Challenges in Measuring the Impact of Political Actors on Federal Spending

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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 funding decisions made 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 public policy. However, when testing these theories on the allocation of budgetary resources, multiple policy measures exist. Scholars face a choice between using measures of funding and measures of spending. Funding data reflect the legislative appropriations (i.e., budget authority) that are adopted by Congress and signed by the President, while spending data represent funding that has achieved certain milestones, such as being committed to a contract (i.e., obligations) or executed from government coffers (i.e., outlays). Although legislators may care most about the downstream benefits of delivered spending, they directly control funding levels. Thus, for studies that examine the impact of political actors on the congressional budget process, such as whether a committee position allows legislators to secure additional pork for their districts, we argue the quantity of interest should be appropriations, not spending.[1] On the other hand, for studies that examine the impact of political actors on the budget execution process, such as whether political appointees distribute pork to potentially vulnerable copartisan congressional districts (e.g., Gordon 2011), the quantity of interest should be spending, not appropriations. This is also true for studies

1. Congressional oversight of executive agencies may have a direct effect on spending. However, most studies using spending data examine the effect of certain political variables in year $t-1$ on obligations in year t. If scholars are interested in how legislators influence delivered spending, then they should examine committee composition in year t on outlays in year t, not in the preceding year.

that examine the effect of budgetary resources on outcome measures, such as whether voters reward politicians for bringing additional pork to their districts (e.g., Kriner and Reeves 2012).

However, appropriations data are not without their limitations. Federal appropriations are largely program based, not location based, and it has proven difficult to acquire appropriations data by congressional district. As a result, studies using appropriations data 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 have also used appropriations data 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 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] However, FAADS data are not comprehensive, and certain

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

3. Many studies incorrectly refer to FAADS data as outlays, not as obligations. However, the U.S. Census Bureau, which previously managed the FAADS database, confirmed that these data are self-reported by agencies in the form of obligations. In addition to FAADS, several studies use spending data compiled from

program areas (e.g., defense) have a substantial amount of missingness.

A standard assumption in these studies is that measures of spending can be used as a proxy for the funding decisions made 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 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

the Consolidated Federal Funds Report (CFFR), which consolidates financial reports on defense, procurement, personnel, grants, and payments to state and local governments. These data are in the form of either obligations or outlays, depending on the type of spending. The principal source of CFFR grants data is FAADS.

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 outlaid 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 of 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.

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

		% Appropriation Spent by 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 outlaid during the first year in which funding is made available; in accounts with low first-year rates, most of an appropriation is not obligated or outlaid 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. To disentangle these competing influences, we collect location-based appropriations data for military construction projects, which we discuss in detail in the following section and in the appendix. These data allow us to isolate congressional influences over the budget by distinguishing between presidentially requested and congressionally directed appropriations. Further, our data are free from *ex post* bureaucratic influence, since Congress specifies the recipient of each military construction project in the annual appropriations bill and report.

Second, spending measures may induce two types of measurement error. The first comes from tying spending to political variables 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 variables 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

5. This measurement error is noted by Alvarez and Saving (1997), who seek to conduct empirical tests

the FAADS data, particularly for defense programs. FAADS data exclude certain types of spending (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, since many political variables may be correlated with measurement error. 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 A.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

$$Bias = \frac{Cov(Committee\ Member,\ Measurement\ Error)}{Var(Committee\ Member)}, \tag{1}$$

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

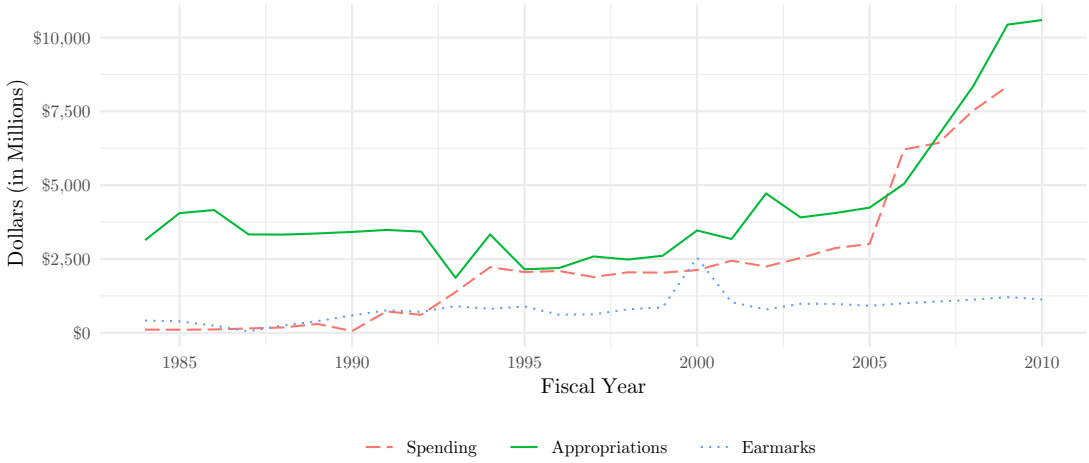
on only new obligations, as measured by an award's first appearance in the FAADS database. While their work is an improvement over earlier studies, it fails to take into account the lag between the enactment of an appropriation and the first appearance of an award in the FAADS database, which may take years.

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

presidentially requested or congressionally directed (i.e., earmarks). We describe our data more fully in the appendix.

Figure 1 presents a comparison of the two data sets with spending, appropriations, and earmarks shown. Earmarks here represent a subset of appropriations. Two points bear mentioning. First, 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] Second, the spending data systematically vary less than the appropriations data, since spending measures represent a weighted rolling average of the appropriations that originated them. For research designs that rely on year-to-year variation to identify the causal effect of political variables on the allocation of budgetary resources, such as panel designs, using the appropriated amount is especially important.

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



To examine the effect of committee membership on appropriations, we adopt the same

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

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 is a legislator/state fixed effect, δ_t is a year fixed effect, and X_{it} is a vector of other covariates: majority party membership and seniority. This within-member design compares appropriations when legislators are on committee to when they are not on committee, rather than comparing 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 spending and appropriations at the legislator level. For the Senate, we analyze spending and appropriations 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

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.

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.

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

	Dependent Variable: Log Dollars					
	Spending		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, 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.[10]

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

10. 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 the model with fixed effects.

appropriations subcommittee member receive nearly 60 percent more in appropriations and four times more in earmarks.[11]

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

	Dependent Variable: Log Dollars					
	Spending		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 in lieu of appropriations may produce starkly different results. We argue that this discrepancy is largely due to measurement error, which arises from incorrectly tying political variables to spending outcomes and from missingness in the data. However, this issue is not unique to military construction programs. Less than three-quarters of all appropriations outlay in the first year, and foreign operations (35%), transportation (35%), homeland security (55%), energy and water (59%), and defense (59%) programs have particularly low rates.[12] Hence our broader argument that tying political variables to spending outcomes may produce inaccurate results should be generalizable to all program areas to varying degrees.[13] As a result, our findings have broad implications for studies that use measures of spending in the congressional and presidency literatures.

11. We also conduct a Senator-level analysis, which we include and discuss in the appendix.
12. See Appendix Table A.2 for estimated outlay rates of all House-reported appropriations bills in FY2019.
13. Note that, for formula grant programs, the budget execution phase typically lasts one year, so most studies that tie spending to political variables (e.g., Martin 2018) do not suffer from this problem.

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 substantial evidence in favor of distributive theory. Contrary to Berry and Fowler's analysis, we find that the pork barrel was alive and well for appropriators during this period.

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