NBER WORKING PAPER SERIES

ACADEMIC EARMARKS AND THE RETURNS TO LOBBYING

John M. de Figueiredo
Brian S. Silverman

Working Paper 9064
http://www.nber.org/papers/w9064

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 2002

We would like to thank Steve Ansolabehere, Frank Baumgartner, Ernie Berndt, Jerry Hausman, Simon Johnson, Paul Joskow, S.P. Kothari, Abigail Payne, Jim Savage, Jim Snyder, Jesper Sorensen, Scott Stern, and participants in seminars at Harvard, MIT, Berkeley, Carnegie Mellon, George Mason, Toronto, Washington University, USC, Caltech and the National Bureau for Economic Research for very helpful discussion and comments. The views expressed herein are those of the authors and not necessarily those of the National Bureau of Economic Research.

Academic Earmarks and the Returns to Lobbying
John M. de Figueiredo and Brian S. Silverman
NBER Working Paper No. 9064
July 2002
JEL No. K0, H1

ABSTRACT

Despite a large literature on lobbying and information transmission by interest groups, no prior study has measured returns to lobbying. In this paper, we statistically estimate the returns to lobbying by universities for educational earmarks (which now represent 10 percent of federal funding of university research). The returns to lobbying approximate zero for universities not represented by a member of the Senate Appropriations Committee (SAC) or House Appropriations Committee (HAC). However, the average lobbying university with representation on the SAC receives an average return to one dollar of lobbying of $11-$17; lobbying universities with representation on the HAC obtain $20-$36 for each dollar spent. Moreover, we cannot reject the hypothesis that lobbying universities with SAC or HAC representation set the marginal benefit of lobbying equal to its marginal cost, although the large majority of universities with representation on the HAC and SAC do not lobby, and thus do not take advantage of their representation in Congress. On average, 45 percent of universities are predicted to choose the optimal level of lobbying. In addition to addressing questions about the federal funding of university research, we also discuss the impact of our results for the structure of government.

John M. de Figueiredo
MIT
Sloan School of Management, E52-546
50 Memorial Drive
Cambridge, MA 02142-1347,
Harvard Law School,
and NBER
jdefig@mit.edu

Brian S. Silverman
University of Toronto
Rotman School of Management
105 St. George Street
Toronto, Ontario M5S 3E6
Canada
silverman@rotman.utoronto.ca

Academic Earmarks and the Returns to Lobbying

John M. de Figueiredo and Brian S. Silverman
May 2002

> "The education industry has long shown a masterful skill in obtaining public funds; for example, universities and colleges have received federal funds exceeding $3 billion annually in recent years, as well as subsidized loans for dormitories and other construction.... [But] the premier universities have not devised a method of excluding other claimants for research funds, and in the long run they will receive much-reduced shares of federal research monies."
>
> -- Stigler, George (1971), "The theory of economic regulation," *Bell Journal of Economics*, pp. 4-5.

Lobbying expenditures exceed $2 billion per year in the United States, more than three times the campaign contributions given by political action committees or PACs (Timothy Groseclose *et al* 2000). Many voters view such spending with suspicion, and the popular press frequently cites it as *prima facie* evidence of the power of "pressure groups, each promoting its own special interests, [to] prevent elected politicians from adopting policies that are in the interest of the electorate as a whole" (*Economist* 1999). Yet remarkably little is known about the economic returns actually obtained by lobbying organizations. Despite sixty-five years of theoretical and empirical investigation,[1] and a steadily increasing interest by the press and electorate, there are no large-scale statistical studies of the returns to lobbying.[2]

The dearth of statistical studies of lobbying is largely due to four challenges in data collection and measurement. First, it is difficult to measure lobbying expenditures. Second, many government policies lack identifiable pecuniary returns, thus making it difficult to measure the monetary value of policy outcomes that have been influenced by lobbying. Third,

[1] There are robust sets of theories on information transmission in lobbying, focusing on who lobbies and gains access (David Austen-Smith 1995; Gary S. Becker 1983; Randall L. Calvert 1985; John Mark Hansen 1991), who is lobbied (Austen-Smith 1993; E.E. Schattschneider 1935; Julio Rotemberg 2002), how legislators receive and process the information (Scott Ainsworth 1993; Rui J. de Figueiredo et al 1999; Lester W. Milbraith 1963, Kay L. Scholzman and John T. Tierney 1986), and the organizational form of lobbying (Mancur Olson 1965; John M. de Figueiredo and Emerson H. Tiller 2001). For a good overview of interest group lobbying theory and evidence, see John R. Wright (1996).

[2] Since Schattschneider's (1935) work on trade policy 65 years ago, scholars have sought to measure the impact of lobbying on policy outcomes. Most of the empirical work is composed of case studies (e.g. Raymond Bauer *et al* 1963). Statistical work has comprised measures of lobbying which are coarse at best: a count or intensity measure of lobbying contacts from surveys of lobbyists (Austen-Smith and Wright 1994; Wright 1990; Ken Kollman 1997), the presence of a Washington office and lobbyists (Douglas Schuler 1999; Scholzman and Tierney 1986), and

organizations typically employ multiple instruments to exert political influence, including lobbying, PAC contributions, and grassroots lobbying, creating statistical challenges to estimating the returns to lobbying. Finally, it is difficult to control for the intrinsic quality differences among competing lobbying interests.

In this paper, we overcome these challenges by studying the returns to lobbying in a particularly conducive context: lobbying efforts by universities to obtain "earmark" grants. Earmarks, which are written into appropriations bills by legislators, allocate money directly to projects at specific universities, thus bypassing the competitive peer review process. This context enables us to overcome the empirical challenges described above. First, the Lobbying Disclosure Act of 1995 allows us to measure university lobbying expenditures, and other techniques described below allow us to allocate lobbying expenditures to the pursuit of earmark grants. Second, earmarks are specified in dollar terms in legislation and targeted to particular, identifiable educational institutions, overcoming problems of measurement of the dependent variable. Third, universities seeking to influence legislators have few options besides lobbying, because most universities, as non-profit institutions, are legally prohibited from using PAC contributions or grassroots political organization to convey their preferences to legislators, overcoming the estimation and confounding causal issues. Finally, we are able to control for quality differences in interest groups with different systems of departmental rankings of universities.

Although our interest in academic earmarking is driven primarily by our desire to estimate the returns to lobbying, the funding of academic research is an important topic in its own right. The U.S. higher education system is widely seen as key engine of U.S. economic growth, both through the training of students and through research discovery (Claudia Goldin and Lawrence F. Katz 1999; David C. Mowery & Nathan Rosenberg 1993). Federal funding of academic research has been a central component of the United States university system for decades, providing roughly 60 percent of all university research funds since World War II (Richard R. Nelson & Nathan Rosenberg 1994), and reaching $17 billion in FY2001. Most of this funding is distributed at the discretion of central funding organizations unaffiliated with Congress, such as the National Institutes of Health and the National Science Foundation, and rely

proxies such as PAC contributions (Ian Maitland 1983; Randall S. Kroszner and Phil Strahan 1999). For an overview of the empirical papers, see Frank R. Baumgartner and Beth L. Leech (1998).

on peer review (or other competitive selection processes) of research proposals to allocate funds. In contrast, academic earmark requests are evaluated and granted by elected legislators and their staffs. Expenditures on academic earmarks have risen over the past 20 years and now account for almost 10 percent of government funding of university research (Jeffery Brainard and Ron Southwick 2001). It is therefore not surprising that academic earmarking has received increasing attention in the policy literature recently (James D. Savage 1999; David Malakoff 2001a, 2001b). Despite this increased interest, there has thus far been no published systematic statistical analysis of the earmarking process.[3]

Finally, the debate over academic earmarking also fits within the broader literature on the structure of government. Broadly speaking, the debate over earmarking mirrors the literature on "good government" and the effect of rent-seeking on government productivity. Kevin M. Murphy *et al*. (1993) demonstrate that rent-seeking behavior is subject to increasing returns, suggesting that an initially small amount of rent-seeking behavior can spiral upward toward a high-rent-seeking equilibrium. High levels of rent-seeking effort can "crowd out" other, more productive efforts. One mechanism for stemming such behavior is for a government to commit to "high quality" policies that effectively preclude its giving in to rent-seeking parties (Rafael La Porta *et al*. 1999). While central, peer-reviewed agencies would likely be considered a form of commitment, lobbying for earmarks might be characterized as rent-seeking, and thus crowding out other productive efforts of government.

Within the broad literature on the structure of government, the paper addresses the congressional committee structure of government, and how it relates to federal discretionary spending. In this literature, there are conflicting views as to whether representation on a committee results in that committee spending more of the committee budget in committee-members' districts than in non-committee members' districts.[4] No study, however, has examined the effect information transmission through lobbying has on such discretionary spending. Wright (1985) does show that PAC contributions are sometimes effective in obtaining favorable policy, only to the extent that the PAC is located in the member's district. Whether

[3] Scholars have begun to study research outcomes associated with peer reviewed vs. earmarked projects (A. Abagail Payne 2001; Payne and Aloysius Siow 2002).
[4] Those finding committee effect on spending include Richard L. Hall et al (1990) and Charles R. Plott (1969). Those finding no effect include Kenneth R. Mayer (1991) and Bruce A. Ray (1980). Those having mixed results include J. Theodore Anagnoson (1980) and R. Douglas Arnold (1981).

location matters in lobbying, and how lobbying might affect the results in the committee structure-discretionary spending debate, remain open questions.

We speak to three main issues in this paper: educational earmarks, the returns to lobbying, and lobbying's relationship to the performance of government and committees. We begin by estimating the determinants of educational earmarks. We assess the importance of political factors, district demographic factors, and institutional factors in determining the size of earmarks that post-secondary educational institutions obtain. We include lobbying expenditures by universities on the right hand side, and assess the impact of lobbying on earmarks, using a number of different specifications, including instrumental variables. We also revisit the federal appropriations process as it relates to educational earmarks, and explore the extent to which 1) spending is targeted toward committee member districts, and 2) lobbying influences the amount of money targeted toward institutions in the district. In doing so, we extend Wright (1985) to include lobbying.

We generate three main results. First, the size of academic earmarks is heavily influenced by certain institutional characteristics, such as school ranking, or the presence of Ph.D. degree-conferring departments or a medical school. We find evidence that, on average, top research institutions are less likely than lower-ranked institutions to receive earmark funding. This is consistent with claims that such institutions prefer to seek funding through the competitive grant system rather than the political system.

Second, political factors also heavily influence the size of earmarks. House and Senate Appropriations Committee members send a disproportionate share of the academic earmarks to their constituent universities, on the order of $105,000 to $130,000 for the Senate, and $80,000 to $145,000 by the House. Contrary to those who claim there is no relationship between federal spending and committee membership, our study provides evidence to support the claim that committee members do direct federal spending toward their districts.

Finally, and most importantly, there is a complex relationship between lobbying and earmarks, with respect to Senate Appropriations Committee (SAC) and House Appropriations Committee (HAC) membership. In particular, the average returns to lobbying for an average university are not statistically different from zero, when the institution is not represented by a member of the SAC or HAC. But the returns to lobbying are very large when the institution is located in the state (district) of a Senate (House) Appropriations Committee member. We

calculate the average returns to a dollar spent on lobbying for the average lobbying university when there is representation on the SAC to range from $11 to $68, with almost all econometric specifications yielding an estimate of the return from $11 to $17. With representation on the HAC, the average lobbying university obtains an average return of $14 to $77 from a dollar investment, with the baseline econometric estimates estimating a return of $20 to $36. Thus, the returns to lobbying without SAC or HAC representation are near zero, but the average returns to lobbying with SAC or HAC representation are indeed very large. Moreover, we cannot reject the hypothesis that, on the margin, lobbying universities with SAC or HAC representation are setting marginal benefit to marginal cost. Nevertheless, the vast majority of universities with representation do not lobby, and thus are not obtaining the full benefit to having representation on the HAC or SAC.

This in turn indicates that lobbying is only effective to the extent that the legislator representing the university is in a position to deliver an earmark, consistent with Wright's argument that location of political influence is important. SAC and HAC legislators are less likely to send educational earmarks to districts they don't represent. In this respect, HAC and SAC members can be considered joint inputs into the earmarks production function. In addition, the results are consistent with vote-seeking legislators doing their best to send money to their districts, but relying upon their constituents to provide information to help them augment and target that amount. Thus, we add to the discretionary spending debate by demonstrating that by omitting lobbying from the calculus, scholars are omitting a potentially large factor driving the discretionary spending behavior of legislators and committees. Finally, this also conforms to the La Porta *et al* (1998) viewpoint of low commitment by legislators to the peer-review process, giving certain interest-groups rent-seeking market power based on representation on certain powerful committees.

We structure the paper as follows. In the next section we offer some background on educational earmarks and lobbying. In Section II we then discuss the empirical challenges in measuring the returns to lobbying. In this section we discuss in depth the measurement of lobbying and earmarks. Section III lays out the data and model. We provide the main results in Section IV. In Section V, we discuss specification issues and possible alternative hypotheses for the relationship between lobbying and earmarks, including how alumni networks affect the results. We conclude in Section VI.

I. BACKGROUND ON EDUCATIONAL EARMARKS AND LOBBYING

As Goldin and Katz (1999) note, American institutions of higher education emphasized learning rather than research until late in the 19th century. However, as the scientific needs of industry increased, so did the demand for academic research in applied sciences. Thus the modern research-oriented university became widely established by World War I, with research funded primarily by states and secondarily by local industry (Rosenberg and Nelson 1994). Although the federal government funded roughly 25 percent of academic research by the 1920s, this was largely in the form of agricultural research grants. These grants were awarded to land-grant universities according to a formula that correlated the size of the grant to a state's agricultural output, rather than to the potential value of specific research proposals (Savage 1999).

The exigencies of war led to a sea change in the mechanisms for federal funding of academic research. As part of the war effort, the newly-formed Office of Scientific Research and Development contracted with private sector organizations for wartime-related research. This civilian agency, directed by Vanevar Bush, relied on scientists from academe and industry "to recommend and to guide as well as to participate in scientific research with military payoffs" (Mowery and Rosenberg 1989: 124). Largely due to the advocacy of Vanevar Bush, the practice of awarding federal research funds to individual scientists via competitive project-based grants became institutionalized by 1950. Under this system, the awarding of funds was managed by the newly-created National Science Foundation and several other federal agencies, and awards were made primarily on the basis of peer review of project proposals.

By 2001, federal funding of academic research through competitive grants exceeded $15 billion. Numerous scholars of technology policy have argued that this system has ensured that money is allocated toward the most promising research projects, and thus underpins the enduring success of academic research in the United States (e.g., Nelson and Rosenberg 1993).

Yet the competitive grant process has had its share of critics as well. A number of prominent academicians and legislators have argued that peer review serves to concentrate research funding in a few elite schools whose scientists populate the peer review boards (William H. Gray 1994, John Silber 1987). Further, these critics have argued that peer review tends to reward "safe" research projects that conform to accepted beliefs, thus starving truly breakthrough

research (Silber 1987). According to this view, the earmarking of federal funds through the legislative process offers a potential counterbalance to the perceived defects of the competitive grant process.

The birth of academic earmarks can be traced to the late 1970s, when Jean Meyer, President of Tufts University, engaged two lobbyists – Kenneth Schlossberg and Gerald Cassidy – to help secure funding for a nutrition and aging center. In addition to demonstrating to other universities that such funding could be obtained, this deal apparently gave Schlossberg and Cassidy the entrepreneurial idea of systematizing the business of securing academic earmarks. Over the next two decades Schlossberg and Cassidy, as well as several imitators, actively pursued educational institutions as clients, holding out the promise of obtaining academic earmarks (Savage 1999). The amount of money allocated through academic earmarks rose from less than $17 million in 1980 (or $32 million if measured in constant 2001 dollars) to nearly $1.7 billion in 2001, a 100-fold increase in nominal terms (and a 52-fold increase in real terms). By 2001 academic earmarks represented nearly 10 percent of total federal funding of academic research (see Figures 1a and 1b).

**********INSERT FIGURE 1a and 1b ABOUT HERE **********

The rise of specialist lobbying firms to secure earmarks also routinized the earmark "production schedule." The "life cycle" of lobbying and obtaining an earmark is as follows.[5] In January, a university's administrators meet with its lobbyist to formulate their requests and lobbying strategy for the upcoming fiscal year earmarks. This entails prioritizing potential requests by the likelihood of success, and identifying elected officials to lobby. In most cases, the lobbyist will approach the Representative and/or Senator from the university's district. Beginning in March and April, the university begins lobbying the targeted representatives to have its request included in the appropriations legislation. After the August recess, there is a large push to have the request included in one of the thirteen appropriations bills. The cycle ends, usually in November or early December, as the appropriations bills are sent to the President. According to our interviewees, requests from one year do not carry forward to the

[5] According to interviews with staffers on the appropriations committees and lobbyists.

next year and the process starts again. This is mainly because the appropriations process, unlike the budget process, is not a multiyear process.

II. CHALLENGES IN MEASURING THE RETURNS TO LOBBYING

As noted in the introduction, estimating the returns to lobbying poses a number of challenges. First, it is difficult to measure the monetary value of lobbying expenditures. Until recently, systematic data on lobbying expenditures has not existed. Consequently, nearly every published statistical study has relied on proxy measures, survey data, or dummy variable measures for lobbying, rather than direct measures of lobbying expenditures.[6]

Recent legislation passed by Congress has created lobbying expenditure disclosure requirements for universities (and all interest groups) and thus allows us to overcome this measurement problem. The Lobbying Disclosure Act of 1995 mandates that any individual who spends more than 20 percent of his or her time lobbying administrative agencies, Congress, or the Executive, must file a report disclosing the amount of money expended on this activity. Each organization that lobbies Congress or an administrative agency, and spends more than $20,000 doing so, also must file a report with the Clerk of the House disclosing the name of the lobbyist, the clients of the lobbyist, and the amount of money spent on lobbying by the client (to the nearest $20,000).[7] One complication that arises, however, is that firms and interest groups typically lobby across a range of issues (and multiple organizations lobby on the same issue). Even when a firm's aggregate lobbying expenditure is known, it is difficult to identify how this expenditure is allocated across different issues.

We overcome this by examining academic earmark funding. Nearly all of university lobbying is directed at two objectives: "earmark funding" and "science and research policy," and the vast majority is directed at the former objective.[8] The first legislative item for which top and lower tier universities lobby is "earmark funding" (discussed further below). A small number of universities and umbrella groups also lobby for "science policy" -- to increase the amount of competitive grant funding that congress allocates to research in the form of budgets for the

[6] Common proxies are PAC contributions, presence of a Washington office, 0-1 variable on "did you lobby on this issue" from survey instruments or archival research, and the presence of trade associations or trade unions.
[7] The lobbyist must include in this report all expenses related to the lobbying, including the costs of lobbying contacts and efforts in support of such contacts, including background work that is intended for use in contacts and coordination with the lobbying activities of others (Office of the Clerk of the House, 2001). This includes salaries and benefits costs, overhead, expenses, and third-party billings.

National Science Foundation (NSF), the National Institutes of Health (NIH), and agencies such as the Department of Energy (DOE) and the Department of Defense (DOD). The organizations that lobby for "research policy" include the top 50-100 research universities in the U.S., and associations such as the American Association of Universities (AAU) and the Science Coalition. The remaining 6,400 post-secondary institutions generally do not. (This fact will become important when we consider how to control for universities that lobby for "science policy.")

Since the vast majority of universities' lobbying expenditures (and virtually 100 percent of lobbying expenditures by universities that are not among the top 50-100 research institutions) is devoted to the pursuit of earmarks, concerns about allocating lobbying expenditures across multiple policy objectives are ameliorated. Thus, we use the dollar amount of lobbying expenditure as the key independent variable in our analysis below. In econometric specification tests, we allow for different measures of lobbying.

Second, it is difficult to measure the monetary value of policy outcomes that have been influenced by lobbying. Many policies that governments legislate – such as saving the forests, mitigating lawsuits, creating a new regulation, and eliminating a disclosure rule – lack identifiable pecuniary returns. Even those government programs that do have discrete, measurable dollar benefits often distribute these benefits among many groups (such as telecommunications legislation). This makes the precise allocation of benefits to individual groups or companies difficult. Coupled with the difficulty in identifying and measuring the dollar value of lobbying expenditures, this challenge has made it nearly impossible to measure the economic returns to lobbying efforts.

We overcome this challenge by studying an easily measurable benefit. Earmark grants specify the university that is to receive funding, the amount of the funding, and the purpose of the funding.[9] These earmarks are non-competitive grants given to universities, colleges, and community colleges, for specific research and other projects attributable to the post-secondary institution (Amy Finkelstein 1995). These projects range from research on corn, to the development of underwater propulsion mechanisms, to the study of Irish management

[8] We have conducted interviews with lobbyists and they confirm this viewpoint.
[9] For example, "$10,000,000 for the construction and equipping a new space dynamics lab Utah State University…."; "$10,000,000 for NASA to establish an independent verification and validation center in conjunction with West Virginia University" (Savage 1999: 8)

techniques. The dollar value of these earmarks is identifiable, measurable, and easily allocated to a specific institution, consequently overcoming the measurement challenges noted above. Thus, we use the dollar amount of these earmarks as the dependent variable in our analysis below.

A third challenge for scholars of lobbying is to disentangle lobbying's impact from that of other instruments of political influence. There are a myriad of ways in which interest groups and firms influence legislation. The three most prominent are a) PAC contributions; b) lobbying; and c) grassroots organizing. It would be incorrect to attribute policy outcomes to only one of the factors when all three are being used or are available. More challenging, interest groups should be simultaneously optimizing across all three tools at their disposal. Thus, when the United Auto Workers (UAW) wants to influence the passage of certain labor legislation, it should consider how to optimally allocate its resources among campaign contributions, membership mobilization, and direct lobbying, to create the most favorable outcome. In statistical studies of lobbying, therefore, one cannot simply include PAC contributions and grassroots organization as variables on the right-hand side of the equation, but rather must employ instruments that are correlated with PAC contributions and uncorrelated with lobbying, and correlated with grassroots organizing and uncorrelated with lobbying. These are not trivial instruments to derive and measure in a large sample statistical study.

A study of university lobbying directly addresses this challenge. As non-profit institutions, universities are not permitted to create and fund political action committees, and thus give no money in PAC contributions or "soft money" to political candidates or political parties.[10] In addition, universities are not allowed to engage in grassroots organization of its members for political purposes. Lobbying is clearly the dominant, and in most cases the only, avenue for universities pursuing earmarks.

A fourth and final challenge in measuring the returns to lobbying relates to variance in the quality of the groups lobbying. Let us suppose, for example, that IBM lobbies for legislation regarding disk drive construction. Winchester and Seagate also lobby, but for a different legislative outcome. IBM's preferred policy is passed by Congress. It is not clear to the researcher whether this results from IBM's lobbying effort, or from its superior technology in

disk drives. If one is to measure the returns to lobbying, then one must be able to control for the optimality of the policy, relative to the alternatives. This is quite difficult to do, because it is difficult to determine if IBM is the best disk-drive maker, and it is likely even more difficult to determine a ranking of all disk drive makers in the industry for a statistical analysis. The compounded challenges become even more onerous if one considers other policies such as saving dolphins, reforming campaign finance, or drilling in the Arctic, where a measuring of social welfare or ranking of groups is required as well.

This challenge is easily surmounted in a study of universities. Using ranking data by independent sources, such as the National Academy of Science, we can control for quality of university by department.

III. DATA AND MODEL

A. DATA

The dependent variable is the amount of money Congress earmarks to a given academic institution.[11] A full description of all the variables can be found in the Appendix.

The primary independent variable of interest is the amount of money an academic institution of higher learning spends on lobbying. We have obtained the 1997-1999 data from disclosures made by institutions in compliance with the Lobbying Disclosure Act of 1995, as described in the previous section.[12]

---

[10] Universities could form non-affiliated PACs. For example, there could arise a Harvard PAC, but this PAC would be independent from the university, and the university would not be permitted to fund the traditional 40 percent overhead these PACs have. However, this is extremely rare.

[11] Some earmarks are shared amongst more than one university. In almost every case, we have been able to identify the universities that share the earmark, and have allocated the earmark funding to the universities in an equal proportion. For those handful of shared earmarks for which we cannot identify all the institutions which share, we have assumed that there are 2.5 institutions sharing the earmark and have allocated 2/5 of the shared earmark to the institution.

[12] One concern about the data is that the Lobbying Disclosure Act of 1995 requires interest groups to file the amount of all of their lobbying of the federal government. This includes both administrative agency and congressional lobbying. However, this study is only concerned with congressional lobbying. If an institution engages in a substantial amount of administrative agency lobbying, then there would be an error in variables problem. To address this problem we conducted a number of interviews with university lobbyists at 20 institutions of various geography and rankings, to discuss their institution's lobbying patterns. All noted that the focus on their lobbying efforts is on Congress. Two elite institutions did note that some of their lobbying is at the administrative agency level over disclosure and safety rules, but they characterized this as small in magnitude and significance relative to their congressional lobbying efforts. To a good first approximation, the lobbying data does reflect congressional lobbying. In addition, we pursue econometric solutions to this potential problem in the next section.

The third set of data employed is a set of characteristics for each congressperson and senator in each year from 1997 to 1999. We include the Representative's ADA score, the two Senators' mean ADA score, dummy variables for appropriations committee assignments, dummy variables for chairmen and ranking members, and dummy variables if the Senator or Representative has previously held a job as an educator. We also match the legislators with their alma maters, to test for any effect on the outcomes of earmarking. This set of data controls for congressional influence over the earmarking process.

A fourth set of data comes from the Bureau of the Census. The Census Bureau maps the results of the Census into congressional districts. In employing this data, we study whether Congress targets earmark grants to universities in districts with specific characteristics. We include data on population density, age, education, employment, and income of individuals in the district.

To control for university quality, we employ the National Academy of Science (NAS) university rankings. Every 10 years, the NAS ranks 41 different departments at all research universities on their research quality. Each department is given a score on a 1 to 5 scale (with decimals), and then is given an ordinal ranking relative to all other schools.

Finally, we employ a database of other university characteristics. This database is popularly called the Integrated Postsecondary Education Data System, or IPEDS database. Each year, the Department of Education certifies post-secondary institutions that are eligible for Title IV (or financial aid) funds. Students who attend certified institutions can apply to the federal government to receive Pell grants, Stafford Loans, and other forms of federally subsidized financial aid. We mapped these institutions into congressional districts by nine-digit zip code to create a concordance with the congressional data. The main variables we use here to control for institution characteristics are whether the institution is private, has a medical school, has a Ph.D. program, or has athletic aid scholarships. We also control for student enrollment. We also use the IPEDS data and zip code data to determine the number of institutions in the state and the congressional district.

One challenge in this study is determining which institutions to include in the sample frame. An examination of the data reveals that there are over 6,453 post-secondary institutions in the 50 states[13] that are certified by the Department of Education, and whose students are

[13] Only institutions in the 50 states have been included in this study.

eligible to receive financial aid. These range from prestigious research institutions such as Harvard University, to one-year certification programs such as AAA School of Hair Styling. Although these could all be considered "credible" institutions of post-secondary training,[14] not all such institutions may be in the "risk set" to receive earmarks. To further cull the dataset, we eliminated all institutions that are not ranked by the Carnegie Foundation as institutions of higher education. We eliminate another 49 institutions because of incomplete data. Finally, we eliminate all for-profit schools (because they are not in danger of losing their tax exempt status if they engage in other forms of political activity). This leaves us with 2,382 institutions under scrutiny. In later sections of this paper, we consider the possibility of further restricting the sample.

Table 1 presents descriptive statistics. We bifurcate the table into all universities all years (n=7,146), and only those that lobby (n=423).[15] The average annual earmark amount for all institutions is $230,290 with a maximum of $44.5 million for Loma Linda University. Annual lobbying expenditures for this group have averaged $7,442, ranging from no lobbying to $760,000 by Boston University. For the sub-sample that lobby, the average earmark is $1.92 million and the average lobbying expenditure $125,726. It is the fact that earmark grants are 15-35 times lobbying expenditures that have led many casual commentators to note that interest groups receive so much for their minor lobbying efforts.

**********INSERT TABLE 1 ABOUT HERE **********

B. LOBBYING AND EARMARKS

We begin by exploring the relationship between committee structure, lobbying and earmarks. Figure 2a presents a graph of earmarks on lobbying for all years, all institutions, with

[14] The Department of Education frequently revokes the status of institutions usually in response to high default rates on student loans.

[15] There are four institutions where the governing board lobbies. For example, the California Community College System lobbies the federal government. We allocated this lobbying effort into each school with an IPEDS number in the California Community College System evenly, and by enrollment. In no case, however, did the allocation exceed a $3,000 per school. Because the cut-off in observable lobbying for all other schools is $20,000, we coded these a zeroes. Note, if we eliminate schools in these four systems from our sample, it does not change our results. If we include the allocated amounts, the results presented in this paper are slightly smaller in magnitude, but with greater statistical significance.

the state in which the institution is located indicated. A review of the figure shows that both earmarks and lobbying and distributed across a range, with a large concentration at smaller amounts. There is no obvious systematic pattern in the data.

In Figure 2b, we replace each state indicator with a legislator indicator. If the institution is represented by a House Appropriations Committee member, the point receives an H; a Senate Appropriations Committee member, an S; both a House and Senate Appropriations Committee member, an HS; and no appropriations committee members, an O. A pattern now begins to emerge. Those institutions that are high are the earmark-scale tend to have Senate and/or House appropriations committee membership. Those institutions that are low on the earmark scale (even if high on the lobbying scale) tend to be more highly represented by no appropriations committees members. This is suggestive of the importance of appropriations committee representation.

**********INSERT FIGURES2a and 2b ABOUT HERE **********

Table 2 shows the average levels of lobbying and average size of earmark per university in the 1997-1999 time period by appropriations committee membership. The table shows the statistics for all universities, and also for the "lobbier" (lobbying expenditures > 0) sub-sample. In the full sample, the results show that the average university with no representation on the SAC spent $9,430 lobbying, and received an earmark of $144,693. The unconditional average return was over $15 for every $1 spent on lobbying. However, universities with representation on the SAC lobbied about 40 percent less than their non-represented counterparts, yet received just over two times the earmark, for an unconditional return on investment of almost $56 for every $1 spent on lobbying. A similar pattern can be found in the House. The return for universities without representation on the HAC is just over $25 for every dollar spent in lobbying. Their counterparts who happen to be in districts where the representative is on the Appropriations Committee, lobby almost the same, on average, and receive an earmark of almost $320,000 more, for a return of $66 for each dollars in earmark for every dollar spent on lobbying.

**********INSERT TABLE 2 ABOUT HERE **********

When we limit our analysis to institutions that actually lobby, the relative results are roughly the same. A lobbying university with SAC representation receives on average, three times the return of a university that is not presented by a SAC member. In the lower chamber, lobbiers with HAC representation also receive three times the amount of earmarks, on average, than lobbying universities without HAC representation. This evidence is consistent with the hypothesis that committee membership is crucial in determining who receives federal educational earmarks. Moreover, it does suggest that universities do alter their lobbying and expectations for federal outlays in a statistically significant way, based on the representation they have in Congress.

While the static unconditional means provide the first chapter of an interesting story, we have a short time series in the data (1997-1999), that might also help to add insight. There are very few individuals who switch on or off of the appropriations committees during this time period. All of the switching occurs after the 1998 election. In Table 2 we illustrate two of the switchers. Senator Faircloth (R-NC) is defeated in 1998 by Senator John Edwards (D-NC), and thus loses his position on the SAC. He is not replaced by Edwards or by Jesse Helms (R-NC), so North Carolina loses its representation on the SAC. One can see the impact of such a switch in the first two columns of Table 3. There is large jump in lobbying by North Carolina universities between 1998 and 1999, but the earmarks to North Carolina are cut in half in 1999. A contrasting example is the retirement of Dale Bumpers (D-AR) who served on the SAC until his retirement in 1998. As in the case of North Carolina, Arkansas actually witnessed an increase in lobbying after Bumpers stepped down from the SAC, but also saw an increase in earmarks.[16]

**********INSERT TABLE 3 ABOUT HERE **********

Arizona provides information on the opposite effect. Jon Kyl is (R-AZ), is elected in 1994 and is elevated to the SAC in 1999, giving Arizona new representation on the Committee as the Committee's most junior member from the majority party. Though average lobbying stays level during between 1998 and 1999, educational earmarks for the average university in Arizona increase by 41 percent. Likewise, Senator Durbin (D-IL) is elevated to the SAC in 1999 (replacing Bumpers). This results in an increase in lobbying and an increase in earmarks. Thus,

[16] This may be partially a President Clinton effect, as the President nears the end of his second term.

in three of the four cases of committee switchers, we see the both lobbying and earmarks responding to changes in SAC membership.

While this section provides evidence that examining the unconditional means supports the committee power story, and that universities change their lobbying in response to representation in Congress on the appropriations committees, it is difficult to determine a causal relationship from this data alone. In order to do this, we conduct a statistical analysis.

C. METHOD

We begin by assuming a diminishing marginal return to lobbying. How lobbying enters into the equation, however is not certain, so we consider $(Lobbying)^{\gamma}$, where γ is the power function that determines the concavity of the function and the rate of diminishing marginal returns to lobbying.[17] Thus, we wish to estimate the following equation:

$$\begin{aligned} Earmark\$_{it} &= \alpha_{it} + \beta_1 (Lobbying_{it})^{\gamma} + \beta_2 HAC_{it} + \beta_3 SAC_{it} + \\ &\beta_4 (Lobbying_{it})^{\gamma} * HAC_{it} + \beta_5 (Lobbying_{it})^{\gamma} * SAC_{it} \\ &+ \omega \mathbf{X}_{it} + \delta \mathbf{\Omega}_i + \eta_t + \varepsilon_{it} \end{aligned}$$

where *Earmark$* is the dollar value of the earmark university *i*, received in year *t*, $(Lobbying)^{\gamma}$ is the lobbying expenditure of institution *i* in time *t* raised to the power γ which is a factor of the degree of diminishing marginal returns, *HAC* and *SAC* are dummy variables for representation on the HAC and SAC, $\mathbf{X}_{it}$ is a matrix of time-varying institutional-specific factors, and $\mathbf{\Omega}_i$ is a set of time-invariant institutional factors. We include interactive variables of lobbying with the two appropriations committees as well.

To account for the committee structure hypothesis, we include direct effects of HAC and SAC, in the way they are traditionally included in the model. If House and Senate members are responsive to the needs of their own districts and tend to send money to their own districts, then the β_2 and β_3 parameters will pick up the magnitude of this effect.

[17] We begin by considering a function of linear relationship between earmarks and the log of lobbying expenditures as the base case, and consider other functional forms in later models. A trans-log or polynomial model might be a natural candidate specification. However, given that we have interactive variables that are endogenous, severe multicollinearity problem arises in attempting to instrument for many higher power endogenous interactive terms.

We also include the interactive effect to see if members in positions of power are more responsive to lobbying than those who are not. That is, controlling for committee assignments, leadership, and district composition, does lobbying a powerful legislator who represents you result in any additional benefit to lobbying. We rely on β_4 and β_5 to measure the effect. A positive coefficient would suggest a larger return to lobbying to universities that are located in key districts.[18]

In order to find γ we conduct a grid search, allowing γ to vary on the interval [0, 1] (no effect to constant returns), and minimize the sum of squared errors (SSR). We find a minimum of the sum of squared errors at $\gamma = 0.23$. This is nearly equal to the log transformation of lobbying. We cannot reject that the log transformation and the $\gamma = .23$ transformation yield the same results. Because of the intuitive and attractive properties of the log transformation, we present the baseline econometric results using *Ln(Lobbying)*.[19] In later specifications in Table 6, we consider $\gamma = .23$ and censored regression models. All standard errors are robust in the single panels, and clustered on institutions in the multiple time period panels.

One concern with the specification above is that the coefficient estimates might be biased. This may occur because the set of schools that lobby may not be a random selection of institutions. Thus, we would have an unobservable factor that is correlated with both the outcome and the error term. Hence, we consider instrumental variables to solve this problem. We look for a variable that is correlated with the independent variable but uncorrelated with the error term. We have four candidate variables that might meet this criterion, two of which are used in the baseline estimations.

The first instrument used in the baseline models is the overhead rate for the university. All federal research grants to universities have indirect costs (commonly known as overhead) which are attached to the grant. Overhead rates, negotiated with government contracting authorities, are designed to pay for operating costs and infrastructure of the university for research. Two characteristics of this variable make it an attractive instrument. First, because overhead is usually attached to earmarks, the higher the overhead rates, the higher the incentive of an organization to seek an earmark. Second, the higher the overhead rate, the more money the

[18] The instrument that is omitted from each equation for these interactive variables is the interaction of the chosen instrument with HAC and SAC.

university has to engage in lobbying activities, and the more likely it is to engage in lobbying. Indeed, in the political realm, it is has been shown that companies tend to give more PAC contributions to politicians the higher are their profits and sales (Kevin B. Grier *et al.* 1994). We use a similar logic here with lobbying. The instrument is likely to be positively correlated with lobbying, yet it is unlikely to be directly correlated with earmarks, because the politicians are unlikely to know the overhead rates for each post-secondary institution in the district.

We obtained the overhead rates from the Division of Cost Allocation of the Office of Grants Management of the Department of Health of Human Services (HHS).[20] Universities usually sign global agreements to cover research funded by the federal government for a specified overhead rate for a given year. While 90 percent of the contracts are signed with HHS, about 10 percent of contracts are signed with the Department of Defense (DOD) and Department of Education (DOEd). HHS collects all of these contracts in the only comprehensive, centralized database of overhead rates of which we are aware. We obtained the contracts from HHS and have taken the relevant overhead rate in April of the year of interest.[21] Table 1 shows that overhead rates range from 8 percent to 85 percent, with 22 percent as a mean. The first stage regression of lobbying on the RHS variables and overhead rate indicates that a 10-point rise in overhead rates results in between a 2 percent to 10 percent rise in lobbying expenditure at the 90 percent to 99 percent level of statistical significance, depending upon the precise first stage specification.

The second potential instrument is lag of *Ln(Lobbying)*.[22] Lobbying is a sticky cost that universities incur from one year to the next. There is also high positive correlation between lag of lobbying and lobbying. An important criterion, however, is that lobbying in the previous period not be correlated with earmarks in this period. To explore whether this is a reasonable assumption, we interviewed congressional staffers. As noted above in Section I, lobbying during

---

[19] We add one to the value of lobbying so that the RHS variable will not reach negative infinity. In Model 7, we relax this transformation of the RHS and use $\gamma = .23$, where zeroes are recorded for zero levels of lobbying.

[20] Special thanks to Charles Seed and Otto Kent for assistance with the data.

[21] Most overhead rate contracts go from summer to summer, though a few are on a calendar year schedule, and are generally sticky from year to year. In most cases, we use the on-campus research rate for the main campus. For universities that did not have this rate, we used the closest category available.

[22] Although one might be concerned about the "quality of projects" being funded, writers have noted that academic earmarks are really just a form of discretionary spending and transfers (Savage 1997), independent of project quality. If universities move along with some steady pattern of lobbying, and then in one particular year, have a good project for an earmark, their lobbying may suddenly shoot up. We would like to have instrument to control

one year has no effect on appropriations decisions the following year, per se. We find further evidence in Savage (1999: 109), who cites the marketing material of one of the top earmark lobbyists that the cycle for obtaining an earmark is 1-2 years. To the extent that the appropriations process is characterized by a "memory-less" annual cycle, it is unlikely that lobbying in one period has an effect on the appropriations in the current period. A doubling of lobbying in the previous period results in an 86 percent increase in lobbying in this period at the 99 percent level of statistical significance. Though there is a potential theoretical argument to use this instrument, a Hausman specification test for overidentification indicates we should include this second instrument at the 99 percent level of confidence. Nevertheless, in Table 6 as an extension to the baseline results, we remove this instrument and estimate the just-identified model with only overhead rates.

We considered two additional instruments, but their disadvantages led us to exclude them from the analysis. The first is a free cash measure. For a sub-sample of the universities, we have information on their total revenue and total expenditures. We could use the log of the difference as a measure of free cash. The more free cash the university has, the more likely it is to engage in lobbying for favors. The logic is the same as that for overhead rates. We opted not to use this because the coverage is not as good as overhead rates, and the effect is likely to be the same. The second additional instrument is endowment levels and returns. Unfortunately, this instrument has a number of problems. Only some universities have endowments. This is not necessarily a problem; however, finding comparable and comprehensive data is difficult. As with the free cash flow measure, the endowment data collected by the Department of Education IPEDs survey is present for less than 1/3 of the sample. Moreover, in both cases, a Hausman specification test allows us to reject the hypothesis that there is systematic variation in the coefficients using these instruments.

IV. RESULTS

In Table 4 we present our initial results. Model 1 presents the simple OLS model using the general framework proposed by most scholars.[23] We include a direct effect for lobbying and

for the "quality of idea", and the lag of lobbying serves as that kind of instrument, because it is correlated with the baseline quality of ideas being generated from the institution.

[23] This includes examining the effectiveness of lobbying as a direct effect, without considering the nature of joint inputs with the legislator or the recipient of the information.

a direct effect for SAC and HAC membership, and no interactive effects. In this model, we see the effect posited by some scholars of federal spending—that committee members direct spending to their home districts and states. SAC members earmark $178,184 more per university to their states than do members who do not hold these seats. HAC members earmark $287,390 more per university to their districts than do members who do not hold those seats. These coefficients are statistically significant at the 99 percent level of significance. Thus, we see that in the case of educational earmarks, committee membership is associated with larger discretionary spending being targeted to the district in this specification. The direct effect of lobbying is also substantial in this traditional model. For a university that spends the average amount on lobbying ($7,450), the average return to lobbying is $100.96 for every dollar spent, after controlling for congressional representation, district characteristics, university quality, and university characteristics. For the average lobbying university ($125,726), the return is $7.88. This, too, is statistically significant at the 99 percent level. The magnitude of the coefficient and its statistical significance confirms the general belief that there are enormous returns to lobbying for everyone given the investments made. However, this is unlikely to be the correct model.

**********INSERT TABLE 4 ABOUT HERE **********

In Model 2, we test what we believe to be a more accurate model of lobbying. This estimation indicates that the high returns to lobbying are confined to those who are fortunate enough to be located in the districts of powerful congressmen, and lobby those powerful legislators. In Model 2, we include the interactive variables (Lobbying*House Appropriations Comm and Lobbying * Senate Appropriations Comm). The inclusion of these two omitted variables changes the estimated effectiveness of lobbying. Although the coefficients on the direct SAC and HAC variables are still measured with statistical significance of 99 percent, their impact is cut by 40 percent. That is, the direct returns to having a SAC or HAC member are now $106,509 and $146,923 respectively, to the average university in the district. The coefficient on lobbying plummets to less than 1/10 of its value in Model 1. Allowing for its log formulation, lobbying efforts by the average university yields average returns of $7.74 for each dollar spent. If we consider the average lobbying university, the average return to its $125,726 investment in lobbying is $0.60 for every dollar spent. More problematic for believers of the direct effect of

lobbying, the coefficient is no longer measured with precision, and it is not statistically significant in this model or in any subsequent models. We cannot reject the hypothesis that there is zero direct effect to lobbying.

The interactive variables, however, have coefficients that are positive and statistically significant at the 95 percent and 90 percent level of significance. Lobbying is much more effective if the lobbyist is located in the district of the key decision-makers. Thus, in this model, controlling for all previously-mentioned effects, the average returns to lobbying for a university that spends the average amount on lobbying ($7,442) and is represented by a HAC member is $275.28; a university with average lobbying and representation on the SAC can expect $150.10 on average for every dollar spent. If we evaluate, however, what SAC representation does for lobbying investment of the average lobbying university ($125,726), the return is $11.11 for SAC representation and $21.48 for HAC representation. This result is consistent with the intersection of two hypotheses: the location hypothesis and the informational hypothesis of lobbying. Thus the returns to having a House or Senate member in the key position is composed of a direct effect unrelated to lobbying and an additional effect tied to the amount of lobbying undertaken.

Model 2 indicates that average returns to lobbying for universities with HAC or SAC representation are extremely high, exceeding 1000 percent. This raises the question: if the average returns to lobbying are so high, are universities "underinvesting" in lobbying? We address this question by examining the marginal returns to lobbying and determining whether universities are setting the marginal returns equal to the marginal costs. We categorize the universities that lobby into three groups: those with no representation, those with HAC but no SAC representation, and those with SAC but no HAC representation. For each category, we identify the average lobbying expenditure by universities, and then calculate the return that the average lobbying university would obtain if it spent one additional dollar on lobbying. We base this calculation on the coefficients from Model 2. Table 5 presents the results.

**********INSERT TABLE 5 ABOUT HERE **********

Table 5 shows that, conditional on lobbying, the average return to lobbying universities is $15.64 for universities with HAC representation and $11.79 for universities with SAC representation. At the same time, the marginal return for those with HAC representation is $1.29

for every dollar spent, and the marginal return for those with SAC membership is $1.00 for every dollar spent.[24] We then conduct a statistical test to answer two questions: can we reject the hypothesis that the marginal return to lobbying for every additional dollar spent is zero? Can we reject the hypothesis that the marginal return to lobbying for every additional dollar spent is one? The final two columns of Table 5 answer these questions. For lobbying universities with HAC or SAC representation, we can reject the hypothesis that the marginal benefit is zero, but cannot reject the hypothesis that the marginal benefit is equal to one at the 95 percent level of confidence using a Wald test. Thus, for universities that enjoy either HAC or SAC representation, we cannot reject the hypothesis that universities are setting MB = MC. The divergence of the marginal condition and the average condition also suggests that universities with representation face a steep benefit from lobbying, which flattens out quickly. Table 5 also shows that, for lobbying universities without HAC or SAC representation, we cannot reject the hypothesis that the marginal return to lobbying is zero, and we can reject the hypothesis that the MB is equal to one. While the vast majority of universities-year observations (93 percent, n = 2,805) without HAC or SAC representation do not lobby, universities without representation that do lobby (7 percent, n = 219) may be engaging in excess lobbying when there is no HAC or SAC representation. We can contrast this to those universities with representation on the HAC or SAC. Here, we see the reverse effect. About 5 percent (n = 172) of university-year observations that do have HAC or SAC representation do lobby and take advantage of their privileged representation in Congress while 95 percent (n = 3,353) do not. On average, we estimate that approximately 45 percent of universities are lobbying optimally, 6 percent are engaged in excessive lobbying, and 49 percent of universities are lobbying less than is optimal. One reason for systematic under-lobbying may be that there is not yet a consensus in the university community as to whether this is a "legitimate" form of government funding of university research.

One concern about these marginal calculations is their robustness. The marginal return calculation is sensitive to the functional form, which thus far has been specified as the log of lobbying. However, we can return to our original formulation and examine over what range of diminishing marginal returns (γ) we will still not reject the hypothesis that MC = MB = 1. The

[24] To calculate the marginal returns, we calculate the return to lobbying at the average level of lobbying. Then we add one dollar to this amount and calculate the returns to lobbying for the average plus one dollar. This amount is

last column of the Table 5 shows the results. We can reject that the coefficient is equal to zero, and cannot reject (with a Wald test at the 99 percent level) that the coefficient implies MC = MB = 1, for universities with HAC representation for the range $\gamma = [.01, .23]$, and for universities with SAC representation for the range $\gamma = [.02, 1.00]$. Put differently, for reasonable ranges of diminishing marginal returns to lobbying, we cannot reject the hypothesis that universities are optimizing on the margin. These results help to explain why we see such large returns to lobbying—namely that the universities are optimizing, in general, on the margin, but are obtaining a large return on average. The popular press and many academics tend to focus on the average return, rather than the marginal return.

The results of Model 2 show that a university that spends the average amount on lobbying ($125,726), and is average in all other respects, will obtain an earmark of $110,000 if it has no representation in either appropriations committees, $1,613,000 if it has representation on only the SAC, and $2,881,000 if it has representation on only the HAC.

Model 3 presents the results using instrumental variables, namely the overhead rate and lagged lobbying expenditure. As in the previous model, the coefficients on the lobbying variables with Senate and House interactions are statistically significant at the 95 percent and 90 percent level, and the direct effect of lobbying is not statistically significant. The coefficients of both interactive variables increases about 50 percent compared to Model 2. The direct effect of SAC maintains its economic and statistical significance, but the coefficient for the direct effect of HAC is almost half its magnitude compared to Model 2 and not statistically significant.

In Model 4, we deal with the problem of institutional capabilities and idiosyncracies. For example, universities could differ in their unobserved abilities to obtain earmark grants. These might be related to the quality of internal lobbyists, alumni networks, and the charisma of the university chancellor or president. To solve for this problem, we repeat the estimation procedure using university random effects in a random effects instrumental variables estimator.[25] This accounts for both the endogeneity of lobbying and for the unobserved institution-specific effects. The result is presented in Model 4. The coefficient on the direct effect of lobbying is around six times larger than the previous two models, and is, again, not statistically significant. The coefficients on both interactive variables (HAC*Lobbying and SAC*Lobbying) are about

---

the marginal benefit, and should be equal to one if the MC=MB.

halfway between the values in the previous two models. Both coefficients are statistically significant at the 99 percent level of confidence. Taken at the average level of lobbying for lobbying universities, having SAC representation results in is $13.61 larger returns to lobbying compared to those universities without SAC representation, while HAC representation results in $28.89 greater return to lobbying than those without HAC representation. The direct effects of HAC and SAC are close to the previous model. Our test of marginal returns for Model 4 yields results that are similar to those presented in Table 5 for Model 2.

Only a handful of the control variables are measured with statistically significant coefficients. Institutions with PhD programs receive $600,000 more in earmarks. However, each top-ranked research department an institution has lowers the earmark by about $50,000.[26] Together these suggest that earmarks are being directed to middle and lower-tier institutions with Ph.D. programs. Institutions with medical schools receive $1.4 - $1.8 million more in earmark funding than do universities without these higher education programs. In some specifications, the political and district variables have a statistically significant impact on the size of earmarks. In Model 4, alumni on the HAC and SAC raise the value of an earmark by $321,000 and $617,000 respectively. Finally, the earmark that a university receives increases with the number of universities in its district, with each additional university in the district increasing the earmark by $15,000 to $25,000.

Overall, the results suggest that there is a zero or small return to lobbying for earmarks in the absence of having a congressional representation on the HAC or SAC. In the presence of HAC or SAC representation, however, the returns to lobbying for the average lobbying university are $11-$17 and $20-$36, respectively.

V. SPECIFICATION AND ALTERNATIVE HYPOTHESES

A. SPECIFICATION

A number of steps were taken to test the accuracy of the assumptions underlying the model as well as the robustness of the results to different specifications. Using an F-test, we can,

[25] One might also employ a fixed effects estimator to address this unobserved heterogeneity. However, given the short panel (t=3), this is infeasible in the current study.
[26] This may be attributable to a conscious decision by these top schools not to pursue earmarks. The problems this may cause, and corrections for this effect, are discussed in the next section.

in all of the models, reject the hypothesis that the coefficients of the model are jointly equal to zero at the 99 percent level of confidence. In addition, we consider a number of possible other specifications using Model 4, the random effects instrumental variable specification, as the point of comparison. The results are presented in Table 6. In all specifications presented in Table 6, the coefficient on the direct effect of lobbying is statistically insignificant, while the coefficients on both of the interactive effects are statistically significant, consistent with the results in Models 3 and 4.

*********INSERT TABLE 6 ABOUT HERE********

First, we consider how specific classes of universities may affect the results. In Model 5, we take out all universities in California, Illinois, and Massachusetts, states with the outlier universities from Figure 2. The coefficients on the interactive effect of lobbying with HAC drops by about 60 percent, but the interactive effect with SAC is almost the same as earlier models. In both cases, the coefficients are statistically significant. In Model 6, we take out the community colleges (as it is unlikely they are engaged in research) and examine only 4-year colleges and post-graduate institutions. The coefficients on the interactive effects are almost the same as in Model 4, and are statistically significant.

Second, we consider how changes in functional form might affect our results. In Model 7, we present the results for $\gamma = .23$, which was the value of γ that minimized the sum of squared residuals in the grid search. Again, the coefficients are of the same magnitude as in Model 4. We can compare this result to a simple model of lobbying where $\gamma = 1$ (linear in lobbying) in Model 8. Here the average return to lobbying is -$1.40 without representation, and additional $14.15 with only HAC representation, and $11.88 with only SAC representation. The direct effect of lobbying is not statistically significant, but the average returns to lobbying calculated in Model 8 with SAC representation are in the range of the baseline models, while the average return to HAC representation is about 25 percent less than the baseline models. This suggests that results are robust to various degrees of diminishing marginal returns.

A third issue is instrumentation. As noted before, a Hausman test does not reject the hypothesis of overidentification in instruments. Nevertheless, one may be concerned about using a lagged dependent variable as an instrument, especially if one believes that lobbying is in fact a

cumulative investment rather than an investment that depreciates after one year (a critique we deal with in the next section). Therefore, in Model 9, we present the results for the just-identified random effects instrumental variable model, with $Ln(Lobbying)_{t-1}$ omitted as an additional instrument. With the exclusion of this instrument in the first stage, we obtain coefficients that are roughly double the size of the coefficients in Model 4, and still statistically significant.

A final potential specification issue is that the dependent variable has a large number of zeroes, thus causing problems with the error distribution. To address this concern, we use a Heckman selection model. In this model, we assume that there is a latent variable, which is how close one is to obtaining an earmark. The latent variable underlies the observed variable, and is continuous, even though we observe only zeroes. Once an institution receives an earmark, however, the latent variable is observed. Thus, there is a selection effect operating. In Model 10 we present the results for Heckman selection model, which selects on lobbying.[27] Here, again, the direct effect of lobbying is statistically insignificant, and the coefficients on the interactive effects are positive and statistically significant at the 90 percent level of confidence. In Model 10, the magnitude of the coefficients on the HAC and SAC interactive variables are about three times the effect estimated in Model 4.

In all, the six alternative specifications yield results that are consistent with those of Table 4, though in two of the specifications, the point estimates of the coefficients are somewhat larger than the base econometric estimates. In all alternative specifications, the estimated interactive variable coefficients of interest are statistically significant, while the coefficients on the direct effects of lobbying are all statistically insignificant.

B. ALTERNATIVE HYPOTHESES

Our first concern is measurement error. As was noted earlier in the paper, top universities may create problems for the analysis in many ways. First, some do not lobby for earmarks, but instead lobby for federal "science" budget of NIH, NSF, DOD, NASA, and DOE. Second, those that do lobby for earmarks may also be lobbying for science budgets.[28] Third,

[27] We use all the exogenous variables in the second stage equations as first stage RHS variables plus the overhead rate variable.

[28] On these first two points, there are three potential sources of measurement error. The first potential source is that the AAU may lobby for specific earmarks, and thus individual university lobby does not correctly assess the

some of the top schools are engaged in regulatory policy-making, and the lobbying expenditures associated with these efforts will appear in the lobbying data. Finally, top schools are just very different in nature than other schools. To address these concerns, we exclude all institutions that have any department ranked in the top 20 in its respective field. This represents 84 top caliber research institutions. We repeat Model 4 without these institutions, and present the results in Model 11 of Table 7.

**********INSERT TABLE 7 ABOUT HERE **********

Eliminating these top research institutions changes the magnitude of the coefficients, but do not change their sign or statistical significance. The coefficient on the direct effect of lobbying is still not statistically significant. The remaining coefficients of interest are statistically significant. The effect of lobbying when there is SAC and HAC increases by 23 percent and 36 percent, respectively. These results together suggest that while on the whole, the results of the earlier models carry through, there are some small differences. Moreover, the direct effect of lobbying for lower ranked institutions is higher than for top institutions. This is consistent with an information story in which representatives know less about lower ranked institutions than they do about higher-ranked ones with higher visibility and status. Thus, lobbying for earmark grants has higher returns for these lower-ranked institutions.

A second alternative explanation is that lobbying is more like an investment in a stock, rather than a flow. This would be consistent with James Snyder's (1990, 1992) theory and analysis of PAC contributions. Snyder shows that PACs give money to candidates early in their careers – targeting individuals who are most likely to rise to more powerful positions – thus investing in politicians so that they earn a return at a later date. Edward O. Laumann (1987) has also noted that relationships are at the basis of successful lobbying.

We believe that in the case of educational earmarks, this is not a debilitating issue. First, as noted earlier, each funding cycle seems distinct when it comes to educational earmarks. The

---

magnitude of the lobby effort. The second source is that universities make contributions to the AAU which are recorded as lobbying on the university's books. The third source of measurement error arises from the fact that top universities lobby for science policy and earmarks, but all lobbying expenditures are being allocated to earmarks. The first two sources of measurement error are not problematic. The AAU and other trade associations do not lobby for individual university earmarks. Also, contributions universities make to trade associations are not reported as

slate is "wiped clean" with respect to education earmarks each year, thus making lobbying less cumulative. Second, nearly every institution in our data has hired outside lobbyists. To the extent that the locus of the "relationship" is the lobbyist and not the institution *per se*, relationships are available for hire. Presumably, the stronger the relationship between the lobbyist and the appropriations committee, the more valuable that relationship is on the market. This should then be reflected in the lobbying expenditure data as the price paid by the university for lobbying.

Nevertheless, we explore this issue statistically by examining only those institutions that have not lobbied in the past and have switched to lobbying, and those institutions that have never lobbied. By examining switchers, we can begin to separate out the effect of cumulative lobbying and one-period lobbying. We assume that if an institution has not lobbied for two time periods, and lobbies in the third time period, it is new to lobbying and has not built up any reputation or relational capital in the current time period. Thus, we eliminate all institutions that lobbied in the first two time periods of the data. We then examine the third year of lobbying as cross sectional data, using instrumental variables. All those remaining with positive observations of lobbying are switchers, and in Model 12 we compare their returns to those who have not lobbied.

In Model 12, the coefficient on the direct returns to lobbying is still statistically insignificant, though it has changed sign. The coefficient on the HAC*Lobbying variable is roughly the same as in Model 4, but is measured imprecisely. This is likely due to the fact that there are only 2 new entrants to lobbying in 1999 (2 positive observations) in HAC districts, making tight standard errors extremely difficult to estimate. However, the coefficient on the SAC*Lobbying variable is nearly eight times that of the same coefficient in Model 4, and is statistically significant at the 99 percent level of confidence. The results seem to lend credibility to the argument that at least some aspects to lobbying are not cumulative. In particular, the Senate effect seems to be substantive in the one-period lobbying game, and the House effect is of the same magnitude as earlier models, but measured imprecisely. Overall, by utilizing the change in behavior by new entrants to lobbying, we generate some evidence that there is an individual year effect to lobbying, provided the university has representation on the HAC or SAC.

---

part of their lobbying expenditures. The third source of measurement error is more problematic. It is difficult to separate out how these top research universities allocate their lobbying efforts to science policy and earmarks.

A third concern, related to the first two in this section, is that although universities maintain well-staffed internal government relations departments, such internal lobbying efforts are focused on administrative regulation and general policy issues. Instead, the real academic-earmark lobbying is handled by external "guns for hire". That is, there are a number of firms (such as Cassidy & Associates) that are well known for their ability to gain earmarks for their clients, and these are really responsible for all earmark lobbying. Indeed, Boston University, known for its focused earmark lobbying effort, uses only external lobbyists to obtain earmarks.

A correlation analysis reveals that top schools are more likely than lower-ranked schools to have internal lobbying departments ($\rho = .61$). In order to address the larger critique of mismeasurement in lobbying, we re-run our earlier base econometric models using only expenditures made by universities on external lobbyists. The results are presented in Model 13. Again, the coefficients are slightly larger than those generated by our earlier models. The average and marginal returns to lobbying are close to those of Model 4.

A final critique of the model is that in conducting this analysis, we miss the value of alumni networks. We have four replies to this critique. First, to the extent that enrollment is correlated with size of alumni network, and NAS Top Ranked School is correlated with "quality" of alumni, we control for the alumni effect. When we re-run Model 4 with an interactive term of the two variables, the coefficient is not statistically significant. Second, to the extent that alumni networks are effective, they are most likely to be effective with members of congress who are alumni of certain institutions. We include these variables in the models and show, indeed, there is a HAC and SAC alumni effect in some estimations. Third, the random effects estimator presented in Model 4 should control for unobserved institution-specific effects, including alumni networks. Finally, the marginal benefit calculations in Table 5 of this paper show that although we cannot reject the possibility that MB=MC=1 for every dollar spent on lobbying, the point estimates of these coefficients in Model 2 imply a marginal return of $1.00 when lobbying with SAC representation and $1.29 when lobbying with HAC representation. We can ask how much more lobbying would have to occur to obtain a result where marginal return to lobbying is $1.00 with HAC representation. This would represent an additional $53,000 in "unobservable" lobbying, or $230,000 in total lobbying, on average. If universities with HAC representation lobbied at this level, then the average return would be $12.09 for every dollar spent on lobbying, nearly equivalent to the estimated average return with SAC representation. We can conduct a

similar exercise for Model 4, and find that unobservable lobbying would be $160,000 for universities with HAC representation and $50,000 for universities with SAC representation. The magnitude of the calculated "unobserved lobbying" could account for the resources that alumni networks put into lobbying the government, but which is not disclosed. Thus, unobservable lobbying, provided it is correlated with actual lobbying, would cause the results to be smaller, but still substantially significant.

VI. CONCLUSIONS

Although scholars have made great progress during the last 65 years in analyzing the nature of interest group participation in government, measuring the returns to investments in lobbying has been elusive. This paper has conducted a statistical analysis to measure the returns to lobbying by examining one aspect of interest group participation: lobbying for educational earmarks. Our results suggest an intriguing pattern in lobbying and earmarks. The amount of educational earmark funding an institution receives is largely determined by the presence of a medical school and graduate programs, its overall departmental rankings, its lobbying efforts, and its representation in Congress. Universities that are fortunate enough to be located in districts with elected representatives on the HAC and SAC are likely to receive enormous returns to their lobbying efforts. The average return to lobbying for the average well-situated university, controlling for other factors, is 11-36 times its expenditures on the activity. Despite this large average return to lobbying, we cannot reject the hypothesis that such universities invest in lobbying up to the point where the marginal benefit of further lobbying equals its marginal cost. We estimate that approximately 45 percent of universities are lobbying optimally, 6 percent are engaged in excessive lobbying, and 49 percent of universities are lobbying less than is optimal. Indeed, this paper suggests that the benefit curve to lobbying with representation is initially very steep, and then flattens out quickly, indicating that a small amount of lobbying can have substantial effects if institutions are represented by HAC and SAC members. On the other hand, lobbying is relatively ineffective in obtaining earmarks for those universities represented by less powerful legislators. We estimate that the return to lobbying for an average university without representation on the HAC or SAC is not statistically different from zero. Universities without such representation may find their money better spent lobbying for placement of their

representatives on the HAC and SAC, rather than lobbying for the earmark directly in the current period.

Our work, moreover, addresses the literature on committees. When we control for the endogeneity of lobbying with instrumental variables, and control for the unobserved characteristics of lobbiers with a random effects model, we find that HAC and SAC members do send money to their districts *in the absence of lobbying*, although the effects of the HAC members are less robust that those of their Senate counterparts. This is consistent with both a distributive and information story of committees—committee members do send money to their districts, and they rely on lobbying to inform them of how much to increment the earmark and where to target the money. Thus, we believe that theories that combine distributional theories of congressional committees with informational models of lobbying may be a useful route for theorists to pursue.

Although we have focused our work on lobbying for academic earmarks, we believe it is generalizable to a whole class of interest group rent-seeking, especially when federal spending is involved. In these cases, politicians are likely to be exposed to re-election pressures, and sending targeted money to one's own district is likely to enhance the probability of re-election (Steven D. Levitt and Snyder 1997). In addition, unlike non-profit universities, most groups have multiple political instruments available to them: lobbying, PAC contributions, grassroots organizing, political advertisements, and the like. To the extent that groups can choose the most effective combination of instruments (where there may be complementarities between instruments) to achieve their goals, they may actually see higher returns to lobbying and political investment than do universities, which are largely constrained to only lobbying.

With respect to the funding of universities, this paper has demonstrated that with the right representation, universities can see substantial returns to their investments in lobbying for earmarks. Politicians are responsive to this kind of information and influence. This paper also demonstrates that earmarks do redistribute research funds from universities that are top-ranked by the National Academy of Science to universities that have representation on the HAC and SAC. The paper does not take a stand on whether earmarked academic funding or peer-reviewed competitive funding is a preferable distribution system. Nevertheless, with 10 percent of the federal budget for university research currently distributed through earmarking, it would seem

that academic administrators and politicians alike should be concerned about how this mechanism might change the nature of research at U.S. universities.

REFERENCES

Ainsworth, Scott (1993). "Regulating Lobbyists and Interest Group Influence," Journal of Politics 55:41-56.

Anagnoson, J. Theodore (1980). "Politics in the Distribution of Federal Grants: The Case of the Economic Development Administration." In Political Benefits: Empirical Studies of American Public Programs, edited by Barry S. Rundquist. Lexington, MA: Lexington Books.

Arnold, R. Douglas (1979) Congress and the Bureaucracy. New Haven: Yale University Press.

Austen-Smith, David (1993). "Information and Influence: Lobbying for Agendas and Votes." American Journal of Political Science 37: 799-834

Austen-Smith, David (1995). "Campaign Contributions and Access." American Political Science Review 89: 566-581.

Austen-Smith, David, and John R. Wright (1994). "Counteractive Lobbying," American Journal of Political Science, 38: 25-44.

Baumgartner, Frank R., and Beth L. Leech (1998). Basic Interests: The Importance of Groups in Politics and Political Science. Princeton: Princeton University Press.

Bauer, Raymond A., Ithiel de Sola Pool, and Lexis Anthony Dexter (1963). American Business and Public Policy. New York: Atherton.

Becker, Gary S. (1983). "A Theory of Competition Among Pressure Groups for Political Influence." Quarterly Journal of Economics 98(3): 371-400.

Brainard, Jeffery, and Ron Southwick (2001). "A Record Year at the Federal Trough: Colleges Feast on $1.67-Billion in Earmarks," Chronicle of Higher Education, August 8, 2001.

Calvert, Randall L. (1985). "The Value of Biased Information: A Rational Choice Model of Political Advice," The Journal of Politics 47(2): 530-555.

de Figueiredo, John M., and Emerson H. Tiller (2001). "The Structure and Conduct of Corporate Lobbying: An Empirical Analysis of Corporate Lobbying at the Federal Communications Commission," Journal of Economics and Management Strategy 10(1): 91-122.

de Figueiredo, Rui J., Pablo Spiller, and Urbiztondo (1999). "An Informational Perspective on Administrative Procedures." Journal of Law, Economics, and Organization 15: 283-305.

The Economist (1999), "Politics Brief: Ex Uno, Plures," August 21, pp. 44-45.

Finkelstein, Amy (1995). Politics and Science. Harvard B.A. Government Honors Thesis.

Goldin, Claudia, and Lawrence F. Katz (1999). "The Shaping of Higher Education: The Formative Years in the United States, 1890 to 1940." Journal of Economic Perspectives, 13: 37-62.

Gray, William H. (1994), "Pork or Providence? A Defense of Earmarked Funds for Colleges," Washington Post, February 27, 1994.

Grier, Kevin B., Michael C. Munger, and Brian E. Roberts (1994). "The Determinants of Industry Political Activity, 1978-1986," American Political Science Review 88: 911-926.

Groseclose, Timothy, Jeff Milyo, and Daniel Primo (2000). "Corporate PAC Campaign Contributions in Perspective," Business and Politics 2(1): 75-88.

Hall, Richard L., and Bernard Grofman (1990). "The Committee Assignment Process and the Conditional Nature of Committee Bias." American Political Science Review 84: 1149-1166.

Hansen, John Mark (1991). Gaining Access: Congress and the Farm Lobby, 1919-1981. Chicago: University of Chicago Press.

Kollman, Ken (1997). "Inviting Friends to Lobby: Interest Groups, Ideological Bias, and Congressional Committees," American Journal of Political Science 41(2): 519-544.

Kroszner, Randall S., and Phil Strahan (1999). "What Drives Deregulation? The Economics and Politics of the Relaxation of Bank Branching Restrictions," Quarterly Journal of Economics (November), pp. 1437-67.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny (1999). "The Quality of Government," Journal of Law, Economics and Organization, 15: 222-279.

Levitt, Steven D., and James M. Snyder (1997). "The Impact of Federal Spending on House Election Outcomes," The Journal of Political Economy, Vol. 105, No. 1. pp. 30-53.

Laumann, Edward O. (1987). The organizational state: social choice in national policy domains. (Madison, Wis. : University of Wisconsin Press).

Maitland, Ian (1985). "Interest Groups and Economic Growth Rates," Journal of Politics 47(1): 44-58.

Malakoff, David (2001a). "Hawaii Rides the Wave of Research Earmarks," Science 292: 835-836.

Malakoff, David (2001b). "Tools of the Trade," Science 292: 833-834.

Mayer, Kenneth R.)1991). The Political Economy of Defense Contracting. New Haven: Yale University Press.

Milbraith, Lester W. (1963). The Washington Lobbyists. Chicago: Rand McNally.

Mowery, David C. and Nathan Rosenberg (1989). Technology and the Pursuit of Economic Growth. New York: Cambridge University Press.

Mowery, David C. and Nathan Rosenberg (1993). "The U.S. National Innovation System." In National Innovation Systems, edited by Richard R. Nelson, New York: Oxford University Press.

Murphy, Kevin M., Andrei Shleifer and Robert W. Vishny (1993). "Why Is Rent-Seeking So Costly to Growth?" American Economic Review, 83: 409-414.

Nelson, Richard R. and Nathan Rosenberg (1993). "Technical Innovation and National Systems." In National Innovation Systems, edited by Richard R. Nelson, New York: Oxford University Press.

Office of the Clerk of the House (2001). Lobby Disclosure Act Guidance and Instructions.

Olson, Mancur (1965). The Logic of Collective Action. Cambridge, MA: Harvard University Press.

Payne, A. Abigail (2001). "Congressional Representation of Alma Maters and District: The Political Economy of Federal Funding to Research Universities," mimeo.

Payne, A. Abigail, and Siow Aloysius (2002). "Estimating the Effects of Federal Research Funding on Universities Using Alumni Representation on Congressional Appropriations Committees," Department of Economics, University of Toronto Working Paper.

Plott, Charles R. (1969) "Some Organizational Influences on Urban Renewal Decisions." American Economic Review 58: 306-321.

Ray, Bruce A. (1980). "Congressional Promotion of District Interests: Does Power on the Hill Really Make a Difference?" In Political Benefits: Empirical Studies of American Public Programs, edited by Barry S. Rundquist. Lexington, MA: Lexington Books.

Rosenberg, Nathan and Richard R. Nelson (1994), "American Universities and Technical Advance in Industry." Research Policy, 23: 323-348.

Rotemberg, Julio (2002). "Commercial Policy with Altrustic Voters," Journal of Political Economy, forthcoming.

Savage, James D. (1999). Funding Science in America: Congress Universities, and the Politics of the Academic Pork Barrel. Cambridge: Cambridge University Press.

Schattschneider, E. E. (1935). Politics, pressures and the tariff; a study of free private enterprise in pressure politics, as shown in the 1929-1930 revision of the tariff. New York: Prentice Hall.,

Schlozman, Kay L., and John T. Tierney (1986). Organized Interests and American Democracy. New York: Harper & Row.

Schuler, Douglas (1999). "Uncovering the Dimensionality of Corporate Political Involvement," Business and Politics 1(1).

Silber, John (1987), "Testimony of Dr. John Silber, President of Boston Uinversiry, Before the Committee on Science, Space, and Technology, United States House of Representatives," Washington DC, June 25.

Snyder, James (1990). "Campaign Contributions as Investments: The U.S. House of Representatives, 1980-1986," Journal of Political Economy 98: 1195-1227.

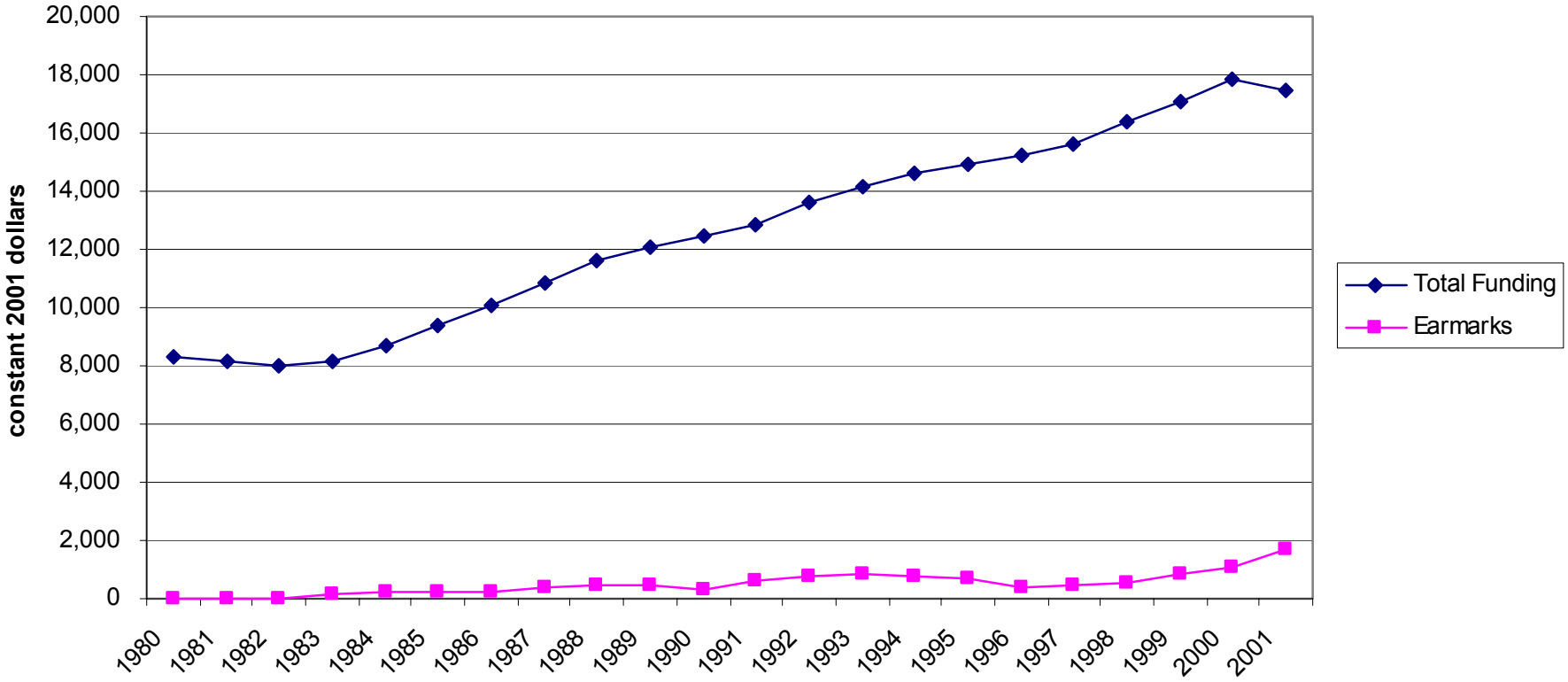
Snyder, James (1992). "Long-Term Investing in Politicians; Or, Give Early, Give Often" Journal of Law & Economics 35: 15-43.

Wright, John R. (1985). "PACs, Contributions, and Roll Calls: An Organizational Perspective," American Political Science Review 79: 400-414.

Wright, John R. (1990). "Contributions, Lobbying, and Committee Voting in the U.S. House of Representatives," American Political Science Review 84(2): 417-438.

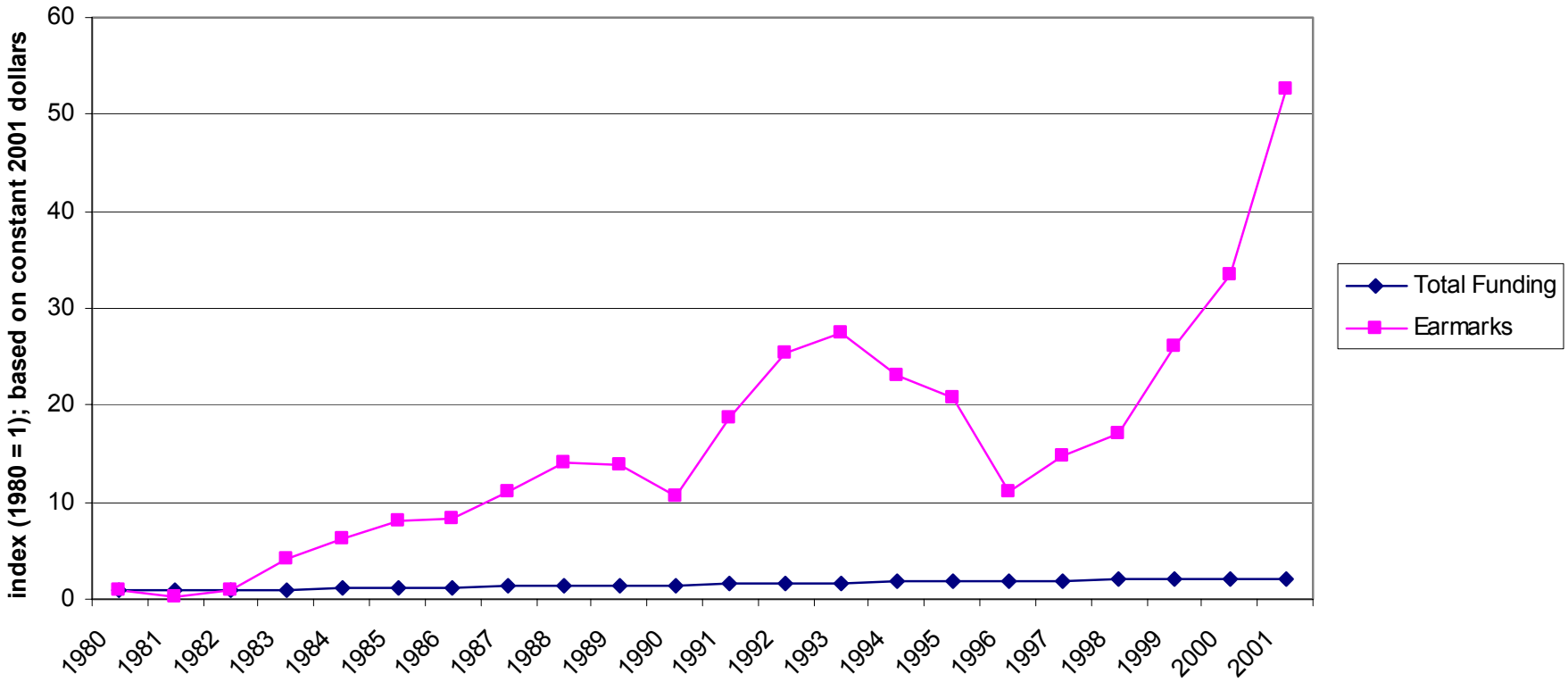
Wright, John R. (1996). Interest Groups and Congress: Lobbying, Contributions, and Influence. Boston: Allyn and Bacon.

Figure 1a: Total Federal Funding and Earmark Funding for Universities and Colleges



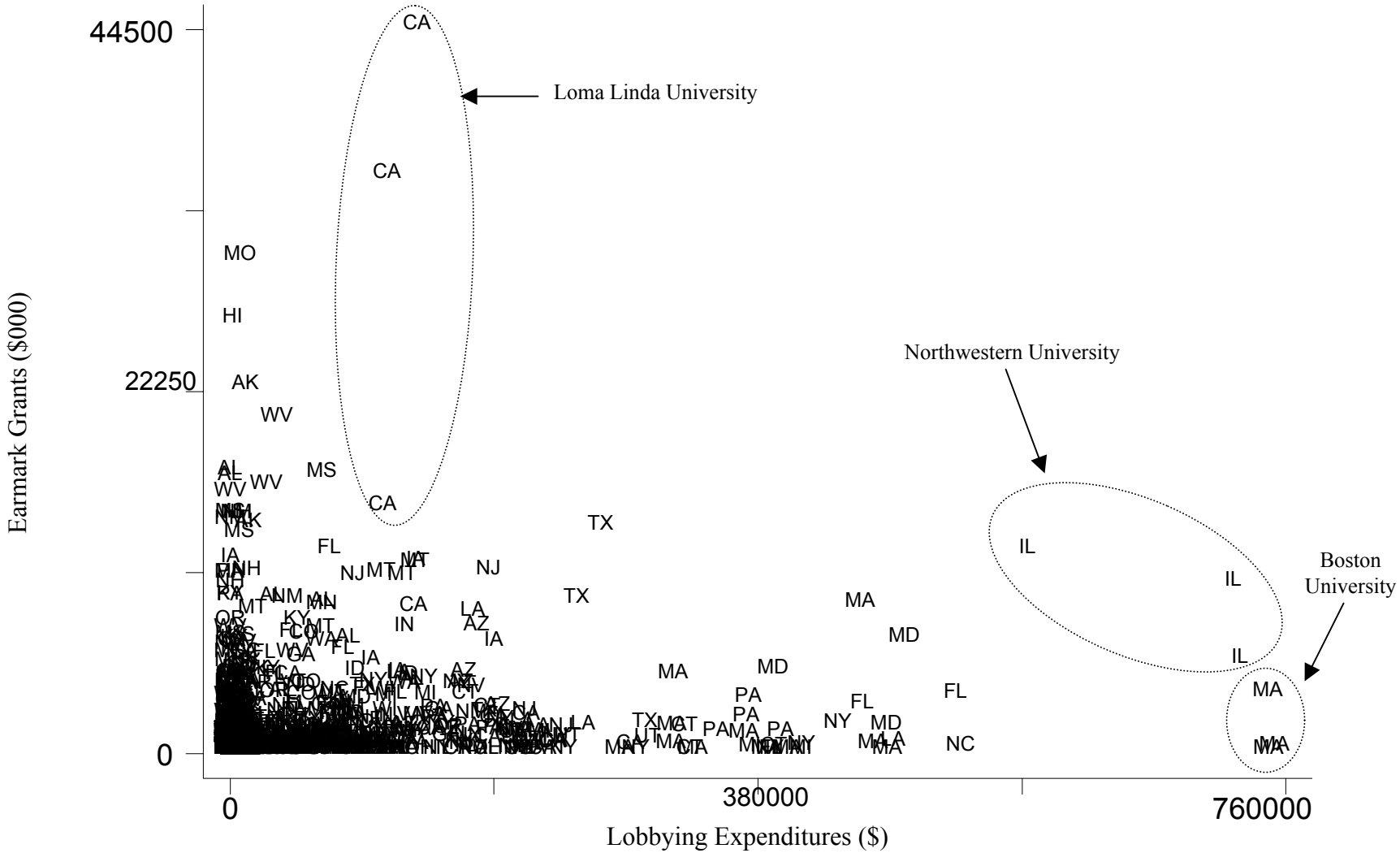
1980-2001 [Source: Total funding - NSF, National Patterns of R&D Resources;
Earmarks - Savage (1999); Chronicle of Higher Education]

Figure 1b: Total Federal Funding and Earmark Funding for Universities and Colleges, Indexed



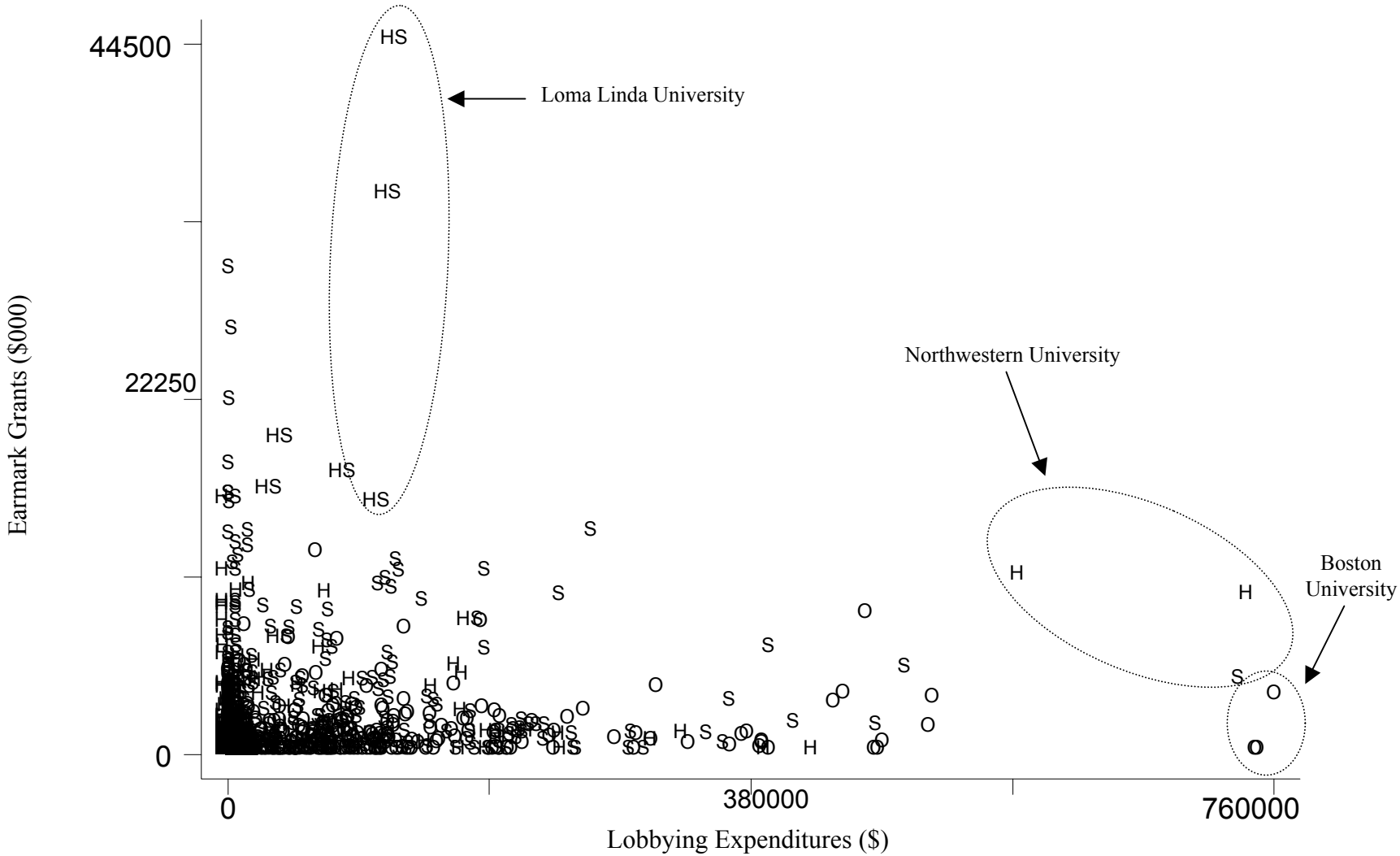
[Source: Total funding - NSF, National Patterns of R&D Resources;
Earmarks - Savage (1999); Chronicle of Higher Education]

Figure 2a: Distribution of Earmarks and Lobbying by State



State of institution noted in graph

Figure 2b: Distribution of Earmarks and Lobbying by Committee



O = no HAC or SAC representation; H = HAC representation; S = SAC representation; HS = HAC and SAC representation

TABLE 1: DESCRIPTIVE STATISTICS

	All Universities, All Years (n = 7,146)				Lobbying Universities, All Years (n = 423)			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Earmarks	232.29	1,411.40	0.00	44,500.00	1,919.19	3,937.38	0.00	44,500.00
Lobbying	7,442.27	42,224.08	0.00	760,000.00	125,726.00	123,611.90	20,000.00	760,000.00
House Appropriations Committee (HAC)	0.14	0.35	0.00	1.00	0.14	0.35	0.00	1.00
Senate Appropriations Committee (SAC)	0.52	0.50	0.00	1.00	0.42	0.49	0.00	1.00
House Chair or Ranking Member	0.08	0.27	0.00	1.00	0.04	0.19	0.00	1.00
Senate Chair or Ranking Member	0.51	0.50	0.00	1.00	0.51	0.50	0.00	1.00
Representative ADA Score	46.53	39.08	0.00	100.00	58.60	38.58	0.00	100.00
Senator ADA Score	47.27	33.88	0.00	100.00	50.93	31.78	0.00	100.00
House Educator	0.13	0.34	0.00	1.00	0.15	0.36	0.00	1.00
Senate Educator	0.32	0.47	0.00	1.00	0.24	0.43	0.00	1.00
Alumni on HAC	0.03	0.16	0.00	1.00	0.18	0.38	0.00	1.00
Alumni on SAC	0.12	0.32	0.00	1.00	0.47	0.50	0.00	1.00
Alumni in House	0.01	0.12	0.00	1.00	0.11	0.32	0.00	1.00
Alumni in Senate	0.03	0.18	0.00	1.00	0.24	0.43	0.00	1.00
NAS Top Ranked School	0.31	2.43	0.00	39.00	3.08	7.42	0.00	39.00
Degree PhD	0.15	0.36	0.00	1.00	0.78	0.41	0.00	1.00
Private University	0.41	0.49	0.00	1.00	0.42	0.49	0.00	1.00
Medical School	0.04	0.20	0.00	1.00	0.37	0.48	0.00	1.00
Athletic Aid	0.50	0.50	0.00	1.00	0.78	0.41	0.00	1.00
Enrollment	5,489.00	6,678.00	17.00	51,445.00	16,309.00	11,644.00	402.00	51,445.00
Rural Population (%)	0.31	0.22	0.00	0.87	0.22	0.22	0.00	0.72
Ages 18-30 Population (%)	0.19	0.02	0.13	0.33	0.20	0.03	0.14	0.33
College Degree Population (%)	0.08	0.03	0.02	0.22	0.08	0.03	0.03	0.17
Employment in Education Sector (%)	0.04	0.01	0.02	0.07	0.04	0.01	0.02	0.07
Median Income	29.19	7.66	15.06	57.22	28.64	6.88	15.26	56.06
Number of Universities in District	7.33	3.52	1.00	20.00	6.65	3.40	2.00	20.00
Number of Universities in State	83.20	54.46	6.00	202.00	80.32	50.91	7.00	202.00
Overhead Rate (%)	22.13	20.95	8.00	85.00	43.73	17.50	8.00	75.00

TABLE 2: MEANS IN LOBBYING AND EARMARKS

FOR ALL UNIVERSITIES IN DISTRICTS WITH AND WITHOUT APPROPRIATIONS COMMITTEE MEMBERS

	Average Lobbying Expenditures	Average Earmark
No Senate Appropriations Committee Member n=3442	$9,430	$144,693
Senate Appropriations Committee Member n=3704	$5,595	$313,686
No House Appropriations Committee Member n=6131	$7,414	$187,331
House Appropriations Committee Member n=1015	$7,612	$503,839

FOR LOBBYING UNIVERSITIES IN DISTRICTS WITH AND WITHOUT APPROPRIATIONS COMMITTEE MEMBERS

	Average Lobbying Expenditures	Average Earmark
No Senate Appropriations Committee Member n=247	$131,410	$1,157,920
Senate Appropriations Committee Member n=176	$117,750	$2,987,555
No House Appropriations Committee Member n=363	$125,225	$1,477,928
House Appropriations Committee Member n=60	$128,765	$4,588,803

TABLE 3: SENATE APPROPRIATIONS COMMITTEE SWITCHERS
UNCONDITIONAL MEANS FOR UNIVERSITIES IN THEIR STATES

	Faircloth R-NC n= 109		Bumpers D-AR n = 33		Kyl R-AZ n = 23		Durbin D-IL n=109	
	Lobbying	Earmarks	Lobbying	Earmarks	Lobbying	Earmarks	Lobbying	Earmarks
1997	$1,481	$148,863	$0	$104,863	$12,608	$294,129	$10,688	$139,961
1998	$3,425	$164,895	$0	$63,037	$14,782	$295,275	$9,555	$162,745
1999	$7,222	$86,112	$606	$141,261	$14,347	$405,523	$11,666	$174,935

TABLE 4: BASE ECONOMETRIC RESULTS

	(1) OLS Popular Belief Model	(2) OLS Full Model	(3) IV Full Model	(4) Random Effects IV Full Model
Ln(Lobby)	84.363***	6.467	4.834	28.380
	(23.929)	(21.840)	(28.090)	(17.536)
Ln(Lobby)*HAC		223.554*	376.142*	309.390***
		(129.591)	(219.659)	(36.059)
Ln(Lobby)*SAC		118.954**	166.874**	145.695***
		(48.211)	(73.539)	(22.457)
House Appropriations Committee (HAC)	297.390***	146.923***	81.015	88.825
	(104.501)	(50.745)	(76.689)	(69.924)
Senate Appropriations Committee (SAC)	178.184***	106.509***	129.523***	104.833**
	(48.428)	(31.167)	(39.257)	(49.673)
House Chair or Ranking Member	94.012	104.842	150.054	122.012
	(83.383)	(82.472)	(110.862)	(83.310)
Senate Chair or Ranking Member	-2.043	4.165	6.654	41.377
	(44.459)	(40.254)	(48.663)	(42.030)
Representative ADA Score	-1.377**	-1.239**	-1.656**	-1.563**
	(0.641)	(0.574)	(0.676)	(0.687)
Senator ADA Score	1.276	0.978	1.157	1.013
	(0.953)	(0.850)	(1.005)	(0.833)
House Educator	64.557	53.278	59.780	71.234
	(60.239)	(61.050)	(88.907)	(78.543)
Senate Educator	75.325	72.939	88.143	81.126
	(51.282)	(49.134)	(61.989)	(61.852)
Alumni on HAC	164.904	226.990	361.396	321.284*
	(330.846)	(300.570)	(389.718)	(180.550)
Alumni in House	-19.918	-40.380	-103.728	-98.518
	(117.102)	(119.863)	(156.312)	(96.191)
Alumni on SAC	974.785*	536.517	444.932	617.903**
	(539.549)	(575.290)	(711.908)	(281.734)
Alumni in Senate	-168.448	-55.126	-131.419	-125.517
	(250.376)	(225.149)	(317.724)	(179.458)
NAS Top Ranked School	-43.940*	-42.573*	-57.164**	-57.728***
	(23.207)	(22.544)	(28.846)	(12.950)
PhD Granting Institution	536.519***	507.416***	602.172***	555.045***
	(118.794)	(113.647)	(148.217)	(97.005)
Private University	-62.152	-49.694	-80.519	-89.811
	(53.317)	(52.959)	(60.679)	(70.647)
Medical School	1,555.289***	1,478.922***	1,813.270***	1,825.021***
	(471.155)	(418.118)	(508.208)	(167.451)
Athletic Aid	-4.984	-1.984	-13.628	-8.804
	(46.792)	(42.502)	(54.074)	(56.884)
Ln(Enrollment)	27.408	38.470*	36.701	33.819
	(22.297)	(19.946)	(25.956)	(34.951)
Rural Population (%)	44.795	78.106	99.752	106.352
	(132.273)	(132.434)	(167.015)	(184.458)
Ages 18-30 Population (%)	216.309	601.537	958.416	738.925
	(904.364)	(847.181)	(1,066.500)	(1,369.045)

College Degree Population (%)	-211.788 (1,359.956)	-474.321 (1,463.817)	-1,111.680 (1,848.057)	-786.500 (1,518.414)
Employment in Education Sector (%)	-3,712.787 (2,412.793)	-2,602.612 (2,438.962)	-4,027.615 (3,173.299)	-4,569.309 (4,063.190)
Median Income (000)	-1.312 (5.546)	0.636 (5.910)	4.974 (7.787)	4.111 (6.256)
Number of Universities in District	18.799** (9.393)	16.352* (9.067)	25.287** (11.891)	23.931** (9.926)
Number of Universities in State	-0.577 (0.617)	-0.669 (0.554)	-1.071 (0.708)	-0.878 (0.570)
1997	-169.626*** (30.731)	-165.979*** (30.959)		
1998	-72.460*** (25.995)	-69.115*** (26.507)	-64.387** (28.476)	-62.149** (26.465)
Constant	-188.047 (281.449)	-352.904 (251.070)	-494.892 (310.070)	-416.154 (419.423)
R-squared	0.19	0.22	0.25	.
F-Statistic	6.14	6.42	6.07	.
n	7,146	7,146	4,764	4,764

Robust and clustered standard errors are presented beneath coefficient estimates.

*** 99% level of significance; ** 95% level of significance; * 90 percent level of significance

TABLE 5: AVERAGE AND MARGINAL RETURNS

	Average Expenditure for Lobbying Universities in Group	Calculated Average Return	Calculated Marginal Return	Reject H0: MB=0?	Reject H0: MC=MB=1?	Range of Gamma Where Cannot Reject MC=MB=1
No HAC, No SAC	$125,481	$0.61	$0.05	no	.	.
HAC, no SAC	$177,782	$15.64	$1.29	yes	no	0.02 - 1.00
SAC, no HAC	$124,833	$11.79	$1.00	yes	no	0.01 - 0.23

TABLE 6: ECONOMETRIC SPECIFICATION

Variable	Lobbying	Lobbying*HAC	Lobbying*SAC
(5) Take Out California, Illinois, and Massachusetts Universities	25.00 (16.45)	126.78*** (38.14)	139.64*** (23.21)
(6) Take Out Community Colleges	36.78 (24.10)	308.39*** (49.51)	130.60*** (30.01)
(7) Gamma = 0.23	-4.80 (14.29)	323.93*** (38.42)	166.13*** (22.15)
(8) Linear Lobbying (Gamma = 1.00)	-1.40 (1.06)	14.15*** (2.39)	11.88*** (2.02)
(9) Exclude Lag of Lobbying as Instrument	173.34 (172.86)	481.72*** (105.65)	390.72*** (67.26)
(10) Heckman Selection Model -- Select on Lobbying	-25.20 (297.14)	852.24* (506.60)	755.58* (419.88)

Robust and clustered standard errors are presented beneath coefficient estimates.

*** 99% level of significance; ** 95% level of significance; * 90 percent level of significance

Note: The coefficients on Model (8) are presented x1000 for easier interpretation.

TABLE 7: MEASUREMENT AND ALTERNATIVE HYPOTHESES

Variable	Ln(Lobby)	Ln(Lobby)*HAC	Ln(Lobby)*SAC
(11) No Top Govt Funded Schools	20.34	421.09***	187.05***
	(19.94)	(51.82)	(28.03)
(12) First Time Lobbiers	-160.39	324.53	1164.03***
	(300.98)	(524.99)	(553.57)
(13) External Lobbying Only	22.57	405.29***	175.52***
	(18.64)	(148.87)	(25.90)

Robust and clustered standard errors are presented beneath coefficient estimates.

** 95% level of significance; * 90 percent level of significance

Note: The coefficients on lobbying for the external models (Model 10) is reported for external lobbying expenditures only.

APPENDIX: DATA DEFINITIONS AND SOURCE

Variable	Definition (Source)
Earmarks	Total dollar appropriation of all academic earmarks to institution (Chronicle of Higher Education)
Lobbying	Total lobbying expenditures on behalf on institutions disclosed (Center for Responsive Politics, Clerk of the House) -- taken as log in most specifications.
House Appropriations Committee (HAC)	Dummy variable =1 if institution is represented by a legislator on the House Appropriations Committee and =0 otherwise
Senate Appropriations Committee (SAC)	Dummy variable =1 if institution is represented by a legislator on the Senate Appropriations Committee and =0 otherwise
House Chair or Ranking Member	Dummy variable =1 if institution is represented by a legislator who is a chair or ranking member of a House committee and =0 otherwise
Senate Chair or Ranking Member	Dummy variable =1 if institution is represented by a legislator who is a chair or ranking member of a Senate committee and =0 otherwise
Representative ADA Score	The ADA score of the House member who represents the institution's district
Senator ADA Score	The ADA score of the Senate member who represents the institution's district
House Educator	Dummy variable =1 if institution is represented by a House member who was a teacher, professor, or educational administrator before being elected to Congress, and =0 otherwise
Senate Educator	Dummy variable =1 if institution is represented by a Senate member who was a teacher, professor, or educational administrator before being elected to Congress, and =0 otherwise
Alumni on HAC	Dummy variable = 1 if institution has an alumus/a on the House Appropriations Committee, and = 0 otherwise
Alumni on SAC	Dummy variable = 1 if institution has an alumus/a on the Senate Appropriations Committee, and = 0 otherwise
Alumni in House	Dummy variable = 1 if institution has an alumus/a in the House of Representatives, and = 0 otherwise
Alumni in Senate	Dummy variable = 1 if institution has an alumus/a in the Senate, and = 0 otherwise
NAS Top Ranked School	The number of departments at the institution that are ranked in the top 20 by the National Academy of Science's 1995 rankings (National Academy of Science and National Science Foundation)
Degree PhD	Dummy variable =1 if the institution awards a Ph.D., and =0 otherwise (IPEDS)
Private University	Dummy variable = 1 if the institution is a private, =0 otherwise (IPEDS)
Medical School	Dummy variable =1 if institution has a medical school, and =0 otherwise (IPEDS)
Athletic Aid	Dummy variable =1 if institution offers athletic scholarships to students, and =0 otherwise (IPEDS)
Enrollment	Total student enrollment (IPEDS) -- taken as log.
Rural Population (%)	% Rural Population in House District (Census)
Ages 18-30 Population (%)	% Population ages 18-30 in House District (Census)
College Degree Population (%)	% Population with College Degree in House District (Census)
Employment in Education Sector (%)	% of Workers employed in Education Sector in House District (Census)
Median Income	Median Income in House District (Census)
Number of Universities in District	Count of the number of universities in the congressional district
Number of Universities in State	Count of the number of universities in the state
Overhead Rate	The federally negotiated on-campus overhead rate for universities in April (HHS)