The Allocation of LISA Research and Extension Funding

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This article considers the political, economic, and environmental factors associated with the allocation of federal LISA (Low Input/Sustainable Agriculture) funds among states. A tobit model is estimated with LISA allocations as the dependent variable. Results indicate that pressure groups are important. LISA funding depends positively on membership in environmental organizations, the number of farms, and the size of the rural-nonfarm population, while it depends negatively on the size of the urban population. States with host LISA institutions receive significantly more funding, as do states with Senators in leadership positions on key congressional agricultural committees.

Improving the environment and conservation of natural resources have historically been objectives of agricultural policies. Along with increasing farm income and improving the welfare of the rural poor, soil conservation has been a goal of farm policies since the New Deal. With the widespread adoption of chemical fertilizers, ,pesticides, and herbicides since the 1930s, broader environmental and health concerns have emerged (Doering). These environmental and health issues are increasingly reflected in agricultural policies. One such policy, initiated in 1987, is a federal program called LISA (Low Input/Sustainable Agriculture). LISA funded research and extension programs to assist farmers in using scientific information and on-farm resources to reduce the use of fertilizer and other chemical inputs (Madden). In addition to environmental concerns, the financial situation of farmers in the 1980s also contributed to the LISA program, since many saw it as a way to increase net farm income by reducing input expenditures (Daberkow and Reichelderfer).

The Food, Agriculture, Conservation, and Trade Act of 1990 changed the LISA program to the Sustainable Agriculture Research and Education (SARE) Program. SARE has broader, vaguer goals than LISA (U.S. General Accounting Office), but reducing the use of inputs with adverse environmental and health effects is at least implicitly part of these broader goals.

LISA/SARE is administered differently from most federal agricultural research and extension programs. Most funds have traditionally been allocated among states on the basis of statutory formulas. At the state level, decisions on program content have traditionally been made at the college, academic department, and individual scientist levels. In contrast, LISA/SARE is administered through host institutions in four regions. In the first two years of the LISA program (1988–89), these institutions were the University of Vermont in the Northeast region, the University of Nebraska in the North Central, the University of Georgia in the South, and the University of California in the West. Funds are allocated to each region and then, within each region, project proposals are reviewed by committees appointed by the host institution. In addition, the organization of research and extension projects are more constrained in LISA/SARE than in traditional programs. Program guidelines for each project suggest inclusion of both research and extension components, multidisciplinary and multi-state participation, and inclusion of farmers, private research institutions, and other agricultural government agencies.

The type of administrative structure used by LISA/SARE has been endorsed by some as a method of making agricultural research and extension more responsive to broader interests, including the development and dissemination of sustainable technologies (Busch and Lacy; National Re-

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This article was written while Musser was at Penn State University. William Lacy, Stephen Ford, Joseph Terza, Otto Doering, and three anonymous reviewers provided helpful comments on earlier drafts. Brooke Smokelin and Lydia Cunningham provided assistance in data analysis. Various environmental organizations generously provided data on their membership, and Greg Hanson kindly provided data on farm loan losses.

search Council; U.S. Office of Technology Assessment). However, others argue that such a program structure will make agricultural research and extension less productive (Just and Huffman; Huffman and Evenson; Chubin and Hackett). Critics argue that it encourages short-term, applied projects with sure payoffs at the expense of long-term, more basic, or riskier projects that might ultimately generate higher returns. They also claim that the year-to-year funding variability inherent in the competitive grant process reduces productivity, and that time spent writing grant proposals is diverted from research activity. In addition, they assert that hidden and major conflicts of interest politicize committee review processes, causing committees to reward friends and associates.

LISA/SARE has probably not existed long enough to make a decision on administrative structure with respect to this program. However, the performance of LISA/SARE in reference to the allocation of funds can be evaluated, especially the influence of political considerations on funding decisions. The objective of this article is to consider the political, economic, and environmental factors affecting the distribution of LISA money among states during fiscal years (FYs) 1988–89. A political "market" for LISA funds is constructed and then used to construct an empirical model of the allocation of funds. We focus on 1988–89 because data on LISA/SARE allocations for later years were unavailable when this study was initiated. Furthermore, LISA had much clearer objectives than SARE, which facilitates model formulation.

The Market for LISA Funds

In modeling the allocation of LISA research and extension funds among states, it is helpful to follow earlier studies of agricultural research and extension funding in using the theoretical concept of a market for government programs (e.g., Guttman; Huffman and Miranowski; Rose-Ackerman and Evenson; White and Araji). Like any market, this one has both demanders and suppliers. The demanders in a political market are the groups that benefit from the program(s) under consideration. The suppliers are the politicians and bureaucrats who institute and administer the program(s). The good being exchanged is income, with the program(s) as the vehicle for this exchange. Payment for the good can take a wide variety of forms, depending on the program(s) and the overall political environment. Some examples within the context of the LISA program are discussed below.

In general, a group "demands" income transfers by exerting political pressure. The list of ways to exert pressure is long, but would include lobbying expenditures (in money and in time), campaign contributions, bribes and kickbacks, demonstrations, strikes, and riots. Demand curve shifters include the size of the group and the anticipated gain per group member from the program(s) under consideration (Becker; Gardner; Peltzman). Group size in general has an ambiguous effect on political influence. On the one hand, a larger group size means that a group can spend more in money and in time on exerting political pressure, holding expenditures per group member constant. This group size effect is especially disadvantageous for very small groups, because there are often fixed costs to participating in the political process that make political activity by these groups uneconomic. As group size increases, these fixed costs impose a smaller burden on each group member. On the other hand, a larger group size worsens free rider problems, because everyone is more inclined to leave the expenditure of resources for lobbying, making contributions, demonstrating, etc. to others. The result is that, for large groups, expenditures per group member tend to decline as group size increases.

Politicians and bureaucrats supply income transfers by raising funds (through a wide variety of programs) and then channeling them through the political and bureaucratic process toward groups that are demanding transfers. The costs of raising funds depend on the economic environment and on the instruments used to obtain funds (e.g., an output subsidy financed by taxpayers vs. a price floor financed by consumers and taxpayers). The costs of channeling funds through the political and bureaucratic process depend on the program(s) under consideration and the overall political environment. Some factors within the context of the LISA program that affect the cost of transferring funds, and thus shift the supply curve for income transfers, are discussed below. The costs of transferring funds also depend on competing demands for funds. Clearly, resources devoted to one program cannot be spent elsewhere. While the general public may be unaware of the fact that a particular program even exists, politicians and bureaucrats recognize that the program is consuming resources that could have been used to garner political support from other interest groups.

For the LISA program, important groups on the demand side include public-interest groups with a concern about the environmental and health effects of fertilizers and pesticides, because LISA was in part an attempt to reduce the usage of these inputs

(Madden). Farm and rural groups also belong on the demand side, because farm financial stress and associated rural economic hardships have created interest in cost-reducing technologies (Daberkow and Reichelderfer). These groups may also be interested in developing technologies for their state that are consistent with evolving regulations on pollution and food safety. In addition, states compete with each other in agricultural markets. Farm and rural groups in one state might lobby for LISA funds simply to prevent the money from going to another state.

One would expect the demand for LISA funding by public-interest groups and others concerned about the environment and public health to be an increasing function of perceived dangers from agricultural chemicals. Risks to the environment and human health from agricultural chemicals vary from one region to another because both the extent of chemical usage and the risks from any given level of usage vary by location. One would also expect demand for LISA funding by farm and rural groups to be an increasing function of farm financial stress.

The supply side for LISA includes those who make allocation decisions: members of Congress, U.S. Department of Agriculture officials, and the decentralized administrators of the LISA program. Clearly, it is easier to secure LISA money for a state if its Congressional delegation is in a position to influence allocation decisions. It is also easier if LISA administrators or USDA officials are partial to that state. LISA administrators and proposal reviewers may also favor grant applications from their own institution or state for self-interest motives. While such motives may not be explicit, standard political-economic reasoning suggests that they are likely implicit (Chubin and Hackett). In this context, the fact that LISA applications are reviewed at a regional level rather than a national level is important. A region may be less likely to have a sufficient number of disinterested scientists to review proposals than the country as a whole. Personal relationships may also be stronger among scientists and administrators within a region than within the country as a whole.

Competing demands on LISA funds also shift the supply curve for reasons discussed above. As the non-rural population increases, the number of people on which and variety of ways in which LISA funds could have been spent also increases. Since LISA is a federally funded program, one might argue that channeling LISA funds to a state does not preclude channeling other federal funds to that state's urban interests. However, this ignores the fact that every state has limits on its political influence in Washington, DC. Scarce political capital used to garner LISA funds is capital that cannot be used to obtain other funds.

The "price" of LISA funds has political and monetary components. For members of Congress, it is measured in votes, campaign contributions, in-kind campaign assistance, and other political favors. For USDA officials and LISA administrators, it is measured in salaries, benefits, research support, and other types of assistance provided by their respective institutions. Some components of this price are easily observable (e.g., campaign contributions), but others are not because of privacy considerations (e.g., salaries and benefits). In any case, estimating the marginal impact of LISA funds on votes for members of Congress, campaign contributions, or other observable components of this price would be difficult and fraught with error. This article therefore uses a reduced-form formulation expressing LISA expenditures in a given state as a function of the above demand and supply shifters. This is a common practice in the literature on program funding across states, including agricultural research and extension.

Data and Econometric Methods

This section presents the data, variables, and estimation methods. The unit of analysis in this study is the state. Summary statistics for all variables are shown in Table 1, while data sources and complete variable definitions are provided in the Appendix. Of the 50 states, 44 received LISA funds (the six without any funds were Alabama, Florida, Kentucky, Nevada, New Hampshire, and Rhode Island).

It may be noted that the four host institutions seemed to receive a disproportionate amount of LISA money during the first two years of the program. Of the $5.52 million in LISA funding during FYs 1988–89, the four host universities received $1.07 million (19%) (USDA, *LISA 88–89*). On average, states with host institutions received about 200% more in LISA funds than states without host institutions. By comparison, states with host institutions received only 7.8% of total federal agricultural research dollars during FYs 1988–89 (USDA, *Inventory of Agricultural Research*). To help obtain a feel for the data, it is also useful to examine the association between LISA allocations and total federal agricultural research allocations. The correlation coefficient between the two variables is not statistically different from zero (0.18,

Table 1. Summary Statistics of State Variables in Tobit Analysis

Variable	Mean	Standard Deviation
Agricultural Research (1987 $/year):		
LISA, 1988–89 (thousands)	52	59
All Federal, 1988–89 (millions)	3.4	1.8
Group Membership:		
IAA/AFT, 1990	279	400
All Farms, 1987 (thousands)	42	37
Rural-Nonfarm Population, 1980 (millions)	1.1	0.83
Farm Bureau, 1988 (thousands)	74	96
Intensity of Group Interest (1987 $/year):		
Fertilizer Expenditures, 1987 (thousands)	134	132
Ag Chemical Expenditures, 1987 (thousands)	94	103
Farm Loan Losses, 1984–88 (millions)	80	104
Supply-Side Variables:		
LISA Host Institution Dummy	0.08	0.27
Senate Key Committee Dummy	0.08	0.27
House Key Committee Dummy	0.08	0.27
Urban Population, 1980 (millions)	3.3	4.1
Regional Dummies:		
North Central	0.24	0.43
South	0.26	0.44
West	0.26	0.44

t-ratio = 1.2). However, the real test of the impact on LISA allocations of either total federal agricultural research allocations or of having a host institution is in the regressions below, since they hold other relevant variables constant.

The ten states with the largest LISA funding are listed in Table 2, along with the ten states with the largest total federal agricultural research expenditures. Four states appear on both lists: Pennsylvania, North Carolina, Texas, and Virginia. However, the two states with most LISA funding, California and New York, are not among the ten highest for all funding. Two of the states in the LISA top ten, California and Vermont, are among the four regional LISA host institutions. The other two host institutions, Georgia and Nebraska, do not appear among the top ten LISA funded states.

The dependent variable in the regressions is average annual LISA research and extension project allocations during FYs 1988–89. (Administrative expenditures by the host institutions or institutions submitting proposals, matching funds, etc. are not included.) The independent variables fall into four categories: membership numbers for interest groups benefitting from LISA (these shift the demand curve for LISA funding); variables measuring the intensity of the interest groups' stake in LISA (also demand shifters); political variables that shift the supply curve for LISA funding to each state; and other variables that serve as proxies for possibly relevant factors omitted from the analysis.

As indicated earlier, LISA money was distributed to states in a two-stage process. In the first stage, funds were allocated to each of the four regions. In the second stage, each region divided its funds among its member states. The econometric model used here attempts to explain the two stages as a whole rather than separately. It would be interesting to model each stage separately, but that would require additional years of data on LISA/SARE allocations that were unavailable to us. Regional dummies are included in the regressions in order to capture differences among regions

Table 2. Top Ten States, LISA and All Federal Agricultural Research (Annual Averages, FYs 1988–89, in 1987$)

	LISA Funding ($1000)		All Federal Ag Research ($ Million)	
Rank	State	Amount	State	Amount
1	California	304	Texas	7.5
2	New York	182	North Carolina	7.2
3	Pennsylvania	171	Alabama	6.3
4	Washington	170	Kentucky	6.0
5	Massachusetts	131	Tennessee	5.8
6	Vermont	111	Georgia	5.7
7	North Carolina	95	Missouri	5.7
8	Minnesota	84	Pennsylvania	5.3
9	Texas	84	Virginia	5.2
10	Virginia	83	Mississippi	5.2
—	All-State Average	52	All-State Average	3.4

in the first stage of the allocation process not accounted for by the other explanatory variables.

On the demand side, the sum of membership in the Institute for Alternative Agriculture (IAA) and the American Farmland Trust (AFT) is used to represent environmental pressure groups with a specific interest in agriculture. IAA includes researchers and others directly interested in LISA, and has grown rapidly since its creation in 1983 (Swenson). The focus of AFT is on broader agricultural conservation issues, but it is also interested in LISA. AFT is also included because of its substantial political influence (Browne). The sum of IAA and AFT membership is used rather than two separate membership variables because of the high correlation coefficient (0.78, t-ratio = 8.6) between membership in these two organizations. While this sum may introduce double-counting, that is not necessarily undesirable. A person belonging to both groups may be more active than a person belonging to just one; more concretely, a person belonging to both is contributing membership dues twice.

The other political pressure groups included on the demand side are farmers as a whole, the rural-nonfarm population, and the Farm Bureau. The Farm Bureau is the largest farm organization and has been skeptical of LISA (Korves), so that its support for LISA may be less than farmers or rural people generally.

It should be noted that including these group size variables in the model does not presume that each person in every interest group has heard of LISA. It only presumes that (1) the leaders of these groups and their legislators in Congress are aware of the program, and (2) these leaders and legislators are looking out for what they perceive to be the best interests of their groups. As indicated earlier, the size of a group affects its political influence. The leaders of a group with more influence can bargain more effectively for programs that they perceive will benefit their members, such as LISA for the groups that we study.

As discussed above, theory suggests the relationship between group size and political influence may be nonlinear, since there are forces that tend to make both small and large groups politically weaker than medium-sized groups. We tried including the squares of group sizes in addition to the group sizes themselves to capture any nonlinearities, but multicollinearity prevented us from obtaining any satisfactory results. Thus we report the results without these quadratic terms.

To capture the intensity of concern among environmental organizations about agricultural pollution, total expenditures by farmers on commercial fertilizer and expenditures on other agricultural chemicals (which are largely pesticides) are included as demand shifters. To test the extent to which farm financial stress affected the intensity of support for LISA among farm and rural groups, annual losses incurred by banks on farm loans are included in the analysis as another demand shifter.

A set of dummy variables is used to model the supply side for LISA funding. The first dummy variable equals one if the state has a host LISA institution and zero otherwise. Another dummy variable equals one if the state had a ranking Senator on the Agriculture Committee or the Agriculture Subcommittee of the Appropriations Committee in the 100th (1987–88) or 101st (1989–90) Congresses. (A ranking Senator is a committee chairperson or a ranking minority member of the committee). A similar dummy variable is included for the House of Representatives. Also included on the supply side is the size of the urban population. As noted above, the number of people on which and the variety of other ways in which LISA funds could have been spent increases as the urban population increases, shifting the supply curve inward.

Other potential supply and demand shifters are unmeasurable or not easily measured. To capture any variables common to LISA and other federal agricultural research programs, average annual federal agricultural research expenditures (on all programs) during FYs 1988–89 are included.

The most important variables missing from the analysis are measures of the number, size, and quality of LISA grant proposals submitted by investigators in each state. Some states might have received little money simply because few efforts were made to secure funds. Unfortunately, no data were available to us on submissions. In any case, submissions would probably also need to be made endogenous, because investigators may respond to the same political-economic considerations that affect final funding decisions, either directly or through signals from administrative superiors. The IAA/AFT variable may proxy for potential applicants in a state because it is plausible that most applicants were members of these organizations.

A tobit model is used in estimation because of zero values for the dependent variable in six states. The tobit model captures both the decision to allocate or not to allocate funds to a particular state and the decision about how much to allocate, given that funds are going to be allocated (see Maddala).

In estimating the tobit model, the dependent variable and all the continuous (non-dummy) independent variables are divided by their sample means. This transformation yields unit-free variables. The coefficients on the continuous independent variables are (approximately) elasticities with this transformation, and the coefficients on the dummy variables, when multiplied by 100, show the percentage changes in LISA funding due to these dummies.[1] Logarithmic transformations were also tried, with ln(1 + LISA) used as the dependent variable in order to take care of the cases where LISA = 0. However, the results indicated that a log model is not at all appropriate for the data. Goodness-of-fit measures were very low and almost all the estimated coefficients were statistically insignificant.

Standard errors of the estimated coefficients are calculated by both the usual method and with a method in White that is robust to model specification error. Let A be the matrix of second derivatives of the log-likelihood function and let B be the cross-product of the first derivatives. White's robust covariance matrix for the coefficient estimates is $A^{-1}BA^{-1}$. Under the usual assumption of information matrix equivalence ($A = -B$), White's matrix collapses to the usual $-A^{-1}$. For comparison, t-ratios calculated by the usual method are also reported below.

The results here could be contaminated by simultaneous equation bias, since IAA/AFT membership is treated as exogenous. Both groups are very interested in LISA, and LISA expenditures could increase their membership. Smith and Blundell's test for exogeneity was used to evaluate the potential for simultaneity. For this test, the variable of concern (IAA/AFT membership) is regressed on a set of exogenous variables, and the residual from that equation is included as an explanatory variable in the tobit equation. If the residual is statistically insignificant, the variable of concern can be treated as exogenous. The variables included in the IAA/AFT equation were membership in general environmental organizations (see the Appendix), farms, rural-nonfarm population, urban population, per capita income, and dummies based on the Census Bureau regions.

The host institution variable might also be endogenous. However, testing or correcting for simultaneity here is impossible because only four states had host institutions. Evaluation of this potential problem would require additional years of data.

Results and Discussion

Maximum-likelihood estimates for two tobit models are shown in Table 3. The total federal agricultural research funds variable is included in the first model, while it is excluded from the second model. The estimated coefficient on this variable in the first model is not statistically significant. With a few exceptions, estimated coefficients and asymptotic t-ratios for the other variables are similar between the two models. This robustness indicates that fundamentally different political-economic forces are driving LISA spending and federal agricultural research spending generally.

The standard error for the host institution variable is significantly smaller with White's method than with the usual method, while the other standard errors are close to each other. These similarities in standard errors suggest that specification error has only a limited impact on the results, except perhaps for the host institution. Even in that case, the statements below regarding asymptotic statistical significance or insignificance are unaffected by the choice of the covariance matrix.

Among pressure groups, the estimated coefficient for IAA/AFT membership is large in magnitude and highly statistically significant. The results indicate that a 10% increase in IAA/AFT membership is associated with about a 10% increase in LISA spending, a substantial effect. In contrast, the estimated coefficient for Farm Bureau is statistically insignificant. The numbers of farms is statistically significant and positive. Holding other variables constant, a 10% increase in numbers of farms is associated with about a 4% increase in LISA allocations. Farmers generally appear to support LISA, but this support is not statistically greater or smaller for farmers who are also Farm Bureau members.

Support for LISA is at least as strong among the rural-nonfarm population as among farmers. A 10% increase in the rural-nonfarm population is associated with about a 5–8% increase in LISA allocations. However, the differences between the estimated rural-nonfarm and farm coefficients are not statistically significant (t-ratio = 1.2 for the first model, 0.6 for the second model).

Neither the fertilizer variable nor the agricultural chemicals variable is statistically significant. Perhaps these variables are poor proxies for the environmental and health risks posed by current pro-

[1] The model is of the form $y_t/\bar{y} = \alpha + \Sigma_i \beta_i x_{it}/\bar{x}_i + \Sigma_j \gamma_j z_{jt}$, where y_t is the dependent variable for the *t*th observation, the x_{it} are the nondummy independent variables, and the z_{jt} are the dummy independent variables. The variables $\bar{y}$ and $\bar{x}_i$ are the corresponding sample means. Neglecting the changes in the sample means $\bar{y}$ and $\bar{x}_i$ as y_t and x_{it} change (which will be negligible if there are a large number of observations), we have $d(y_t/\bar{y}) \approx dy_t/\bar{y}$ and $d(x_{it}/\bar{x}_i) \approx dx_{it}/\bar{x}_i$. Evaluating these derivatives at the sample means $y_t = \bar{y}$ and $x_{it} = \bar{x}_i$, we obtain $dy_t/\bar{y} = d\bar{y}/\bar{y} = dln\bar{y}$ and $dx_{it}/\bar{x}_i = d\bar{x}_i/\bar{x}_i = dln\bar{x}_i$. Thus $\beta_i \approx \partial ln\bar{y}/\partial ln\bar{x}_i$ and $\gamma_j \approx \partial ln\bar{y}/\partial z_j$.

duction practices. Fertilizer and chemical expenditures measured on a per acre basis were also tried in regressions not reported here, but they were not statistically significant either. Other measures of environmental and health risks (e.g., groundwater contamination figures in Nielson and Lee) were also tried, but were not statistically significant.

The estimated coefficient for farm loan losses is positive, small in magnitude, and statistically significant at the 10% level but not the 5% level. The results indicate that a 10% increase in farm loan losses is associated with about a 2% increase in LISA disbursements. These results support the view discussed above that the farm financial crisis of the 1980s played only a supporting role in the LISA program.

The results for the supply-side variables are largely consistent with prior expectations. States with a regional coordinator receive more LISA allocations, and this effect is statistically significant. Other things equal, the difference is about 60%. While large, this effect is less than the 200% difference that one sees in the raw data on LISA allocations (i.e., the difference not holding other things constant).

Similarly, the estimated coefficient for Senate key committee is positive and statistically significant. Having a key Senate committee member is associated with about a 70% increase in LISA disbursements. The four states with these Senators were Vermont, Indiana, North Dakota, and Mississippi. However, only Vermont is among the top 10 in LISA allocations, so this variable does not explain the rankings in Table 2 by itself. In contrast, the House key committee variable is statistically insignificant. Texas, Illinois, Mississippi, and Massachusetts are the states with these members. Ironically, two of these states were among the highest ten LISA allocations in Table 2.

As expected, the estimated coefficient for urban population is negative and statistically significant. A 10% increase in the urban population is associated with a 8–10% decrease in LISA allocations.

The dummy variables for the North Central and South regions are statistically insignificant, while the estimated coefficient for the West dummy is positive and significant at the 10% level but not the 5% level. This effect is related to regional allocation decisions to the West vs. the Northeast in the first-stage of the two-stage process discussed above (allocate money to regions, then divide each region's money among its member states).

Results of the Smith-Blundell test indicate that IAA/AFT membership can be treated as exogenous. In the equation with total federal agricultural research funding, the estimated coefficient (t-ratio) on the residual from the IAA/AFT equation is 0.17 (0.4). Furthermore, other coefficient estimates do not vary much from the models in Table 3. Among the statistically significant variables, the average percentage change in the coefficient estimate caused by including this residual is less than 5%. In the equation without total federal agricultural research funding, the estimated coefficient (t-ratio) on the residual from the IAA/AFT equation is 0.24 (0.6). Among the statistically significant variables, the average percentage change in the coefficient estimates in this case is only about 7%.

Conclusions

The objective of this article was to consider the political economy of allocation of research and extension spending on the LISA program among states during its first two years. Results indicate that the disbursement of LISA money is strongly related to political considerations. On the demand side of the market for LISA funds, membership in political pressure groups definitely matters. The allocation of LISA funds to a state is highly responsive to membership in that state in the American Farmland Trust and the Institute for Alternative Agriculture, two public-interest groups with a strong interest in LISA. LISA allocations also respond positively and to a significant degree to the number of farms and the rural-nonfarm population in the state.

Variables included to measure the intensity of demand among states were not generally important. In particular, the results provide only limited support for the view that LISA was a response to recent financial problems faced by farmers. Results indicate that states with higher farm loan losses received more LISA money than other states, but not a lot more. More surprisingly, LISA allocations were not related to the use of fertilizer or pesticides, which was an important motive for establishing the program.

On the supply side of the market for LISA funds, states with host institutions receive significantly more money, even after controlling for other factors. Similarly, states with Senators in leadership positions on key agricultural committees receive substantially larger LISA allocations. These results support general concerns raised about the politicization of competitive grant funding (Chubin and Hackett). On the other hand, having a Representative in a similar position in the House does not have a statistically significant effect on LISA allocations. Members of the House apparently use their political influence elsewhere.

Table 3. Tobit Results of State Allocation of LISA Funds, FYs 1988–89

Variable	Estimated Coefficient (Absolute Value, Asymptotic t-Ratio, White's Method) [Absolute Value, Asymptotic t-Ratio, Usual Method]	
	With Federal Ag Research	Without Federal Ag Research
Federal Ag Research	−0.79 (1.5) [1.4]	
Group Membership:		
IAA/AFT	1.07* (5.8) [5.2]	0.98* (5.7) [5.0]
Farms	0.49* (2.5) [2.0]	0.36* (2.0) [1.5]
Rural-Nonfarm	0.86* (3.2) [2.8]	0.55* (2.7) [2.5]
Farm Bureau	−0.22 (1.4) [1.6]	−0.23 (1.4) [1.7]
Intensity of Group Interest:		
Fertilizer	−0.20 (0.6) [0.5]	−0.21 (0.6) [0.5]
Ag Chemicals	0.23 (0.7) [0.7]	0.16 (0.5) [0.5]
Loan Losses	0.25* (2.0) [1.6]	0.23* (1.8) [1.5]
Supply-Side Variables:		
LISA Host Institution	0.59* (3.4) [1.8]	0.60* (3.3) [1.8]
Senate Key Committee	0.67* (2.5) [1.9]	0.74* (2.7) [2.1]
House Key Committee	0.13 (0.5) [0.3]	0.09 (0.3) [0.2]
Urban Population	−1.00* (3.8) [3.6]	−0.81* (3.2) [3.3]
Regional Dummies:		
North Central	−0.02 (0.0) [0.0]	−0.12 (0.3) [0.3]
South	0.62 (1.5) [1.3]	0.22 (0.6) [0.5]
West	0.55* (1.9) [1.9]	0.51* (1.8) [1.7]
Intercept	−0.14 (0.4) [0.5]	−0.36 (1.4) [1.3]
Actual vs. Predicted r^2	0.79	0.78
Degrees of Freedom	34	35

NOTE: An * denotes significance at the 10% level, based on t-ratios calculated using White's method. The predicted value of the dependent variable, LISA, is $p_t = \Phi_t\beta' x_t + \sigma\phi_t$, where β is the vector of coefficient estimates, x_t is the vector of exogenous variables, and σ is the estimated standard error. Φ_t and ϕ_t are the distribution function and the density function of the standard normal, respectively, evaluated at $\beta' x_t/\sigma$.

States with larger urban populations receive significantly less LISA funding, probably reflecting the fact that there are more competing demands on funds in more urbanized states.

In short, LISA allocations are not entirely consistent with traditional farm politics. Nonetheless, the program may continue to expand if there is logrolling between environmental interests and farm interests similar to the current logrolling between farm interests and beneficiaries of food stamps. Considerable support exists for the LISA program organization, which has been continued in SARE (e.g., National Research Council; U.S. General Accounting Office). This program organization is supported because it is hypothesized to produce different research and extension outcomes than traditional programs. Results in this study indicate that the program has been successful in being different, because LISA allocations are not related to total federal agricultural research funding. However, the lack of a relationship with chemical input use and the small relationship with farm financial stress raise questions as to whether the program is meeting its stated objectives. Whether or not these allocations result in the development and adoption of desired technologies is beyond the scope of this research.

Our results suggest a need for additional research on the allocation of LISA/SARE funds and on program efficiency. This would include a more detailed investigation between chemical input use, environmental externalities associated with agriculture, and LISA/SARE allocations. This would also include an analysis of additional years of LISA/SARE allocations beyond the initial two years (1988–89) investigated here. With sufficient time series data, the selection process for regional host institutions could be analyzed. State-level data on the number, proposed budgets, and quality of proposals would be very useful as well. Furthermore, contrasting this program with programs that allocate funds on a nationally competitive basis or a formula-funds basis would permit a comparison of the relative importance of political variables in the allocation process.

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Appendix

This appendix contains variable definitions and data sources. All monetary figures were converted to 1987 dollars using the U.S. implicit GNP price deflator.

LISA Funding. Average annual LISA funding for fiscal years 1988–89. Source: *LISA 88–89*.

Federal Agricultural Research. Average annual federal agricultural research spending for fiscal years 1988–89. Source: *Inventory of Agricultural Research*.

Institute for Alternative Agriculture/American Farmland Trust (IAA/AFT). Combined membership in these two environmental groups, 1990. Membership data were generously supplied by the organizations themselves. We requested 1988 data, but both had only 1990 data.

Farms. Number of farms, 1987. Source: *1987 Census of Agriculture*.

Rural-Nonfarm, Urban Populations. Rural-nonfarm and urban populations, 1980. Source: *Statistical Abstract of the United States*. Available every ten years from the Census of Population. Data for 1990 were unavailable when the analysis was completed.

Farm Bureau. Membership, 1988. Source: *Farm Bureau News*.

Fertilizer Expenditures, Agricultural Chemical Expenditures. Expenditures by farms on fertilizer and agricultural chemicals (excluding fertilizer), 1987. Source: *1987 Census of Agriculture*.

Farm Loan Losses. Average annual public and private bank losses on loans to large farms, 1984–88. A farm is called large if it has at least $40,000 in production, sales, and/or expenses. Small farms were excluded because of unreliable data. Source: USDA, Economic Research Service, Agricultural and Rural Economics Division, unpublished data. The data were kindly provided by Greg Hanson.

Regional LISA Coordinator. Equals one if the state had a regional coordinator, zero otherwise. The four states with regional coordinators during 1988–89 were California, Georgia, Nebraska, and Vermont. Source: *LISA 88–89*.

Senate Key Committee. Equals one if a Senator from the state was the chair or ranking minority member of the Agriculture Committee of the Agriculture Subcommittee of the Appropriations Committee during the 100th (1987–88) or 101st (1989–90) Congresses, zero otherwise. The four states were Indiana, Mississippi, North Dakota, and Vermont. Source: *Congressional Quarterly Almanac*.

House Key Committee. Defined similarly to the Senate. The four states were Illinois, Mississippi, Nebraska, and Texas.

Regional Dummies. These dummies are for the USDA's four regions (Northeast, North Central, South, and West). The control region is the Northeast.

General Environmental Organizations. Combined membership in the Audobon Society (1988), Greenpeace (1990), National Wildlife Federation (1988), and the Sierra Club (1988). Membership data were generously supplied by the organizations themselves. We requested 1988 data from all organizations, but Greenpeace had only 1990 data. This variable was used in the test for simultaneous equation bias discussed in the text.

Per Capita Income. Per capita income, 1988. Source: *Statistical Abstract of the United States*. This variable was used in the test for simultaneous equation bias discussed in the text.

Census Bureau Regional Dummies. These dummies are for the Census Bureau's nine regions (New England, Mid-Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific). These variables were used in the test for simultaneous equation bias discussed in the text.