accounts and among programs, projects, and activities within the same appropriations account. In accounts with high first-year rates, most of an appropriation is obligated or spent during the first year in which funding is made available; in accounts with low first-year rates, most of an appropriation remains unobligated or unspent during that fiscal year. Consequently, measures of spending in a given year are a function of spending from new appropriations and spending from prior-year appropriations, a point also observed by other scholars (e.g., Alvarez and

Saving 1997, 58-59; Krehbiel 1998, 191).

2 The Problems with Spending Data

Measures of spending conflate competing budgetary influences, induce measurement error, and may bias estimates. First, spending measures, whether obligations or outlays, do not allow scholars to disentangle presidential, congressional, and bureaucratic influences over the budget. Presidents exert *ex ante* influence in their annual budget requests; legislators exert influence in the drafting of appropriations bills; and bureaucrats exert *ex post* influence in the management of legislative appropriations. Appropriations data are free from *ex post* bureaucratic discretion, and the location-based appropriations data we collect allow us to isolate the congressional influences over the budget by distinguishing between presidentially requested and congressionally directed appropriations.

Second, there are two types of measurement error caused by using spending as a proxy for appropriations. The first comes from tying spending to legislative organization at the time an appropriation is enacted. Scholars typically assume that spending in a given year is the result of the budget passed in the preceding year. Tying measures of spending in year t to political characteristics in year $t-1$ is accurate only when the budget execution phase lasts one year, which implies that spending equals appropriations. The amount of measurement error is thus a function of the obligation or outlay rate, depending on the measure that is used. A high rate implies less prior-year spending, which thereby results in low measurement error. A low rate, on the other hand, implies more prior-year spending, which results in high measurement error. This measurement error may lead to imprecise estimates and larger standard errors, making a null result more likely.[5] The second type of measurement error comes from missingness in the FAADS data. FAADS data exclude certain types of spending

5. This measurement error is noted by Alvarez and Saving (1997), who seek to conduct empirical tests on only new obligations, as measured by an award's first appearance in the FAADS database. While their work is an improvement over earlier studies, it fails to take into account the lag between the enactment of an appropriation and the first appearance of an award in the FAADS database, which may take years. In addition, their classification of new obligations does not conform to the definition used by budget scorekeepers.

(e.g., federal wages and salaries) and suffer from incomplete reporting by agencies, which has been noted by a number of Government Accountability Office audits.[6] This missingness in the FAADS data induces measurement error, since scholars typically assume that a district receives no spending if it is not represented in the data.

Third, there may be cases in which this measurement error results in omitted variable bias. Many political characteristics may be correlated with measurement error, inducing bias. For example, if distributive theory is correct, then committee members should receive more pork than non-committee members. Since pork typically consists of programs, such as construction and procurement, that outlay at a lower rate than other types of government spending, such as salaries and operations (see Appendix Table 1), committee members should have a larger measurement error than non-committee members. This correlation between measurement error and committee membership would result in omitted variable bias. In a simplified setting with a single covariate, the bias can be written as

$$Bias = \frac{Cov(CommitteeMember, MeasurementError)}{Var(CommitteeMember)}, \tag{1}$$

and we demonstrate in the appendix that this result carries through with multiple regressors.

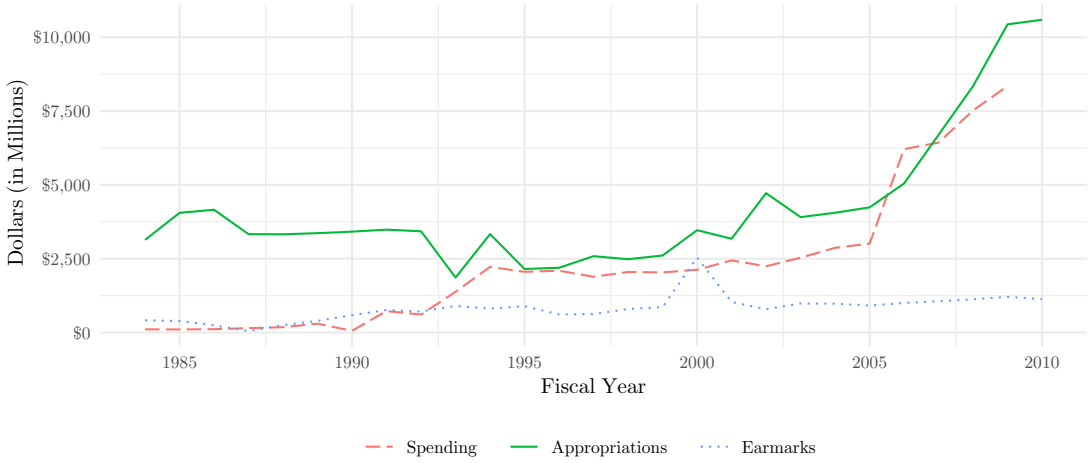
3 Data & Methodology

We compare the spending data used in a recent prominent study (Berry and Fowler 2016) with an original data set of military construction appropriations covering the same time period (FY1984 to FY2010). We compile the appropriations data from conference reports that accompany each enacted appropriations bill and classify enacted appropriations as either presidentially requested or congressionally directed (i.e., earmarks). We describe our data more fully in the appendix.

6. See, for example, *Data Transparency: Oversight Needed to Address Underreporting and Inconsistencies on Federal Award Website* (2014).

Figure 1 presents a comparison of the two data sets with spending, appropriations, and earmarks shown. Earmarks here represent a subset of appropriations. There are substantial differences in the data due in large part to missingness. In all but one year, appropriations exceed spending, and this discrepancy is particularly pronounced during the first nine years of the panel: appropriations average $3.36 billion per year and spending averages $374 million per year. In addition, the FAADS data records no military construction spending in any House districts from FY1984 through FY2005.[7]

Figure 1: Comparison of Military Construction Spending, Appropriations, and Earmarks



To examine the effect of committee membership on appropriations, we adopt the same two-way fixed effects design and model specifications as Berry and Fowler:

$$Pork_{it} = \beta * CommitteeMember_{it} + \alpha X_{it} + \gamma_i + \delta_t + \epsilon_{it}, \tag{2}$$

where $CommitteeMember_{it}$ is a binary indicator of whether a legislator serves on the authorizing committee/appropriations subcommittee with jurisdiction over military construction, γ_i legislator/state fixed effects, δ_t year fixed effects, and X_{it} other covariates: membership in the majority party and seniority. This within-member design compares appropriations when legislators are on committee to when they are not on committee, rather than comparing

7. Note that Figure 1 reflects state-level, not district-level, data.

committee members to non-committee members.

Provided that legislators follow parallel trends over time, β represents the average effect of committee membership on pork.[8] Models are estimated separately for the House and Senate. For the House, we analyze appropriations and outlays at the legislator level. For the Senate, we analyze appropriations and outlays at the state level. In the appendix, we include a committee position analysis, placebo tests, and robustness checks, as well as demonstrate that the parallel trends assumption appears to hold.[9]

4 Results & Discussion

In their analysis, Berry and Fowler find no evidence of a committee effect on spending, a finding we replicate using their data. However, estimating the same model with appropriations data provides strong evidence that legislators use their seats on appropriations subcommittees to distribute pork. Table 2 shows the effect of House committee membership on military construction spending, appropriations, and earmarks.

8. Since the dependent variable is measured in log dollars, $100 \times (e^{\beta} - 1)$ reflects the percentage change in pork in a legislator's district or state when that legislator is on committee. For small values of β, this can be approximated by $100 \times \beta$. However, due to the large magnitude of the coefficients in this analysis, the latter transformation will not serve as a good approximation.

9. For the House analysis, we use Berry and Fowler's approach of resetting legislator fixed effects following congressional redistricting so as to only compare when a legislator is representing the same district over time. Additionally, like Berry and Fowler, we drop all observations for which district boundaries changed between congressional decisions and appropriations being made available. For the Senate analysis, we depart from Berry and Fowler's approach by analyzing appropriations at the state level, not the Senator level, since the dependent variable is measured by state and not by Senator. As a result, our Senate analysis examines whether representation by at least one Senator on the appropriations subcommittee or authorizing committee increases military construction funding for that state. Legislator seniority here is measured as the number of terms served by a Senator. When aggregated to the state level, the senior Senator is used.

Table 2: Effect of House Committees on Spending, Appropriations, and Earmarks

	Dependent Variable: Log Dollars					
	Outlays		Appropriations		Earmarks	
	(1)	(2)	(3)	(4)	(5)	(6)
Authorizing Committee	−0.023		−0.992		0.030	
	(0.023)		(0.839)		(0.694)	
Appropriations Subcommittee		0.029		2.163***		3.101***
		(0.029)		(0.492)		(0.703)
Legislator & Year Fixed Effects	✓	✓	✓	✓	✓	✓
Observations	10,498	10,498	10,108	10,108	10,108	10,108
Adjusted R^2	0.998	0.998	0.600	0.601	0.472	0.475

Note: *p<0.05; **p<0.01; ***p<0.001
Standard errors clustered by state

Columns 1 and 2 of Table 2 replicate Berry and Fowler's analysis using spending data,[10] Columns 3 and 4 perform the same analysis on the $106.9 billion of military construction appropriations, and Columns 5 and 6 re-estimate the analysis exclusively on the $21 billion of legislative earmarks. Using appropriations rather than spending, we find that appropriations subcommittee members' districts receive nearly nine times more in appropriations when they are on the subcommittee and 22 times more in earmarks.[11]

With respect to the Senate, Table 3 shows the effect of Senate committee membership on spending, appropriations, and earmarks at the state level. The columns of Table 3 are presented in the same manner as Table 2. We find that states represented by at least one Senate appropriations subcommittee member receive nearly 60 percent more in appropriations and

10. The analysis included in this table differs from the analysis in Table 4 of Berry and Fowler (2016) only in that we have corrected certain coding errors in the appropriations subcommittee membership data.

11. Columns 3 through 6 have fewer observations than Columns 1 and 2, since the appropriations data exclude the full-year continuing resolution in FY2007. For both the House and Senate analyses, the R^2 value for the model using the outlay data is substantially higher than the R^2 value for the models using our appropriations data. However, the within-group R^2 is very similar for all three models. This is likely because outlays vary less than appropriations, since outlays represent a weighted rolling average of the appropriations that originated them. Thus a larger share of the variance in the outlay data, compared to our appropriations data, is variance between states or between years, which is picked up in their model with legislator and year fixed effects.

four times more in earmarks. We include a Senator-level analysis in the appendix.

Table 3: Effect of Senate Committees on Spending, Appropriations, and Earmarks

	Dependent Variable: Log Dollars					
	Outlays		Appropriations		Earmarks	
	(1)	(2)	(3)	(4)	(5)	(6)
Authorizing Committee	0.010		0.310		0.302	
	(0.117)		(0.275)		(0.792)	
Appropriations Subcommittee		0.092		0.458*		1.395*
		(0.094)		(0.204)		(0.573)
State & Year Fixed Effects	✓	✓	✓	✓	✓	✓
Observations	1,295	1,295	1,300	1,300	1,300	1,300
Adjusted R^2	0.834	0.834	0.313	0.314	0.426	0.430

Note: *p<0.05; **p<0.01; ***p<0.001
Standard errors clustered by state

Our analysis of military construction spending and appropriations makes several contributions. First, we show that using spending as a proxy for appropriations may produce starkly different results. We argue that this discrepancy is largely due to measurement error, which arises from both tying spending measures to political characteristics and missingness in the FAADS data. This has broad implications for studies that use spending as a proxy for appropriations. Second, we demonstrate that this measurement error increases the likelihood of a null result. The null findings using the spending data, compared to our strong findings using the appropriations data, are consistent with this interpretation. Third, we find strong evidence in favor of distributive theory. Contrary to Berry and Fowler's analysis, we find that the pork barrel was alive and well for committee members during this period.

References

Albouy, David. 2013. "Partisan representation in congress and the geographic distribution of federal funds." *The Review of Economics and Statistics* 95 (1): 127–141.

Alexander, Dan, Christopher R. Berry, and William G. Howell. 2015. "Distributive Politics and Legislator Ideology." *The Journal of Politics* 78, no. 1 (December): 214–231.

Alvarez, R. Michael, and Jason L. Saving. 1997. "Congressional committees and the political economy of federal outlays." *Public Choice* 92, nos. 1-2 (July): 55–73.

Anzia, Sarah F., and Christopher R. Berry. 2011. "The Jackie (and Jill) Robinson Effect: Why Do Congresswomen Outperform Congressmen?" *American Journal of Political Science* 55, no. 3 (July): 478–493.

Balla, Steven J., Eric D. Lawrence, Forrest Maltzman, and Lee Sigelman. 2002. "Partisanship, Blame Avoidance, and the Distribution of Legislative Pork." *American Journal of Political Science* 46 (3): 515–525.

Berry, Christopher R., Barry C. Burden, and William G. Howell. 2010. "The President and the Distribution of Federal Spending." *American Political Science Review* 104, no. 4 (November): 783–799.

Berry, Christopher R., and Anthony Fowler. 2016. "Cardinals or Clerics? Congressional Committees and the Distribution of Pork." *American Journal of Political Science* 60 (3): 692–708.

Bickers, Kenneth N., and Robert M. Stein. 1991. *Federal domestic outlays, 1983-1990 : a data book.* Armonk, N.Y.: M.E. Sharpe.

———. 2000. "The Congressional Pork Barrel in a Republican Era." *The Journal of Politics* 62 (4): 1070–1086.

Canes-Wrone, Brandice. 2006. *Who leads whom? : presidents, policy, and the public.* Studies in communication, media, and public opinion. Chicago: University of Chicago Press.

Carroll, Royce, and Henry A. Kim. 2010. "Party Government and the "Cohesive Power of Public Plunder"." *American Journal of Political Science* 54 (1): 34–44.

Cox, Gary, and Mathew McCubbins. 2005. *Setting the agenda: responsible party government in the U.S. House of Representatives.* New York: Cambridge University Press.

Data Transparency: Oversight Needed to Address Underreporting and Inconsistencies on Federal Award Website. 2014 GAO-14-476. Government Accountability Office, June.

Dynes, Adam M., and Gregory A. Huber. 2015. "Partisanship and the Allocation of Federal Spending: Do Same-Party Legislators or Voters Benefit from Shared Party Affiliation with the President and House Majority?" *The American Political Science Review; Washington* 109, no. 1 (February): 172–186.

Ferejohn, John A. 1974. *Pork barrel politics; rivers and harbors legislation, 1947-1968.* Stanford, Calif: Stanford University Press.

Gordon, Sanford C., and Woo Chang Kang. 2015. "Distributive Politics: Federal Outlays." In *Emerging Trends in the Social and Behavioral Sciences,* edited by Robert Scott and Stephen Kosslyn, 1–16. John Wiley & Sons, Inc.

Howell, William G., Saul P. Jackman, and Jon C. Rogowski. 2013. *The wartime president: executive influence and the nationalizing politics of threat.* Chicago series on international and domestic institutions. London: The University of Chicago Press.

Hudak, John Joseph. 2014. *Presidential pork : White House influence over the distribution of federal grants.* Washington, District of Columbia: Brookings Institution Press.

Kiewiet, D. Roderick, and Mathew D. McCubbins. 1991. *The logic of delegation : congressional parties and the appropriations process.* American politics and political economy. Chicago: University of Chicago Press.

Krehbiel, Keith. 1991. *Information and legislative organization.* Michigan studies in political analysis. Ann Arbor: University of Michigan Press.

Krehbiel, Keith. 1998. *Pivotal politics : a theory of U.S. lawmaking.* Chicago: University of Chicago Press.

Kriner, Douglas L., and Andrew Reeves. 2015. *The particularistic president : the politics of federal grant spending.* Cambridge, UK: Cambridge University Press.

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

Mayhew, David R. 1974. *Congress: the electoral connection.* Yale studies in political science ; 26. New Haven: Yale University Press.

Payne, A. Abigail. 2007. "The Effects of Congressional Appropriation Committee Membership on the Distribution of Federal Research Funding to Universities." *Economic Inquiry* 41 (2): 325–345.

Rohde, David W. 1991. *Parties and leaders in the postreform house.* American politics and political economy. Chicago: University of Chicago Press.

Weingast, Barry R., and William J. Marshall. 1988. "The Industrial Organization of Congress; or, Why Legislatures, Like Firms, Are Not Organized as Markets." *Journal of Political Economy* 96 (1): 132–163.