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Earmarked: The Political Economy of Agricultural Research Appropriations

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Since 1965 a significant portion of the US Department of Agriculture's extramural research budget has been earmarked by Congress for particular research projects. We analyze the process by which a minority of Congress induces the USDA to carry out its budgetary suggestions. We present evidence demonstrating the influence that appropriators possess over the allocation of earmarked grants. Finally, we argue that this program provides an excellent illustration of path-dependence in government policy, and that an understanding of the special grants program may shed light on the decline of science at the USDA and Congress's reluctance to increase agricultural research funding.

At the National Institutes of Health (NIH) and the National Science Foundation (NSF), decisions about which scientific research projects to fund are largely made by other scientists through the competitive peer-review process. Decisions about the allocation of research projects at other agencies, especially those at the Department of Defense, National Aeronautics and Space Administration, and the Department of Agriculture (USDA) are not. For instance, less than 20% of USDA extramural research dollars were allocated through the competitive peer-review process.[1] At these agencies, research projects are often "earmarked" by members of Congress.[2] In the context of agriculture, the House and Senate Agricultural Appropriations Subcommittees let the USDA know which research projects should be funded through a system of "special grants." Since 1965, an increasing amount of federal agricultural research dollars has been spent on earmarked special grants. How did agricultural appropriators acquire this power over the allocation of agricultural research funds?

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There appears to be a widespread consensus, albeit based largely on anecdotal evidence, that the quality of earmarked research at the USDA is low. Since the Pound Report in 1972 (National Research Council [NRC] 1972), earmarked research has been consistently criticized by scientific bodies. The National Academy of Sciences, in reference to congressional earmarks (NRC 1972, p. 23), noted, "A serious hazard here is decision without adequate information and judgment." The Association of American Universities, a group of sixty-two top research institutions, has also tried to use professional pressure to discourage universities from requesting earmarked research dollars (Malakoff, p. 1436). It appears that earmarked research grants are a form of political pork because they deliver narrow benefits to specific constituents while spreading the costs across society as a whole.[3] Nevertheless, in spite of these criticisms, there is no indication that the earmarking of special research grants will be discontinued or diminished at any time in the future.

In this article we take as given the potential efficiency problems with research allocations undertaken by a small number of legislators without benefit of advice by scientists.[4] The purpose of our article is to elucidate the origins and persistence of agricultural research earmarks. We argue that while special grants for agricultural research have become an important source of political pork for certain legislators, specifically, members of the House and Senate Agricultural Appropriation Subcommittees, this outcome was the unintended consequence of legislation sought by the USDA to exercise more control over the agricultural research agenda and to utilize its research funds more efficiently.[5] We show how a minority of Congress induces the USDA to carry out its preferred research earmarks. We argue that because of the way that special grants are supported in the budgetary process, appropriators have no incentive to share the benefits of this program with other members of Congress. Additionally, we present compelling empirical evidence demonstrating the power agricultural appropriators possess over the allocation of earmarked research funds. Finally, we show that because of the structure of the budgetary process, the elimination of these grants is unlikely even in the face of intense opposition from other legislators, the national scientific community, and the President of the United States. The story of the special grants program therefore provides a good illustration of path-dependence in the political process because in the absence of the legislation that created this program, it is unlikely that agricultural research would have become so highly politicized.[6]

The politicization of research that has resulted from the growth of earmarked special grants appears to have had consequences for the quality of science funded by the USDA and Congress's overall willingness to fund agricultural research. While other scientific agencies have experienced dramatic increases in their budgets, the USDA has not. Between 1983 and 2003 real federal spending on the NIH and the NSF grew at an average annual rate of 5.37% and 2.43%, respectively, while the USDA's research budget only increased at a rate of 0.7% per year during this same period (Research Education and Economics, p. 52). It may be the case that rising health care costs and falling food prices have contributed to the stagnation of agricultural research funds and the growth of the NIH. However, the facts of the matters are that the social rate of return to agricultural research are still very high (Gardner) and there remain important research questions related to the sustainability of current agricultural production practices that are

insufficiently funded (Research, Education, and Economics Task Force). Hence, an understanding of the origins and persistence of the special grants program may shed light on the decline in the quality of science funded by the USDA and Congress's reluctance to increase funding for agricultural research.

In fiscal year 2004, total spending on special grants amounted to approximately $90 million, representing 17% of the USDA's extramural research budget. While many would consider this a minor program, Congress has been involved in heated budgetary disputes over much smaller amounts (Wildavski, p. 162). Indeed, as we will show, the small size of the special grants program is not indicative of its political impact.

Historical Background

By the 1960s, the USDA began to feel constrained in its ability to make grants and pursue open-ended applied research. Throughout much of the twentieth century, federal support for agricultural research largely took the form of block grants to the land grant universities and colleges (Hatch Act of 1887 as amended in 1955), and narrowly defined contracts for specific research outputs (Agricultural Research and Marketing Act of 1948). In the early 1960s the House, at the request of the USDA, began hearings on new legislation to expand the authority of the USDA to make grants for agricultural research. The USDA sought this authority for several reasons. First, block grants gave the USDA no control over the scientific research agenda at the land grant institutions. Instead, the deans of the land grant universities and colleges controlled the allocation of these funds. Therefore, the USDA, in its effort to pursue more applied science, found it necessary to seek other mechanisms for the allocation of research dollars. Second, the USDA found contract authority too constraining. Contracts, by their nature, are narrowly defined and have specific research outputs as objectives. Most scientists found it impossible to conduct research effectively under such narrow strictures. Hence, the USDA found it necessary to broaden its authority to fund applied scientific research (US Congress 1963).

The product of these hearings was H.R. 7155, which authorized the Secretary of Agriculture "to make grants, for periods not to exceed five years' duration, to State agricultural experiment stations, colleges, universities, and other research institutions and organizations and to Federal and private organizations and individuals for research to further the programs of the Department of Agriculture." H.R. 7155 augmented the USDA's existing authority to make grants in two fundamental ways. First, it expanded the pool of potential grant recipients. Second, an examination of the USDA's testimony to the House on H.R. 7155 indicates that this new law was also intended to broaden the scope of potential research projects that could be funded by the USDA (U.S. Congress 1963).

H.R. 7155 was enacted as Public Law 89–106 and published in U.S. Statutes at Large on August 4th, 1965. The language of the law is as follows:

> The Secretary of Agriculture is authorized to make grants, for periods not to exceed five years' duration, to State agricultural experiment stations, colleges, universities, and other research institutions and organizations and to Federal and private organizations and individuals for research to further the programs of the Department of Agriculture. Each recipient of assistance under this section

Table 1. USDA support for extramural agricultural research, 1970–2002

Year	Formula Funds	Competitive Grants	Special Grants	Contracts and Other Support	Total
			A. In Thousands of Constant Dollars (1984 = 100)		
1970	143,227	0	4,075	17,974	165,276
1975	150,461	0	19,520	21,721	191,702
1980	146,995	11,505	11,246	60,728	230,474
1985	174,937	10,701	18,956	34,244	238,838
1990	154,606	25,140	38,394	44,462	262,602
1994	144,571	42,201	46,668	58,728	292,168
2002	120,980	42,817	33,669	35,901	233,367
			B. In Percentages		
1970	87	0	2	11	100
1975	78	0	10	12	100
1980	64	5	5	26	100
1985	73	5	8	14	100
1990	59	10	15	16	100
1994	50	14	16	20	100
2002	52	18	15	15	100

Note: Data from 1970 until 1994 were taken from table 2 of U.S. Department of Agriculture with authors' calculations. Data for 2002 were taken from the Current Research Information Service website.

> shall keep such records as the Secretary shall prescribe, including records which fully disclose the amount and disposition by such recipient of the proceeds of such grants, the total cost of the project or undertaking in connection with which such funds are given or used, and the amount of that portion of the costs of the project or undertaking supplied by other sources, and such other records as will facilitate an effective audit. The Secretary of Agriculture and the Comptroller General of the United States or any of their duly authorized representatives shall have access for the purpose of audit and examination to any books, documents, papers, and records of the recipients that are pertinent to the grants received under this section.

Even though PL 89–106 was enacted in August 1965, the law was not invoked until the 1969 fiscal year. In what may be considered the earliest "special grants" made under this authority, Congressional appropriators from the Senate earmarked $1,000,000 for cotton research and $400,000 for soybean research (U.S. Congress 1968).

From these humble beginnings, special grants have become an increasingly important component of USDA agricultural research funds. As illustrated in table 1, between 1970 and 1975 special grants increased from approximately $4 million to $19 million in constant dollars. By 1990, over $38 million was spent on special grants. In 2002, special grants amounted to nearly $33 million. As a share of USDA support for extramural agricultural research, special grants increased from 2% in 1970, to 10% in 1975 and 15% in 2002. While this may not seem like an alarming trend, when one looks at the amount of money that is granted by

the USDA through competitive peer-review and formula funds, these numbers are striking. The growth in competitive peer-review grants is closely mirrored by the growth in special grants. As a share of federal agricultural research spending by the USDA, competitive grants increased from 5% in 1980 to 18% in 2002. Meanwhile, formula funding of agricultural research has declined from $143 million in 1970 to $120 million in 2002. It would appear that peer-reviewed grants and special grants receive similar funding levels while formula funding has eroded in real terms. Given the evidence that earmarked special grants fund marginal research, it is worth asking what has allowed this to happen.

One possible hypothesis is that PL 89–106 was enacted with the goal of assisting appropriators in their efforts to capture political pork. Among economists and political scientists, it is often argued that particular government policies arise in response to rent-seeking by special interests. In the most general formulation of this perspective, politicians supply policy to increase their probability of reelection while interest groups demand policy for private benefits. Some models emphasize the role of interest groups in demanding policy for private advantage (Stigler) while others emphasize the incentives faced by legislators to supply policy for political gains (Weingast, Shepsle, and Johnsen). Clearly, special grants generate benefits for certain legislators (who can claim credit for bringing home the bacon) and constituents (who seek funds for research). But do these models explain the origins of special grants authority at the USDA?

We believe that the evidence does not support this kind of explanation. This is for three reasons. First, our examination of the testimony leading up to the passage of the 1965 law revealed that it was the USDA, not Congress, who sought this grant-making authority. In fact, the available testimony indicates that Congress was skeptical of the need for this additional legislation. Second, a close reading of PL 89–106 reveals that the grant making authority resides with the Secretary of Agriculture, not with Congress. As we will discuss shortly, it is through a peculiar interpretation of this law combined with its ability to punish the USDA for failing to carry out earmarks that Congress has managed to use special grants for its own purposes. Third, while special grant making authority was enacted in August of 1965, special grants do not appear until the budget for fiscal year (FY) 1969. If Congress *intended* to introduce special grants in order to deliver political benefits, or if special interests from the academic community (i.e., agricultural scientists) lobbied for this legislation to increase their rents, then we should have observed the use of special grants immediately, since elections were held in both 1966 and 1968. Why would legislators seeking to use this authority to maximize their chances of reelection forgo the opportunity to bring benefits to their districts? Given this evidence, it would appear that the pork-barrel consequences of the 1965 special grants legislation were unintended by Congress. How then did appropriators capture this authority from the USDA?

The Process of Earmarking

In order to analyze how earmarked special grants are supported, it is necessary to understand the budgetary process and the relevant Congressional committees. With respect to the budget process, there are two important types of committees: authorizing committees and appropriation committees. Authorizing committees

structure and provide the legal authority for federal agencies. Authorizers make recommendations regarding how much is to be spent by agencies to advance specific objectives. In contrast, appropriation committees determine actual funding levels. Technically, no federal money can be spent by Congress without authorizing legislation. Additionally, agencies cannot spend money for any purpose without the approval of appropriators.

While there are multiple authorizing committees within both chambers of Congress, each chamber only has one Appropriations Committee. Decisions about funding levels for particular programs are delegated to House and Senate Appropriations Subcommittees after general spending targets have been established by the Budget Committees. For example, authorization for the USDA comes from both the House and Senate Agriculture Committees. Funding levels for the USDA, on the other hand, are decided by House and Senate Agricultural Appropriations Subcommittees. It is often the case that House and Senate Agriculture Appropriations Subcommittees differ in the funding levels they approve for the USDA. Whenever this happens, these two subcommittees reconcile these differences in a conference committee. In the context of the agricultural appropriations bill, every member of the House and Senate Subcommittees on Agricultural Appropriations attends the conference committee. The document produced by this committee is called the Conference Report, which details how much the USDA can spend and how it is to be spent (Streeter 2004).

Within the Conference Report are detailed notes or suggestions about how sums of money appropriated for specific programs are to be allocated. It is here that agricultural appropriators insert their suggestions for research projects under the authorization of PL 89–106. Appropriators have a clear incentive to procure special grants for their districts because they can claim credit for making this money available for a local research project (Mayhew, pp. 52–53). Oftentimes these research projects are very narrow in focus and are of questionable merit.[7] Nevertheless, every appropriator, regardless of her political persuasion, faces a powerful incentive to procure special grants to increase her chances of reelection. Since only members of the appropriations subcommittee attend conference, there is no opportunity for other members of Congress to gain access to this political pork. Additionally, because appropriations legislation emerging from conference cannot be amended when it returns to the floor of each chamber, appropriators have very little incentive to share the pork created by this program. Finally, because the agricultural appropriations bill contains a number of important programs including food stamps, agricultural price supports, the Food and Drug Administration, and the Women, Infants, and Children Feeding Program, it is far too costly for the rest of Congress to check this program. Thus, because of the position they occupy within the budgetary process, agricultural appropriators need not share the benefits of this program with other members of Congress.

While the funding for all of the USDA's programs is voted on in Congress as one of several appropriations bills, the notes contained in the Conference Report are not; that is, they are not part of the Agriculture Appropriations bill. They are simply recommendations that *are not voted on by Congress as a whole, and consequently do not have the force of law*. In spite of the fact that the USDA as well as the broader scientific community has criticized special grants, the USDA faithfully carries them out. The question for us is, why? How did legislation that was

proposed by the Department of Agriculture as a means for generating efficiency through greater bureaucratic discretion and flexibility in the allocation of research funds become a vehicle for political pork?

The answer has to do with the Department of Agriculture's deference to appropriators in Congress. One USDA official admitted to the authors that the agency has *never* defied an Appropriations Committee recommendation. The reason is that the agency is simply concerned that a failure to defer to appropriators' wishes will result in retribution in the form of lower Agriculture budgets in future years. The appropriators' influence as exerted through the budgetary process is the precise vehicle by which formal bureaucratic discretion is transformed into the means for political pork. The USDA recognizes that the proposals recommended by appropriators in the conference reports are often scientifically weak, with little to offer the scientific community or the state of agricultural knowledge. Indeed, in annual audits of the agency's expenditures, USDA officials almost invariably recommend that special grants be discontinued.[8] Nevertheless, the USDA inevitably funds these proposals, with the resolve to "work with" the funded researchers to get the most that they can from the proposed research.

Empirical Evidence of Appropriators' Influence

The most obvious way to show the influence of agricultural appropriators over the allocation of special grants involves examining the relationship between appropriations subcommittee membership and the value of special grants allocated to various states. If appropriators have an electoral incentive to provide narrow benefits to their districts, and if appropriators are able to induce the USDA to fund their preferred earmarks, then we should observe a correlation between states that have members on the House and Senate Agricultural Appropriations Subcommittees and the value of earmarked special grants allocated to those states. Anecdotally, the first earmarks loosely illustrate this claim. Recall that one of the first agricultural research earmarks originating from the Senate in FY 1969 was $1 million for cotton research. That cotton research should have received one of the earliest special grants is consistent with our conjecture. Cotton is one of the top two commodities produced in the south (Gardner, p. 237). A glance at the membership of the Senate Subcommittee on Agricultural Appropriations in 1968/69 (see table 2) reveals that seven of the nine members of the Democratic majority on this subcommittee were from southern states, including the subcommittee chairman. In fact, four of the five largest cotton producing states (Texas, Mississippi, Georgia, and Arkansas) were represented on the subcommittee.

More systematic evidence of the influence that House and Senate agricultural appropriators wield over the allocation of earmarked agricultural research grants can be found through regression analysis. For each of the even numbered fiscal years between and including 1982 and 2002 we computed the total amount of special agricultural research grants allocated to each state and matched this with information on membership in House and Senate agricultural appropriations subcommittees. By exploiting cross-state and intertemporal variation in agricultural appropriations subcommittee membership, we can determine whether states that are represented on this subcommittee receive more earmarked research money.[9]

Table 2. Membership of the 1968/69 Senate subcommittee on agricultural appropriations

Democratic majority members
Holland (FL)—chairman*
Russell (GA)*
Hayden (AZ)
Hill (AL)*
Stennis (MS)*
McGee (WY)
Proxmire (WI)
Yarborough (TX)*
Ellender (LA)*
Eastland (MS)*
Republican minority members
Hruska (NE)
Young (ND)
Mundt (SD)
Javits (NY)
Aiken (VT)

*Denotes southerner.

Clearly, other factors apart from membership on agricultural appropriations subcommittees influence the allocation of earmarked research grants across states. One might imagine that states that are represented on the agricultural appropriations subcommittees are also states that have a greater interest in funding agricultural research, primarily because these are states where agriculture is an important industry. Failure to account for this influence will bias the regression coefficients on agricultural appropriations subcommittee membership. Accordingly, we also collected data on membership on the House and Senate (authorizing) Agricultural Committees, the value of competitive, peer-reviewed USDA agricultural research grants (National research initiative [NRI] grants), the value of Hatch formula funds received by each state, and the value of agricultural production in each state. We include Agriculture Committee membership because states that are represented on these committees are invariably states where agriculture is a significant industry. The inclusion of Agriculture Committee membership will also allow us to determine whether the benefits of the special grants program are shared across groups in Congress with an interest in agricultural research or are concentrated among agricultural appropriators. Additionally, we control for the value of competitive, peer-reviewed grants allocated to each state, the value of Hatch Act formula funds received by each state, and the value of each state's agricultural production because these variables are likely to be even more direct proxies for the importance of agricultural research within a given state. Finally, we also include state and year fixed effects to control for unobserved heterogeneity across states and years.

Our variables are defined as follows. To control for agricultural appropriation subcommittee membership we use two binary variables: the first binary variable

Table 3. Descriptive statistics

Variable	Mean	Standard Deviation	N
Log(real earmarks in thousands)	4.15	2.92	550
Log(real Hatch formula funds in thousands)	7.52	0.54	550
Log(real competitive grants in thousands)	5.57	1.85	550
Log(real agricultural production in thousands)	14.22	1.35	550
Share of USDA extramural funding that is earmarked	0.11	0.15	550
Senate Ag. Approps. Membership	0.12	0.14	550
House Ag. Approps. Membership	0.22	0.42	550
Senate Ag. Committee Membership	0.23	0.42	550
House Ag. Committee Membership	0.55	0.10	550

Note: Sources discussed in text.

equals 1 if state i has a Senator on the agricultural appropriations subcommittee in year t and 0 otherwise; the second variable equals 1 if state i has a House member on the agricultural appropriations subcommittee in year t and 0 otherwise. We include an analogous set of indicator variables to control for House and Senate (authorizing) Agriculture Committee membership. We include the log real value (1984 = 100) of peer-reviewed NRI agricultural research grants and the log of Hatch formula funds received by each state i in fiscal year t. We also include the natural logarithm of real agricultural production in each state. Finally as dependent variables, we use either (i) the natural logarithm of the constant dollar value of earmarks allocated to state i in fiscal year t; or (ii) the share of the USDA's extramural research budget allocated to state i in fiscal year t that is earmarked.[10] Descriptive statistics for our regression variables are shown in table 3.[11]

In order to rule out the possibility that earmarks and subcommittee membership are correlated because earmarks are "causing" committee membership, we estimated a regression to determine whether lagged earmarks are correlated with current appropriations subcommittee membership. The dependent variable in this regression is House or Senate agricultural appropriations subcommittee membership from state i in year t and the relevant control variable is the value of earmarks allocated to each state in the previous fiscal year. The results of this regression show no statistically significant relationship between lagged earmarks and House or Senate agricultural appropriations subcommittee membership. Accordingly, we can be more confident that our analysis identifies a causal relationship.

Table 4 presents the fixed effect ordinary least squares regression estimates when the dependent variable is the log of real earmarks. Column (1) displays the coefficient estimates when we control for authorizing and appropriations committee membership. Column (2) also controls for the log value of agricultural production. Column (3) controls for the log of the real value of competitive, peer-reviewed grants, and the log of Hatch formula grant allocations. Column (4) includes all the variables. Consistent with our hypothesis, we find that agricultural appropriations subcommittee membership has a positive and significant correlation with the value of special research grants allocated to a given state. Taken at face value, the coefficient estimates suggest that having at least one

Table 4. Effects of committee membership on the natural log of real earmarks

	(1)	(2)	(3)	(4)
Senate Ag. Approps.	0.88***	0.89***	0.81***	0.82***
	(0.28)	(0.28)	(0.28)	(0.28)
House Ag. Approps.	1.06***	1.06***	1.06***	1.04***
	(0.24)	(0.24)	(0.25)	(0.24)
Senate Ag. Committee	−0.03	0.06	0.01	0.10
	(0.28)	(0.28)	(0.29)	(0.23)
House Ag. Committee	0.36	0.44	0.29	0.37
	(0.24)	(0.30)	(0.23)	(0.24)
Log(value of Ag. Production)		0.82***		0.82***
		(0.16)		(0.16)
Log(Hatch formula funds)			1.01	1.14
			(1.61)	(1.52)
Log(competitive grant)			−0.16	−0.16
			(0.10)	(0.10)
State and year fixed effects	Yes	Yes	Yes	Yes
F-statistic	24.12***	24.06***	23.27***	23.24***
Adjusted R^2	0.71	0.72	0.71	0.72

Note: Heteroskedasticity-robust standard errors are shown in parentheses.
***p-value < 0.01.

Senator on the agricultural appropriations subcommittee increases the value of research earmarks allocated to a given state by over 80% while having at least one House member on the appropriations subcommittee increases the value of earmarks by over 100%. These results are remarkably robust to the inclusion of additional control variables, and are also consistent with other research that also finds appropriations committee membership to be an important factor influencing the overall allocation of academic research earmarks (Payne 2003b; de Figueiredo and Silverman).

Table 5 displays the fixed effect regressions estimated using the earmarked share of the USDA's extramural research funds as the dependent variable. In each of these regressions, appropriations subcommittee membership has a positive and significant relationship with the share of funds that is earmarked. Having at least one Senator on the agricultural appropriations subcommittee increases the share that is earmarked by around 2% while having at least one House member on the subcommittee increases the share by at least 6%. These results are also robust to the inclusion of the various control variables.

The regression results displayed in tables 4 and 5 also show that House and Senate Agriculture Committee membership does not have a statistically significant influence on either the value of earmarked research grants or the share of USDA extramural funds that is earmarked. This finding supports our claim that only appropriators capture the benefits of this program and that because of the way special grants are supported in the budgetary process, no sharing of the benefits of this program is necessary between agricultural appropriators and agricultural

Table 5. Effects of committee membership on the earmarked share of USDA extramural funds

	(1)	(2)	(3)	(4)
Senate Ag. Approps.	0.022**	0.021**	0.020*	0.019*
	(0.010)	(0.010)	(0.010)	(0.010)
House Ag. Approps.	0.064***	0.064***	0.068***	0.068**
	(0.017)	(0.017)	(0.018)	(0.018)
Senate Ag. Committee	−0.0001	0.003	−0.002	0.0008
	(0.015)	(0.015)	(0.015)	(0.015)
House Ag. Committee	−0.009	−0.007	−0.007	−0.004
	(0.013)	(0.013)	(0.014)	(0.013)
Log(value of Ag. Production)		0.026		0.026
		(0.16)		(0.017)
Log(Hatch formula funds)			−0.17	−0.17
			(0.90)	(0.90)
Log(competitive grant)			0.004	0.004
			(0.008)	(0.008)
State and year fixed effects	Yes	Yes	Yes	Yes
F-statistic	11.56***	11.56***	12.29***	12.30***
Adjusted R^2	0.52	0.52	0.52	0.52

Note: Heteroskedasticity-robust standard errors are shown in parentheses.
***p-value < 0.01; **p-value < 0.05; *p-value < 0.10.

authorizers, the other group within Congress that might potentially have an interest in agricultural research.[12]

As further evidence that appropriations membership "causes" earmarks, we regressed appropriations subcommittee membership and authorizing (Agriculture) committee membership on the log value of peer-reviewed NRI grants allocated to each state as well as on the log value of state-level Hatch formula funds, two USDA programs that fund agricultural research but where appropriators presumably have no influence over the interstate allocation of funds. If appropriations subcommittee membership is a statistically significant determinant of the allocation of earmarked special grants but not of the allocation of peer-reviewed NRI grants or Hatch formula fund allocations, then we have more confidence that there is in fact a causal relationship between appropriations membership and earmarked special grant allocations. As shown in columns (1) and (2) of table 6, agricultural appropriations subcommittee membership does not have a statistically significant influence on the value of NRI grants or Hatch Act grants allocated to each state. Moreover, columns (3) and (4) also show that committee membership does not influence the share of USDA funds that is allocated through either block grants or competitive grants. Our empirical results therefore strongly suggest that it "pays to be an appropriator" and to have an appropriator from one's own state on the subcommittee for agricultural appropriations.

Opposition to Earmarking

Earmarked special research grants have clearly come to play an important role in the USDA's research budget. While earmarking has been a political boon to

Table 6. Robustness checks

	(1) Dep Var: Log(Real Hatch Formula Funds)	(2) Dep Var: Log(Real Competitive Grants)	(3) Dep Var: (Hatch Formula Funds)/(USDA Extramural Funding)	(4) Dep Var: (Competitive Grants)/(USDA Extramural Funding)
Senate Ag. Approps.	0.018	−0.32	−0.005	0.002
	(0.012)	(0.22)	(0.014)	(0.007)
House Ag. Approps.	−0.013	−0.07	−0.010	0.012
	(0.008)	(0.12)	(0.011)	(0.008)
Senate Ag. Committee	−0.006	−0.23	0.006	0.004
	(0.006)	(0.18)	(0.014)	(0.008)
House Ag. Committee	0.0052	−0.42***	−0.009	−0.0005
	(0.0058)	(0.14)	(0.012)	(0.006)
State and year fixed effects	Yes	Yes	Yes	Yes
F-statistic	21.87***	22.89***	75.95***	30.80***
Adjusted R^2	0.78	0.76	0.81	0.78

Note: Heteroskedasticity-robust standard errors are shown in parentheses.
***p-value < 0.01.

agricultural appropriators and certain scientists, since 1972 the scientific priorities established by earmarked research funds have been called into question by a number of groups. In fact, for the last 30 years, the entire process of earmarking has come increasingly under attack by some scientists, universities, certain legislators, and the executive branch. In this section we will detail the growth of opposition to earmarked research at the USDA.

Opposition from the Scientific Community

Let us begin with the scientific establishment. Since the early 1970s professional scientists in the academy as well as within the USDA and other federal research agencies have expressed growing concerns about the quality of science being funded by the USDA through the special grants program. One of the most prominent and important critiques of USDA science was published in 1972 by the National Research Council of the National Academy of Science. Entitled the *Report of the Committee on Research Advisory to the US Department of Agriculture* (the so-called Pound Report), the authors of this study argue that the central problem with earmarked research is that it may lead to "decision without adequate information and judgment" (NRC 1972, p. 23). Earmarking has been accompanied by erosion in the influence of scientific experts over the allocation of research funds. Instead, politicized interests take priority over sound scientific judgment and politically important commodities (cotton, for instance) receive a disproportionate share of earmarked funds. This concern is patently evident in the following quotation from the Pound Report (NRC 1972, p. 21):

> The Congress may not wish to appropriate money for research in general but rather for research on particular problems. In the faith that science can solve

> these problems, a legislature may decide to attack a clearly perceived problem in agriculture by allocating funds specifically to that problem. Although the faith in a solution may be encouraged by particular scientists, the principal force brought upon the legislature is generally without much regard for the researchability [*sic*] of the problem. The legislature then too often 'earmarks' money on the basis of needs rather than feasibility.

Hence, as one if its recommendations, the Pound Report urged Congress and the USDA to "seek a greatly increased level of appropriations for a competitive grants program, which should include support of basic research in the sciences . . . that underpin the USDA mission . . . The Committee recommends that this program be administered in such a way that research proposals are subject to evaluation by peer panels of selected scientists . . . " (NRC 1972, p. 49).[13]

The sentiments expressed in the Pound Report are not anomalous. Since the Pound Report, there have been four additional National Research Council evaluations of the quality of science at the USDA (NRC 1989, 2000, 2002, 2003). While some of these studies were initiated by the National Academy of Science itself, most were undertaken at the request of either Congress or the USDA. In each of these studies, the National Research Council has reiterated the need for more peer review evaluation of agricultural research proposals. The National Academy is not alone in criticizing the USDA research enterprise. Individual scientists have also been critical of how USDA research funds are allocated. For example, in an article published in *Science*, Krogmann and Key discuss the need for more peer-reviewed science at the USDA. These authors go on to argue that peer-reviewed science has not been fully adopted at the USDA for political, institutional, and administrative reasons. Hence, it is clear that the scientific research establishment has come to hold a very low opinion of earmarked agricultural research.[14]

Opposition within Congress

Within Congress restraint in public budgeting is clearly a public good. When one legislator shows restraint in the allocation process, she affords an opportunity for another member to bring more bacon home to her district. Spendthrift legislators therefore have an incentive to free ride off the restraint exercised by their more thrifty colleagues. Clearly, tensions exist between these two groups.

While this tension exists in the context of agricultural research earmarks, as noted earlier, agricultural appropriators do not have to share the benefits of the special grants program or engage in a legislative bargain with authorizers or, for that matter, any other members of Congress. Hence, for the rest of Congress, there is no opportunity for a quid pro quo. The lack of restraint exercised by agricultural appropriators is therefore costly to the rest of Congress. Additionally, because of the way the budget process works, there are few opportunities for Congress as a whole to prevent these types of earmarks from being funded. In the original House and Senate agricultural appropriations bills, PL 89–106 never appears as a line item. It is not until the conference committee meets that the overall funding for PL 89–106 appears in the legislation. However, because appropriations legislation emerging from conference cannot be amended, there is no opportunity for members of Congress to prevent agricultural research earmarks from being funded unless they decide to reject the entire agricultural appropriations bill. It

is not surprising, then, that there have been repeated efforts to eradicate or limit the growth of agricultural research earmarks through other mechanisms.

The first major effort to limit the growth of agricultural research earmarks occurred in 1977 with the reauthorization of the Department of Agriculture. Title XIV of the 1977 Farm Bill attempted to fundamentally change the way the USDA allocates research grants in two ways. First, it introduced a category of competitive peer-reviewed grants, which is currently known as the National Research Initiative (NRI) (7 U.S.C 450i(b)). Second, it empowered the Secretary of Agriculture to come up with a set of rules to administer special research grants more effectively (7. U.S.C. 450i(c)). Under the original 1965 legislation, no formal rules were established for the administration of these grants. In what can be interpreted as an effort on the part of the authorizers to discipline the agricultural appropriators, Title XIV attempted to remove some of the discretion held by appropriators in awarding special grants. In particular, under Title XIV, a pseudo peer review process was established to vet special research grant proposals. Unfortunately, this process lacks the true advantages of peer-reviewed science because the individual requesting the special grant chooses his own reviewers. At best, it improves the quality of science at the margins. In many conversations with Cooperative State Research, Education, and Extension Service (CSREES) officials, the authors were told that no special grant has ever been denied on scientific grounds. In contrast, no more than one-quarter to one-third of NRI grant applications, which are subject to a true, competitive peer-review, receive funding (Kaiser, p. 173). Hence, it is apparent that the pseudo peer-review system established under Title XIV lacks teeth.

Other attempts have been made by individual legislators to curb agricultural research earmarks. An important motivation behind these efforts has been to increase the amount of research dollars available for agricultural research. Since the mid 1970s, the agricultural research budget has been largely flat in real terms and a growing portion of this budget has been consumed by earmarks. As shown in table 1, USDA support for agricultural research has hovered between $230 million to $300 million in constant dollars between 1980 and 2002 while the share of these funds devoted to special grants has increased from 5% to 15% over this same period. In an effort led by Senator Lugar (R-IN) in 1998, the agricultural authorization committee within the Senate attempted to limit the impact of earmarking on agricultural research by establishing a new, competitive peer-reviewed research grant program. So as to ensure the success of this new program, a new funding stream was created. Unfortunately, the Senate Appropriations Committee responded to this development by reducing the total amount available for agricultural appropriations by exactly the amount of this new funding stream! The Subcommittee on Agricultural Appropriations then placed a limitation on this new program to redirect its funding to earmarked special grants ("Ag Research"). This example clearly demonstrates how difficult it is to challenge the entrenched interests that support special grants.

Opposition from the Executive Office

Historically, the President and the Office of Management and Budget have been opposed to earmarking of any kind, including earmarked research at the USDA.

Indeed, both Republican and Democratic presidents have generally opposed earmarks. A recent example of such opposition can be found in a statement by the White House regarding USDA earmarks in the FY 2002 budget:

> In 2001, USDA funded approximately 300 Congressionally earmarked projects for research, education, and extension grants to land grant universities. Earmarked research is not subject to merit-based selection processes; therefore these projects do not represent the most effective use of limited Federal funding and often fail to address national priorities. The [President's] budget proposes to eliminate funding for these earmarks, saving taxpayers about $150 million. (*http://www.whitehouse.gov/omb/budget/fy2002/bud10.html*)

To understand why the executive office is generally opposed to earmarked agricultural research, it is necessary to consider the different incentives faced by an individual legislator and the President. The President's constituency is the whole of the United States. Thus, he would like to see broadly based public goods provided in order to increase his political support and he will tend to eschew narrowly defined projects for which the overall costs exceed the overall benefits.[15] In contrast, an individual legislator has a very narrowly defined constituency (i.e., his electoral district). Thus, it is not surprising that while individual legislators are often in favor of earmarked research, the President is not.

Unfortunately, because Congress controls the purse strings, earmarked special grants continue to flourish. While the budget process begins with the President, it requires Congressional consent. By law, public money cannot be spent without the approval of Congress. This gives appropriators an opportunity to reinsert politically valuable earmarks that are removed by the President. Therefore, in this context, unless appropriators can agree to refrain from earmarking research funds for political advantage, it seems likely that special research grants are here to stay, regardless of the pressure exerted by the President, scientists, and other interests to curb earmarked research.

Path-Dependency and Earmarked Research

As North, Krueger, and others have observed, once government policy is enacted, it tends to take on a life of its own. Political actors that benefit from the policy become key constituencies in favor of its persistence, and the policy begins to serve objectives that were never intended by its original sponsors. Additionally, because interests in the policy become entrenched, the policy becomes very difficult to eliminate even if it imposes significant costs on society. An important question for us to address is whether the policy outcomes created by PL 89–106 were path-dependent. In other words, in the absence of PL 89–106, would federal agricultural research funds have become so politicized?[16]

Clearly, members of Congress always face enormous pressure to deliver narrow benefits to their constituents in order to maximize their chances for reelection. Hence, whenever Congress has discretion over the allocation of public funds, it faces a powerful incentive to use this money to further its political objectives. In the context of agricultural research, however, it is important to note that prior to 1965 Congress did not have much discretion over the allocation of agricultural research dollars. As noted earlier, before the enactment of PL 89–106, federal research funds for agricultural research were distributed either through block grants

or contracts. Because block grant allocations were set by a formula, Congressional discretion over the distribution of agricultural research funds was limited. While Congress could always change the formula, politically this was enormously difficult. Hence, it would have been extraordinarily hard to employ block grants for narrow political purposes. While it is possible that contracts could be used for narrow political gains, contracts were not useful in the context of agricultural research because, as the USDA itself noted in its testimony, it is very difficult to specify a research contract. Indeed, it was for precisely this reason that the USDA sought the authority granted by PL 89–106 in the first place. Thus, we believe that had Congress not enacted this legislation, there would have been less opportunity for the politicization of agricultural research funds.

Given the incentive faced by legislators to channel public funds for narrow political gains, it is also worth asking why all federal research dollars are not earmarked. As we noted at the beginning of this article, earmarking of federal research funds, while not unique to the USDA, is far less prevalent at the NSF and the NIH where only 1% and 7%, respectively, of each of these agencies' budgets were earmarked.[17] This point is especially salient given the growth in earmarking in general that has occurred over the last decade. While there are many reasons for this divergence it would appear that an important factor is the relative independence enjoyed by the NSF and the NIH as compared to the USDA and the ongoing political pressure from the academic community and the medical profession to maintain that independence. Since their inceptions as research agencies, the NSF and the NIH have recognized the importance of competitive peer review, specifically, that the "determination of what research activities deserved federal assistance should be made by men and women who were themselves competent in the sciences covered" (Lomask, p. 74). The rise of earmarking at the USDA has reinforced the belief that decisions about the allocation of research funds need to be made by experts if the quality of scientific is to be maintained (NRC 1972, 1989, 2000, 2002, 2003); thus, in an effort to preserve the autonomy of the NSF and the NIH, organized interests including the American Medical Association, the Association of American Universities, and the National Academy of Sciences have worked hard to ensure that legislation like PL 89–106 is not foisted on these research agencies.

Conclusion

This article details the origins and unintended consequences of PL 89–106, the law that appropriators invoke to earmark special grants for agricultural research. While this legislation was not intended to generate opportunities for political pork, we show that, once special grant authority arose, it created an avenue for individual legislators to bring home narrowly defined benefits to their constituents at the cost of the population at large. Because agricultural research earmarks are rooted in notes to the conference reports of the agricultural appropriations bill, Congress does not vote directly on them. Instead, a minority within Congress has the power to determine which projects are funded. This outcome arises because the position that appropriators occupy within the budgetary process allows them to coerce the USDA to carry out its preferred research allocations. Moreover, because of this position, appropriators do not need to bargain with other legislators

to support the special grants program and can therefore capture all of the political pork created by special grants. Our empirical analysis substantiates this claim.

The outcomes supported by PL 89–106 are firmly entrenched. This is in spite of intense pressure from the executive branch, members of the scientific community, agricultural stakeholders, and individual legislators as well as evidence that other funding mechanisms (competitive grants and formula funds) generate better outcomes. The only way agricultural research earmarks can be eliminated is if appropriators collectively resist the temptation to earmark funds for politically valuable research projects. Because appropriators face a reelection incentive, and because earmarks allow legislators to claim credit for "bringing home the bacon," there is no reason to be optimistic that the earmarking of special grants will be discontinued. Accordingly, the special grants program furnishes an excellent example of path-dependence in the political process because if PL 89–106 had not been enacted, it is unlikely that agricultural research would have become so politicized.

The opportunities for pork-barrel politics created by PL 89–106 have had serious consequences for the quality of science funded through the USDA's extramural research program. Since the Pound Report, independent groups like the National Academy of Science and the Association of American Universities have been critical of the mechanism through which special grants are allocated and the quality of science funded by special grants. Federal support for agricultural research has therefore stagnated in spite of the fact that the social rate of return to agricultural research remains high. Thus, while the special grants program has been a source of political pork for certain legislators, it has also contributed to an erosion of the quality of the USDA's extramural research program and the willingness of most of Congress to fund agricultural research.

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Endnotes

[1]There are numerous mechanisms through which the USDA allocates its extramural research dollars. One is the competitive peer-review process, which is similar in spirit to the process used by the NIH and NSF to distribute research funds. Another is the system of block grants, in which local experts and administrators within the land grant system determine which projects get funded. A third is the special grants program in which members of Congress determine research priorities. This article concerns the origins and evolution of this third mechanism.

[2]According to the Congressional Research Service, an earmark refers to funds set aside within an account for a specified purpose. Earmarks are used in annual appropriations acts to direct the availability of funds for specific projects or purposes. See Streeter (1999).

[3]Because research is a public good, economists generally argue that there is a role for government in supporting research. However, from society's perspective, Congressional earmarking of agricultural

research may not be an optimal mechanism because Congress does not have a comparative advantage in evaluating the quality of science. An advantage of peer-review and formula funding mechanisms is that qualified scientists possess the expertise that Congress does not.

[4]There is a widespread belief and substantial anecdotal evidence that earmarked research is of lower quality and questionable scientific merit. See NRC (1972, 1989, 2000, 2002, 2003) and Rockefeller Foundation. More systematic analysis on the quality of earmarked academic research overall also suggests that earmarking may not be an effective mechanism for allocating federal research dollars. Payne (2003a) finds that earmarked research grants generate fewer citations than peer-reviewed research grants; she believes this indicates that earmarked research has less impact and is of lower quality than peer-reviewed research. Savage finds that universities that receive more earmarked grants do not tend to improve in overall rankings of research quality. His conclusion is that earmarking does not help ameliorate the competitive disadvantage that smaller universities may suffer as a result of the peer-review process. In the context of agriculture, recent scholarship suggests that block grants are also an effective mechanism for funding agricultural research. Because of the heterogeneous nature of agriculture, local scientific leaders often have an informational advantage vis à vis their national counterparts in determining how to allocate research dollars. For more on this perspective and evidence of the advantages of block grants in agricultural research see Huffman and Evenson as well as Huffman and Just (1994, 1999, 2000).

[5]Earmarking is also an issue for the Agricultural Research Service through the direction, initiation, or maintenance of specific research programs, buildings, and facilities.

[6]Path dependence has also been demonstrated for specific programs like the U.S. sugar program (Krueger) and the federal ethanol subsidy (Johnson and Libecap).

[7]Consider, for instance, the following special grants authorized under PL 89–106 for the 2002 fiscal year (U.S. Congress 2001): $260,000 for asparagus technology and production in Washington; $172,000 for cranberry/blueberry research in Massachusetts; $294,000 for wool research in Texas, Montana, and Wyoming.

[8]In hearings on agricultural appropriations, Senator Burdick (D-ND) commented on the USDA's "perennial proposal to eliminate special research grants." See U.S. Congress (1991, p. 41).

[9]For more empirical evidence on the relationship between committee membership and budget allocations see Krehbeil, Payne (2003b), and Knight.

[10]The entire USDA extramural research budget (Cooperative State Research, Education and Extension Service or CSREES budget) includes formula funds (Hatch funds plus McIntyre-Stennis funds), special grants, competitive grants (NRI as well as some Animal Health Grants), and contracts. To compute the share of funds that is earmarked we divided special grants by the total CSREES budget.

[11]Data on committee membership are taken from annual issues of the Congressional Directory. State-level agricultural production figures are from the USDA's Economic Research Service website. Data on the state-level allocation of Hatch grant, competitive grant, and CSREES funds are from the Current Research Information Service (CRIS) website (from 1994 onward) and from the annual *Inventory of Agricultural Research* (for earlier years). Finally, data on earmarked special grants are taken from the notes to the Conference Report for each fiscal year.

[12]This finding also suggests that the special grants program is not part of a larger legislative logroll. For a fuller discussion of why the allocation of special grants is not supported through logrolling see Law and Tonon.

[13]Although Congressional committees may be organized to reduce asymmetric information problems (Weingast and Marshall; Gilligan and Krehbiel) scientists are still likely to possess a comparative advantage over committee members in evaluating the quality of research proposals.

[14]There are a number of papers by Huffman and Evenson, and Huffman and Just (1994, 1999, 2000) that also argue that earmarked research is of limited value. These papers also differentiate formula funding from competitive grant funding and they find that the shift away from Hatch formula funds to competitive grants may have been misdirected. We do not dispute the possibility that Hatch formula funds are a more efficient way of allocating agricultural research dollars relative to competitive, peer-review. Our point is simply that there is broad agreement that earmarks are an inferior mechanism for the allocation of scarce agricultural research funds.

[15]There are, of course, some exceptions. For example, steel tariffs.

[16]As discussed earlier the evidence indicates that PL 89–106 was not enacted in order to give appropriators an opportunity to earmark research grants for their political benefit. The politicization of agricultural research under the special grants program was clearly an unintended consequence of this law. Hence, in this section, we restrict our attention to the issue of whether the USDA's extramural research portfolio would have become so easily politicized without PL 89–106 or similar legislation.

[17]As Vannevar Bush stated: "To persuade the Congress of these pragmatically inclined United States to establish a strong organization to support fundamental research would seem to be one of the minor miracles." Quoted in Lomask (1975, insert).

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