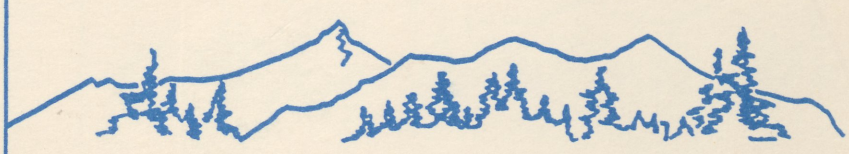
Papers of the 1991 Annual Meeting

Western Agricultural Economics Association



Portland, Oregon
July 7 – 10, 1991

Factors Influencing Producer Support for a State Mandatory Seed Law: An Empirical Analysis	Larry D. Makus	Univ. of Idaho
	Joseph F. Guenthner	Univ. of Idaho
	Biing-Hwan Lin	Univ. of Idaho

A probit model identifies characteristics influencing Idaho potato producer support or opposition to a state mandatory seed law. Economic factors seemed to be the most important influencers. Current users of certified seed and growers of certified seed were strong supporters. Concern about seed borne disease and type of farm were not important.

INTRODUCTION

Two important groups from the Idaho potato industry [Idaho Potato Commission (IPC) and Potato Growers of Idaho (PGI)] have expressed interest in a state mandatory seed law. This interest developed after a national potato industry task force proposed state mandatory seed laws as one recommendation for the eradication of bacterial ring rot. Maine, Minnesota, Montana, and New Brunswick, Canada currently have mandatory seed laws and several other states are considering such legislation (Guenthner, *et al*). A survey of potato growers in Idaho was recently conducted to determine their support for legislation requiring the use of certified seed for all potato acreage planted in the state. This article uses survey results to analyze economic variables and personal characteristics which are hypothesized to influence producer support for the mandatory seed law.

Several factors influence the decision-making process for agricultural producers. Policy decisions (primarily at the state and federal level) are becoming an increasingly important factor impacting agricultural producer decisions. The Farm Bill, federal marketing orders, and federal tax laws are examples of legislation having a significant impact on decisions of agricultural producers.

Studies analyzing policy impacts on producer behavior typically use some form of profit maximizing economic model to determine the anticipated producer response. The largest number of studies have focused on expected producer response to provisions of the Farm Bill. Examples include crop acreage response models by Chavas and Holt; expected producer responses to changes in milk support prices by Weersink and Howard; and farmer responses to conservation provisions of the 1981 and 1985 Farm Bills (Helms *et al*). A few studies have explicitly examined producer preferences for a set of policy alternatives associated with the Farm Bill (Edelman and Lasley; Orazem, *et al*).

Analyses of marketing orders generally focus on welfare and efficiency impacts of marketing orders. A comprehensive discussion of studies is contained in Heifner *et al*. Two studies (Halligan; Mixon, *et al*) explicitly examined producer voting behavior regarding marketing orders. The Halligan study looked at voting behavior for a federal hop marketing order in Washington. Mixon, *et al* analyzed factors influencing both the decision to vote and voting behavior on a Georgia state marketing order for Vidalia onions.

Studies on impacts of federal taxation programs are generally motivated by a significant change in income tax policies. Typically, these studies use economic modeling to project producer response to specified changes in the tax code. Examples include studies by Hanson and Bertelsen; and Lins *et al*. A few studies have explicitly looked at producer attitudes regarding alternative tax policies (for example, Hanson *et al*).

An alternative approach is to assess forces influencing the policy-making process. Rauser outlined a methodology for using this approach in an invited address to the AAEA in 1982. Conceptually, the idea is similar to economic models that predict producer responses to policy decisions. Instead of using profit maximization, the procedure involves modeling legislative behavior using a political preference function (PPF). Empirical analyses include studies by Rauser and Foster. Identifying factors that explain actual legislator behavior regarding agricultural policy is limited to a study by Lee and Tkachyk.

Extensive research has focused on impacts of various policy decisions. Typically, this research focuses on national agricultural programs and applies an economic modeling approach to measure the anticipated response. This response measure is then used as a basis for assessing impacts of the policy decision. Two areas seem to have received limited attention; state policies affecting the behavior of agricultural producers, and analyses focusing on producer attitudes about policy alternatives (or factors which may influence their attitudes).

Several factors concerning state level policy decisions suggest additional research is warranted. Many policies initiated at the state level have implications beyond state boundaries. For example, the initiation of a state mandatory seed potato law in Maine provides a strong motivation for other states (Idaho and Wisconsin) to initiate similar laws. Potential reduction or elimination of federal support programs will likely intensify competition between states in several commodity areas, especially for specialty or nontraditional crops and livestock. Additional state level legislation to improve competitiveness through control orders mandating specified production practices, organic certification programs, marketing orders, etc. are a likely response.

DATA

A combination mail and telephone survey of Idaho potato producers was conducted during early summer and fall of 1989. The initial mail survey was sent to 1937 names included on the mailing list for Potato Growers of Idaho (PGI). Since the mailing list was known to include ineligible respondents, the questionnaire included a post card to be returned by ineligible respondents (non-potato producers). The total survey design method was used for the mail survey (Dillman). A telephone survey of non-respondents was conducted using an identical survey questionnaire. From the list of 1937 names, 882 were identified as ineligible, leaving an eligible sample of 1055. A total of 716 producers completed the mail survey and 166 completed the telephone survey. The total sample of 882 represents an 83.6 percent response rate. Elimination of respondents not providing all of the necessary information used for the analytical model resulted in 588 usable responses.

The survey instrument solicited information about whether or not the respondent strongly favored, somewhat favored, somewhat opposed, or strongly opposed an Idaho mandatory seed law. Those in the first two categories were viewed as favoring the law and the second two categories were viewed as opposed. Additional information regarding personal and farm characteristics, attitudes regarding seed borne disease problems, the effectiveness of other potential solutions to seed borne diseases, and farm location were also obtained.

Implementation of a mandatory seed law is accomplished through the legislative process. The Idaho Potato Commission and Potato Growers of Idaho are recognized within the state as the two primary representative groups for

the potato industry. Information provided by the two groups prior to the survey and the cover letter included with the survey questionnaire provided a clear message to producers that their response on the survey would be construed as a vote for or against such legislation. Even though an indication of support or lack of support on the survey is not an explicit vote, respondents likely viewed their responses as the primary opportunity to "vote" on the mandatory seed law.

EMPIRICAL MODEL

The primary focus of this analysis is to identify respondent characteristics which influence support or lack of support for an Idaho mandatory seed law. Binary choice models have been widely used to assess factors influencing an individual's choice from among two or more alternatives. Such models are strongly linked to utility theory (Amemiya), and their application is well described in most econometrics texts (Judge *et al*). Due to problems with the linear probability model, the probit and logit specifications are commonly used. Selecting between the probit and logit specifications is not strongly supported on theoretical grounds and results have been similar in direct comparisons of the two specifications (Capps and Kramer). The probit specification was used for this analysis.

The decision to support or not support a state mandatory seed law was hypothesized to be influenced by four groups of variables. The first group focuses on producer concern about seed borne diseases and how producers feel about use of certified seed as an effective procedure in reducing such disease problems. These variables represent an attempt to capture the "ideological" component of voting behavior discussed by Lee and Tkachyk.

The second set of variables focuses on geographic location. Different regions of Idaho produce potatoes for a different mix of market outlets; the processed market (southwest), the fresh market (southeast), or both fresh and processed (south central). Processors are sensitive to the impacts of seed borne disease problems and generally procure potatoes through pre-planting contracts. These contracts often require growers to use certified seed. Thus, the level of processor involvement will likely influence to what degree growers already have a "mandatory" certified seed requirement.

Third, economic self interest is generally expected to influence producer voting behavior (Mixon, *et al*; Orazem, *et al*). The economic self interest impact is measured by classifying respondents as seed versus commercial growers. Seed producers are likely to benefit from a mandatory seed law (most non-certified seed is own-grown seed), and commercial growers will likely have higher seed costs.

Finally, personal and business characteristics of the respondents were included. Type of farming operation and income level were the two variables selected to reflect general characteristics of the respondents. Educational level and age were included in an alternative specification of the model, but were both insignificant and eliminated from the the final model.

The estimated probit model is specified as:

$$SEEDLAW = f(PROB1, PROB2, DISEASE, CERT, REGION_i, SEEDGRWR, INCOME_i, FARMTYPE)$$

Where;

SEEDLAW = 1 if favored a state mandatory seed law, 0 if opposed to the law;

PROB1 = concern about the quality of certified seed and the

certification procedure (1 if concerned about the quality of certified seed, 0 otherwise);

PROB2 = concern about poor quality seed adversely affecting the reputation of Idaho commercial potatoes (1 if concerned that poor quality seed impacts potato quality and adversely impacts the reputation of Idaho potatoes, 0 otherwise);

DISEASE = concern about problems of seed borne disease in the producer's area (1 if any one of 6 seed borne diseases were viewed as a serious problem in the producer's growing area, 0 otherwise);

CERT = current use of certified seed (1 if currently using 100 percent certified seed, either tagged or untagged, for planting potato acreage, 0 otherwise);

$REGION_i$ = region of the state where potato operation is located (i = 1 for the southwest region, 2 for the southeast, and 3 for the south central);

SEEDGRWR = primarily a seed or commercial grower (1 if over 50 percent of potato acreage was grown for seed, 0 otherwise);

$INCOME_i$ = gross farm income (i = 1 for less that $100,000, 2 for $100,000 to $500,000, and 3 for over $500,000);

FARMTYPE = type of farming operation (1 if potatoes generated the majority of farm receipts, 0 otherwise).

Model parameters were estimated using a maximum liklihood procedure employing the Newton-Raphson convergence algorithm. For the two variables with three categories (those subscripted with an i), the final category (i = 3) was excluded in the estimation procedure to eliminate the singular matrix problem.

RESULTS

Estimated model parameters and related statistical information are presented in Table 1. Results indicate a high level of significance for several explanatory variables and the model produces expected signs for the explanatory variables. Predictive capability is quite good, with a percent of correct predictions equal to 73.5 percent and an R-square (Maddala) of 0.23.

The four ideological variables (PROB1, PROB2, DISEASE, and CERT) have the expected signs. PROB1 is negative, indicating that concern about the quality of certified seed tends to reduce support for a mandatory seed law. DISEASE has a positive coefficient, suggesting concern about seed borne disease problems in the producer's area tends to increase support. However, both of these variables have insignificant parameters and impacts on the probability of supporting the seed law are small. The other two ideological variables have the expected sign. Additionally, both are highly significant and have a substantial impact on the probability of supporting the mandatory seed law. PROB2 measures the level of concern about commercial potato quality and its impact on the reputation of Idaho potatoes. Concern about this impact tends to increase support for the mandatory seed law, and the impact on the probability of supporting is substantial (0.299). Current use of certified seed (CERT) also has a significant and positive impact and increases the probability of supporting a mandatory seed law by a sizable amount (0.389).

The location variable representing the southwestern region of Idaho (REGION1) is highly significant and the sign is positive as expected. The southwest part of the state is dominated by contract growers who are generally required by processors to use certified seed. The impact on the probability of supporting the law is, however, quite small (0.038). REGION2 represents the southeast part of the state, which has mostly open market growers. The

Table 1. Maximum Liklihood Estimates from the Probit Model Used to Analyze Factors Influencing Producer Support for a State Mandatory Seed Law in Idaho

Variable Name	Estimated Parameter	Standard Error	T-Ratio[a]	Change In Probability[b]
Constant	- 1.173	0.251	- 4.67***	-
PROB1	- 0.118	0.140	- 0.84	0.043
PROB2	0.768	0.141	5.57***	0.299
DISEASE	0.050	0.034	1.47	0.067
CERT	0.864	0.171	5.05***	0.389
REGION1	0.892	0.278	3.32***	0.038
REGION2	- 0.230	0.125	- 1.84*	0.070
SEEDGRWR	1.364	0.233	5.86***	0.114
INCOME1	- 0.151	0.206	- 0.74	0.008
INCOME2	0.318	0.126	2.52***	0.075
FARMTYPE	- 0.005	0.138	- 0.04	0.002

N = 588
Percent of Correct Predictions = 73.5
Maddala R-Square = 0.23

[a]Tests if the parameter estimate is significantly different from zero (significance at the 10 percent level is indicated by *, and the 1 percent level by ***).

[b]The change in probability is calculated at the mean values. Since all variables are 0-1 in nature, the change in X_i is consistently a 1 unit change.

negative coefficient is as expected, and indicates growers in this region are less likely to support the law compared to the base region (REGION3, or south central). Location consistently has the expected impact on support for the mandatory seed law, but the degree of the impact is relatively small.

The major economic self interest variable is SEEDGRWR, which represents those producers who grow over 50 percent of their potato acreage for seed purposes. Major seed growers produce primarily certified seed and can logically expect to benefit from a mandatory seed law. As expected, this variable has a positive coefficient, is highly significant, and has a relatively large impact on the probability of favoring the seed law (0.114).

Gross farm income is used as a proxy for size. The higher income level (INCOME3 = over $500,000) represents the base. The lowest income level (INCOME1) has the expected negative coefficient, but is not significant. The middle income category (INCOME2) has a positive and significant coefficient. However, the impact on the probability of favoring a mandatory seed law is comparatively small. Whether or not potatoes are the primary source of farm income (FARMTYPE) has an unexpected negative coefficient, but is insignificant and has a minor impact on the probability of supporting a seed law.

SUMMARY AND IMPLICATIONS

Only a few studies have directly analyzed factors influencing producer "voting" behavior regarding important policy decisions. Studies by Mixon *et al* and Halligan are the two studies most closely related to the analysis presented here. The Mixon *et al* study found only the number of growers in the county as significant in determining whether or not growers voted and number of packers in the county as significant in explaining whether they voted for or against the marketing order. Halligan's study suggested economic self interest (size of acreage base and plans to expand hop acreage in the near future) were significant in voting for or against a hop marketing order.

With the exception of specific economic self interest characteristics (for example, being a certified seed grower), factors external to the grower appear to be more important influencers than individual characteristics of the grower. Location, current use of certified seed, and concerns about the impact of poor quality seed on the reputation of Idaho potatoes were primary factors influencing the level of support for a certified seed law. Problems with seed borne disease, income, and farm type were generally insignificant or had a minor impact on the probability of supporting a mandatory seed law.

The original survey indicated that 62 percent of potato producers in Idaho support a mandatory seed law. This is a majority but does not indicate overwhelming support (Guenthner, *et al*). Advocates of the legislation or groups representing the growers may feel additional efforts must be made to strengthen the share of growers favoring a mandatory seed law. If so, this analysis identifies which geographic regions to target (primarily the southeast and south central), identifies certain characteristics of non-supporters (lower and higher income groups and those not currently using certified seed), and suggests issues on which the discussion should focus. Focusing on the potential negative impact that poor quality seed may have on the reputation of Idaho's commercial potatoes appears to be the logical focus. Concerns about seed borne disease appear less important, but may be tied to the quality issue, since some of the diseases affect potato quality as well as yield.

REFERENCES

Amemiya, Takeshi. "Qualitative Response Models: A Survey." Journal of Economic Literature. 19(1981):1483-1536.

Capps, Oral Jr., and Randall A. Kramer. "Analysis of Food Stamp Participation Using Qualitative Choice Models." American Journal of Agricultural Economics. 67(1985):49-59.

Chavas, Jean-Paul and Matthew T. Holt. "Acreage Decisions Under Risk: The Case of Corn and Soybeans." Amer. J. Agr. Econ. 72(1990):529-538.

Dillman, Don A. Mail and Telephone Surveys: The Total Design Method. New York: John Wiley & Sons, 1978.

Edelman, Mark A. and Paul Lasley. "An Analysis of Agricultural and Trade Policy Preferences of Iowa Farm Operators." N. Cent. J. Agr. Econ. 10(1988):245-254.

Guenthner, Joseph F., Rose Krebill-Prather, Larry D. Makus, and John E. Carlson. "Idaho Mandatory Seed Law Survey." Univ. of Idaho, Dept. of Ag. Econ. and Rural Soc., A.E. Research Series No. 90-1, April 1990.

Halligan, W.S. "Contracting Problems and the Adoption of Regulatory Cartels." Econ. Inquiry 23(1985):37-56.

Hanson, Gregory D. and Diane R. Bertelsen. "Tax Reform Impacts on Agricultural Production Decisions." Amer. J. Agr. Econ. 69(1987):1013-20.

Hanson, Gregory D., Henry Kinnucan and Daniel Otto. "Tax Management Costs in Agriculture: Evidence from Iowa and Alabama." N. Cent. J. Agr. Econ. 8(1986):69-82.

Heifner, Richard, Walter Armbruster, Edward Jesse, Glenn Nelson, and Carl Shafer. A Review of Federal Marketing Orders for Fruits, Vegetables, and Specialty Crops: Economic Efficiency and Welfare Implications. Washington DC: U.S. Department of Agriculture, AER-477, November 1981.

Helms, Gary L., DeeVon Bailey and Terrence F. Glover. "Government Programs and Adoption of Conservation Tillage Practices of Nonirrigated Wheat Farms." Amer. J. Agr. Econ. 69(1987):786-95.

Judge, George G., William E. Griffiths, R. Carter Hill, and Tsoung-Chao Lee. Theory and Practice of Econometrics. New York: John Wiley & Sons, 1980

Lee, D.R. and S.J. Tkachyk. "Agricultural Policy and the Politics of Agriculture: An Empirical Analysis of Congressional Voting on Farm Legislation." Dept. of Ag. Econ., Cornell University, 1987.

Lins, David, Susan Offutt, and James Richardson. "Distributional Impacts of the 1986 Tax Reform Act." Amer. J. Agr. Econ. 69(1987):1021-26.

Mixon, Bobby, Steven C. Turner and Terence J. Centner. "An Empirical Analysis of a Marketing Order Referendum for a Specialty Crop." West. J. Agr. Econ. 15(1990):144-50.

Orazem, Peter F., Daniel M. Otto and Mark Edelman. "An Analysis of Farmers' Agricultural Policy Preferences." Amer. J. Agr. Econ. 71(1989):837-846.

Rauser, Gordon C. "Political Economic Markets: PERTs and PESTs in Food and Agriculture." Amer. J. Agr. Econ. 64(1982):821-33.

Rauser, Gordon C. and William E. Foster. "Political Preference Functions and Public Policy Reform." Amer. J. Agr. Econ. 72(1990):641-52

Weersink, Alfons and Wayne Howard. "Regional Adjustment Response in the U.S. Dairy Sector to Changes in Milk Support Price." Western J. Agr. Econ. 15(1990):13-21.