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Factors Influencing Producer Support for a
State Mandatory Seed Law: An Empirical Analysis*

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A.E. Research Series 91-10
June 1991

selected Paper presented at
the ¹⁹⁹¹ WAEA annual meeting
Portland, Oregon July 7-10, 1991

*Research for this article was supported under project 054-K070 of the Idaho Agricultural Experiment Station. Appreciation is expressed to the Idaho Potato Commission for their financial support of this research project.

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Abstract

A probit model identifies characteristics influencing Idaho potato producer support or opposition to a state mandatory seed law. Economic factors seem to be the most important influencers. Current users of certified seed and growers of certified seed are strong supporters of a mandatory seed law. However, factors external to the firm, including location and concern about the reputation of Idaho's commercial potatoes, are also important.

INTRODUCTION

The decision-making process for agricultural producers is influenced by several factors related to the physical, economic, and political environment in which they operate. Policy decisions, at both the state and federal level, are becoming an increasingly important factor impacting agricultural producer decisions. The Farm Bill, marketing orders, and 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 review of such 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 producer's

decision to vote and voting behavior on a Georgia state marketing order for Vidalia onions.

Studies on impacts of taxation programs are generally motivated by a significant change in federal 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.*). Analyzing 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: 1) state policies affecting the behavior of agricultural producers, and 2) 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 (e.g., 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 a state's competitive position (through control orders

mandating specified production practices, organic certification programs, marketing orders, promoting the state's agricultural products in the international market, etc.) is a likely response.

Two influential commodity 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. Bacterial ring rot is one of the more devastating potato diseases. One infected plant or tuber in a seed lot causes the entire lot to be rejected for certification. In commercial potatoes, bacterial ring rot usually causes large yield and storage losses. 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.

DATA

A combination mail and telephone survey of Idaho potato producers was conducted during the 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 individuals and organizations not growing potatoes, 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 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 typically 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 commercial producers (produce potatoes for the food market), seed potato producers, or producers indicating something other than potatoes as their primary source of cash receipts. Seed producers are likely to benefit from a mandatory seed law (most non-certified seed is own-grown seed) due to a higher demand for their seed. Commercial growers will likely have higher seed costs, and producers obtaining the majority of cash receipts from other enterprises are less impacted by changes in the potato industry.

Finally, personal and business characteristics of the respondents were included. Acres of commercial potatoes 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. Both variables were insignificant and eliminated from the final model specification.

The estimated probit model is specified as:

$$\text{SEEDLAW} = f(\text{PROB1}, \text{PROB2}, \text{PROB3}, \text{CERT}, \text{REGION}_i, \text{GRWRTYPE}_i, \text{COMACRES}, \text{INCOME}_i)$$

Where;

- SEEDLAW = 1 if favored a state mandatory seed law, 0 if opposed to the law;
- PROB1 = concern about seed-borne diseases in seed potatoes as a problem within the Idaho potato industry (1 if perceive the problem as serious, 0 otherwise);
- PROB2 = concern about the quality of certified seed and the certification procedure (1 if perceive the problem as serious, 0 otherwise);
- PROB3 = concern about poor quality seed adversely affecting the reputation of Idaho commercial potatoes (1 if perceive the problem as serious, 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);
- GRWRTYPE_i = type of farming operation (i = 1 if over 50 percent of potato acreage is for commercial purposes and potatoes generate the majority of farm receipts; i = 2 if over 50 percent of potato acreage is for seed purposes and potatoes generate the majority of farm receipts; i = 3 for potato producers not receiving the majority of cash receipts from potatoes);
- COMACRES = total acres of potatoes grown for commercial purposes;
- INCOME_i = gross farm income (i = 1 for less than \$100,000, 2 for \$100,000 to \$500,000, and 3 for over \$500,000).

Table 1 provides a summary of the response patterns for each of the variables. Model parameters were estimated using a maximum likelihood 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 2. Results indicate a high level of significance for several variables and the model produces expected signs for the explanatory variables. Predictive capability is quite good, with a percent of correct predictions equal to 75.0 percent and an R-square (Maddala) of 0.253.

The four ideological variables (PROB1, PROB2, PROB3, and CERT) have the expected signs. The coefficient for PROB1 is positive, indicating that concern about the impact of seed-borne diseases within the Idaho potato industry increases the probability of supporting the mandatory seed law. The coefficient for PROB1 is significant, but the change in the probability of supporting a mandatory seed law is the smallest of the four ideological variables. The negative coefficient for PROB2 indicates that as the level of concern about the quality of certified seed increases, support for a mandatory

Table 1. Response Patterns for Variables Included in the Analytical Model Analyzing Factors Influencing Producer Support for a State Mandatory Seed Law in Idaho

Variable	<u>Response Categories</u> (number of respondents) ^a		
SEEDLAW (n)	<u>Support</u> (378)	<u>Not Support</u> (210)	
PROB1 (n)	<u>Serious Problem</u> (63)	<u>Not a Serious Problem</u> (425)	
PROB2 (n)	<u>Serious Problem</u> (224)	<u>Not a Serious Problem</u> (364)	
PROB3 (n)	<u>Serious Problem</u> (206)	<u>Not a Serious Problem</u> (382)	
CERT (n)	<u>Use Certified Seed</u> (507)	<u>Don't Use Certified Seed</u> (81)	
REGION (n)	<u>Region 1 (SW)</u> (44)	<u>Region 2 (SE)</u> (342)	<u>Region 3 (SC)</u> (198)
GRWRTYPE (n)	<u>Seed Grower</u> (79)	<u>Commercial Grower</u> (354)	<u>Other Grower</u> (155)
COMACRES (acres)	<u>High</u> (8100)	<u>Average</u> (410)	<u>Low</u> (27)
INCOME (n)	<u>Less than \$100,000</u> (59)	<u>\$100,000 to \$500,000</u> (266)	<u>Over \$500,000</u> (263)

^aAll variables except COMACRES are categorical in nature and the number of responses in each category is presented. For COMACRES, the range and average size in acres are presented.

Table 2. Maximum Likelihood Estimates from the Probit Model Used to Analyze Factors Influencing Producer Support for a State Mandatory Seed Law in Idaho

Variable Name	Estimated Parameter	T-Ratio ^a	Change In Probability ^b
Constant	- 0.637	- 2.79***	-
PROB1	0.526	3.55***	0.074
PROB2	- 0.312	- 2.30**	0.090
PROB3	0.950	6.64***	0.169
CERT	0.792	4.58***	0.347
REGION1	0.736	2.57**	0.031
REGION2	- 0.237	- 1.86*	0.070
GRWRTYPE1	0.003	0.02	0.001
GRWRTYPE2	1.124	4.31***	0.077
COMACRES	- 0.001	- 1.15	0.023
INCOME1	- 0.256	- 1.20	0.013
INCOME2	0.201	1.50	0.046

N = 588

Percent of Correct Predictions = 73.6

Maddala R-Square = 0.25

^aTests if the parameter estimate is significantly different from zero (significance at the 10 percent level is indicated by *, the 5 percent level by **, and the 1 percent level by ***).

^bThe change in probability is calculated at the mean values. All variables except COMACRES are 0-1 in nature, implying the change in X_i is a one unit change. For COMACRES, the change is one acre.

seed law decreases. The sign of PROB2 is as expected and the parameter is significant. The impact of PROB2 on the probability of supporting a mandatory seed law is slightly larger than PROB1, but still well below the other ideological variables. PROB3 has a positive coefficient, suggesting concern about how seed-borne disease problems may adversely impact the reputation of Idaho's commercial potatoes tends to increase support. The parameter for PROB3 is highly significant, and the variable has a substantial impact (0.169) on the probability of supporting a mandatory seed law. The last ideological variable (CERT) has a positive sign as expected. Current use of 100 percent certified seed tends to raise the level of support for the mandatory seed law. Additionally, the parameter is highly significant and has the largest impact on the probability of supporting the law (0.347).

The location variable representing the southwestern region of Idaho (REGION1) is 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, however, is quite small (0.031). REGION2 represents the southeast part of the state, which has mostly open market growers. The negative coefficient 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 economic self interest component is related to type of grower. Commercial growers (GRWRTYPE1) and seed producers (GRWRTYPE2) are analyzed relative to producers indicating something other than potatoes as their primary source of cash receipts. As expected, results indicate seed producers tend to support the mandatory seed law. Major seed growers produce primarily

certified seed and can logically expect to benefit from a mandatory seed law. This variable (GRWRTYPE2) has a positive coefficient, is highly significant, but does not have a large impact on the probability of favoring the seed law (0.077), especially when compared to some of the ideological variables. Being a commercial grower (GRWRTYPE1) does not have a significant impact on the mandatory seed law relative to the base group.

The two measures of farm characteristics (COMACRES and INCOME) have the expected sign, but are not significant and the impact on the probability of supporting the law is small. COMACRES represents the number of acres of commercial potatoes, and the coefficient is negative. Larger commercial producers are more likely to use their own seed. Being required to purchase certified seed or certify their own seed will represent a substantial increase in costs. Thus, the larger commercial growers tend to not support a mandatory certified seed law. With regard to farm income, 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 coefficient, but is also insignificant. The impact on the probability of favoring a mandatory seed law is comparatively minor for both income categories.

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 of a referendum on an onion marketing order found only the number of growers in the county as significant in determining whether or not growers voted. The number of packers in the county

was significant in explaining whether they voted for or against the marketing order. Halligan's study suggested economic self interest indicators (size of acreage base and plans to expand acreage in the near future) were significant in voting for or against a hop marketing order.

With the exception of a specific economic self interest characteristics (being a certified seed grower), factors other than individual grower characteristics appear to be more important. Location (which likely reflects the impact of contractual requirements), 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. Producer concerns about seed-borne disease (PROB1), concerns about the certification procedure (PROB2), acres of commercial potatoes, and income were generally insignificant or had a minor impact on the probability of supporting a mandatory seed law.

From a broader perspective, this analysis tends to support other evaluations of "voting" behavior by producers that suggest policy preference is determined by economic self interest (Halligan, *Mixon et al*, *Orazem et al*). Conceptually, such results lend support to economic models which predict voting behavior, response to policy changes, and eventual welfare impacts based on profit maximizing behavior of producers. However, results also suggest factors external to the producer can have significant impacts. In this analysis, the concern about long run impacts of poor quality seed on the reputation of Idaho commercial potatoes was a major factor influencing support for a mandatory seed law. Even though this factor can eventually impact individual producer profitability, it doesn't represent the type of variable traditionally used in profit maximizing economic models. Additionally, the region impact (which was hypothesized to reflect the requirements of

contractors) suggests marketing procedures may play an important role in producer voting behavior.

From the perspective of the Idaho potato industry, 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, larger commercial producers, and those not currently using certified seed), and suggests issues on which the discussion should focus. 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 many seed-borne diseases affect potato quality as well as yield.

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