An Analysis of Farmers' Agricultural Policy Preferences: An Ordered Probit Approach

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While apparent interest and innovations in agricultural issues typically intensify before the drafting of comprehensive farm policy legislation, the mix of policy tools adopted are selected from a relatively finite array of policy options (Cochran; Boschwitz; Harkin). The broad range of diverse agricultural interests and options available makes consensus on a policy framework or reform improbable. Understanding who supports various policy proposals and under what circumstances those preferences change would be helpful to policymakers and analysts in assessing likely support and in developing strategies to alter support. This paper develops a theoretical model, empirical strategy, and an analysis of results for one data set to provide this understanding.

In recent years, there have been several surveys of farmers' opinion on government agricultural policies. Typically, the results of these surveys are reported as the proportion of all respondents who support a given policy initiative (Guither et al.; Jordan and Tweeten). Some analysts have disaggregated farmers into groups and then have reported the level of support for the policies within each group (Zulauf et al.; Coughenour and Christenson; Padgitt and Lasley). Others have focused on correlation between policy preferences and socioeconomic variables (Edelman and Lasley; Lasley et al.). While these studies provide much information, they have left three important questions unanswered. There is little understanding of why or how farmers form

their opinions, whether distinctive groups of farmers hold certain preferences and how farmers' opinions will change in the future.

Studies that concentrate on average responses of farmers in a given group or correlations may yield misleading interpretations because other factors are not held constant. Group averages, in particular, may disguise heterogeneity of farmers within the group. For example, if farmers with gross farm income above $200,000 are defined as a group, there may be considerable variation in gross farm income and in farmers' opinion that is not accurately captured by the group mean.

Here we attempt to solve the methodological and theoretical difficulties encountered in previous studies of farmers' opinions on agricultural policy.

I. THEORY

We assume that farmers face a range of potential government agricultural policies. A farmer will support policies that are expected to benefit him relative to the expected value of the alternative policies. A farmer will oppose policies whose relative expected benefits are negative. A farmer will be indifferent or uncertain about policies that are expected to be neither beneficial nor harmful relative to alternative policies. Alternatively, one could say that a farmer will be indifferent toward policies whose expected benefits relative to the policy alternatives are not significantly different from zero.

We assume that farmers attempt to maximize the present value of profit from their operations. If this is correct, then farmer support of various government policy alternatives should be subject to the same type of rent-seeking behavior that is commonly assumed in derived input demand or output supply applications.

To begin, suppose that there are n possible mutually exclusive governmental policies that might potentially be applied in agriculture, $S_1, S_2, \ldots, S_n$. Each of these policies has an associated probability of implementation, $P_1, P_2, \ldots, P_n$, such that $P_1 + P_2 + \ldots + P_n = 1$. The expected present value of profit conditional upon the implementation of policy S_1, evaluated in period zero will be:

$$(1) \quad E\left(\sum_{t=0}^{T} B^t \Pi_{1t} | \Omega_o\right) = \Pi^1(\Omega_o)$$

where E is the expectation operator, B is the discount factor, $0 < B < 1$, Π_{1t} is the profit under policy S_1 at time t, and Ω_o is the information set the operator has upon which to base his expectations of future profit at time zero.

We can construct an expected present value of profit under all possible policies as:

$$(2) \quad \Pi^o(\Omega_o) = P_1\Pi^1(\Omega_o) + P_2\,\Pi^2(\Omega_o) + \ldots. + P_n\Pi^n(\Omega_o)$$

so that the farmer's unconditioned expected profit will be the weighted sum of the conditional expected present values of profit under each policy, with the probability of policy i's occurrence being the weight associated with $\Pi^i(\Omega_o)$.

If a farmer supports an individual agricultural policy, it must be because he expects that the present value of profit under this particular policy significantly dominates his current expected present value of profit, $\Pi^o(\Omega_o)$. Alternatively, the farmer will be indifferent to a policy if its expected present value is not significantly different from $\Pi^o(\Omega_o)$ and will reject a policy if its expected present value is

significantly less than $\Pi^{o}(\Omega_{o})$. In the longer version of this paper, we demonstrate that this theoretical model can be approximated by the empirical specification:

$$(3)\quad Y^{i} = 0 \text{ if } -\infty < \gamma^{i}X + \upsilon^{i} < \mu_{1}^{i}$$

$$Y^{i} = 1 \text{ if } \mu_{1}^{i} < \gamma^{i}X + \upsilon^{i} < \mu_{2}^{i}$$

$$Y^{i} = 2 \text{ if } \mu_{2}^{i} < \gamma^{i}X + \upsilon^{i} < +\infty$$

Y^{i} is an indicator variable with zero meaning opposition, 1 meaning indifference and 2 meaning support for policy S_{i}, X is a vector of variables believed to be in the information set, Ω_{o}, and γ^{i} is a vector of parameters whose elements are interpretable as the effect of a given exogenous variable on expected profit under policy S_{i} relative to the unconditional expected profit. The set of equations (3) show that a farmer will oppose a policy if the difference in expected profit falls in the range $(-\infty, \mu_{1}^{i})$, be indifferent to a policy if the difference in expected profit falls in the range $(\mu_{1}^{i}, \mu_{2}^{i})$, and support a policy when the difference in expected profit is greater than μ_{2}^{i}.

If the error term υ^{i} is distributed normally, (3) is an ordered probit specification. The estimated coefficients can be used to assess what types of farmers support a given policy. A positive and significant coefficient implies that the factor significantly increases profits under the policy. Farmers with large endowments of this factor will form a natural constituency in favor of the policy. Similarly, a negative coefficient implies that holders of the factor will form a natural constituency in opposition to the policy.

II. DATA

Data for estimating the model are taken from the Farm Finance Survey of Iowa farm operators conducted in March of 1987 (Edelman and Olsen). In addition to the demographic and financial-status variables, farmers' preferences about four agricultural policy positions were also collected. These options include: a) continuing the current program with minor revisions, b) adopt mandatory supply controls if approved in a referendum, c) move to a market-oriented policy by decoupling, and d) target financial assistance to farmers experiencing the most severe financial stress. The possible range of responses to these options are: a) agree, b) not sure, and c) disagree. The sample consists of 515 households. The age and farm size distribution of the respondents were similar to those in the Census of Agriculture for Iowa and were judged to be representative of commercial farm operators (Edelman and Olsen). The variable definitions and descriptive statistics are contained in Table 1.

III. EMPIRICAL RESULTS

Maximum likelihood probit estimates of the reduced form equations for the four agricultural policy options are presented in Table 2. The regressors were all rescaled to lie between -10 and 10 to help the estimation converge. The ordered probit procedure estimates were obtained using LIMDEP.

Generally, the results indicate that various groups with specific views are more distinguishable for two of the four policy options: targeting assistance to financially stressed farmers and the mandatory supply controls in relation to their unconditional estimates. This is

suggested by the higher number of significant coefficients for the various variables in these alternatives. The other two policy options examined in this model, continuing current programs and decoupling had less identifiable camps of support or opposition as indicated by fewer significant coefficients. Still, the Chi-Squared test of the null hypothesis that none of the variables explained farmers' opinions on policy was easily rejected in each equation.

The computed response elasticities indicate that farm support for the existing farm program is very insensitive to changes in farm financial position or farm characteristics. The percentage change in the probability of support from a ten percent change in the various exogenous variables exceeds one percent for only one variable, years on farm. The support for decoupling is also quite insensitive, with only three variables resulting in responses that exceed one percent in absolute value. In contrast, support for mandatory controls and targeting to fiscally stressed farmers has consistently higher elasticities, although no response is larger than 10 percent.

The analysis of the mandatory control and targeting options provides the most interesting results. The mandatory supply control option seeks to increase farm prices and returns by reducing planted acres. Larger farms would have a larger production base and would receive a proportionately larger benefit from any price increase. Our results indicate that with other variables held constant, Iowa farms with larger acreages support mandatory controls, although farmers with

higher gross farm income and net worth tended to oppose this option. Farmers with livestock operations tended to oppose mandatory controls. Less-educated farmers and their spouses tended to support mandatory controls. This is consistent with the hypothesis that individuals with higher levels of human capital will prefer policies that increase decision-making flexibility, thus making human capital more important. Increasing levels of farm stress were also associated with increasing support for mandatory controls, although not at a significant level.

There were also several very identifiable characteristics of supporters for targeting financial assistance to the more severely stressed farm operators. As the degree of financial stress increases, the degree of support for targeting increases significantly. Curiously, higher gross farm income was associated with increased support for targeting, but higher net worth decreased support. The effect of net worth was more significant with an elasticity nearly twice as large as the effect of gross farm income. Also interesting was that more experienced farmers tended to support targeting fiscal stress. Apparently the tendency of farmers with shorter time horizons to prefer policies aimed at short-term profits outweighs the tendency of those with more human capital to support policies allowing more flexibility. More-educated farm spouses supported targeted benefits but more-educated farmers opposed the policy.

There are fewer identifiable groups supporting or opposing the option for decoupling. Farmers supporting decoupling tend to have fewer acres but have a higher net worth relative to those farmers who are

opposed to this option. The paucity of significant identifiable support or opposition to the decoupling option may be because the proposal was too new and not yet understood so that many farmers may have not yet formed firm opinion on the policy's impact on profitability. The relatively high 23 percent of farmers undecided suggests that many are still seeking information on the option.

The only significant coefficient in the regression explaining support for the current program is the negative effect on support of the number of dependents. Even in this case, the elasticity is extremely small. While our results suggest that there is some measurable lack of constituent support for the current program, it also means that there is no significant identifiable camp of opposition.

The results from this section provide an economic rationale for why farmers tend to support different types of farm policies. The most striking finding from this analysis is that farm support for the existing farm programs is virtually insensitive to changes in farm financial position or farm characteristics. While support for mandatory controls and targeting of program benefits to financially stressed farmers has consistently higher elasticities, none is larger than the 10 percent change in a given factor. The implication is that large changes in farm characteristics or financial position would be required to alter farmers' opinions significantly away from existing programs.

The results of a test for consistency in policy preferences strongly support the conjecture that there exist strong and consistent camps of support (and, hence, opposition) for all the policy alternatives considered. The test was performed by adding the predicted probability that the farmer would support the three alternative policies to each equation. Evidence that farmers supporting a given policy are a unique group exists if increasing the predicted probability of supporting alternative policies decreases support for the given policy. All but one of the coefficients on the predicted probabilities are negative, the exception being a positive but insignificant effect of the probability of accepting mandatory controls on the expected relative profitability of decoupling. On the other hand, significant negative effects on decoupling support occur as the probability increases of accepting either targeting financial stress or continuing the existing program. Similarly, predicted support for decoupling significantly reduces support for continuing the existing program, predicted support for targeting aid or decoupling significantly reduces support for mandatory controls, and predicted support for decoupling is significantly negatively correlated with support for targeting financial stress. These results are reported in the long version of this paper.

IV. SUMMARY AND IMPLICATIONS

This study developed a theoretical model of farmers' opinion formation, which relates a farmer's support or opposition on a policy option to the farmer's expected profit from the policy. The empirical test of the model yielded many interesting results. Among these, we found that a farmer's financial circumstance strongly influences his/her

policy opinions, as does the size of his/her operation. A farmer's education, farm experience, and type of operation also influence his/her opinions. In most cases, the pattern of support for a given policy is consistent with expectations concerning how the policy will affect a farmer's profits.

The results show that farmers' support of mandatory controls or targeting fiscal stress are relatively sensitive to changes in farmers' economic and personal characteristics but that support for the existing farm program is virtually insensitive to these changes. The implication is that large general increases in farm fiscal stress or large general reductions in farm net worth would be necessary to shift farm opinion away from the current program and toward an alternative farm program.

The results also show the existence of identifiable and distinct camps of support for and against alternative farm policies. Increasing the probability that a farmer supports a given policy reduces the probability that the farmer will support the alternative policies. This result further supports the conclusion that it will be difficult to shift support away from the current program. Farmers who favor targeting, not only oppose the existing program, but also oppose mandatory controls and decoupling as well. This implies that it would be difficult to build a constituency against the existing program by uniting farmers who prefer any specific alternative.

Table 1. Mean, Standard Deviation, and Definition of Variables Used.

DEPENDENT VARIABLES

	0	1	2	Definition
DECOUPLE	.236	.345	.419	Support for decoupling benefits with 0=oppose, 1=indifferent, and 2=support
CONTPROG	.158	.283	.559	Support for continuing current programs with 0=oppose, 1=indifferent, and 2=support
TARGETFS	.473	.287	.240	Support for targeting benefits to financially stressed farmers with 0=oppose, 1=indifferent, and 2=support
MANDCONT	.557	.242	.201	Support for mandatory supply controls with 0=oppose, 1=indifferent, and 2=support

INDEPENDENT VARIABLES

	Mean	Standard Deviation	Definition
EDUC ≤ 12	.541	.498	Dummy variable equal to one for farmers with a high school education or less
SPOUSE EDUC ≤ 12	.466	.499	Dummy variable equal to one if the farmer's wife has a high school education or less
YRS ON FARM	29.82	11.36	Years in farming
CROPS	.564	.337	Proportion of farm gross returns from crops
LVSTK	.334	.322	Proportion of farm gross returns from livestock
DAIRY	.029	.119	Proportion of farm gross returns from dairy
FINST2	.228	.42	Dummy variable equal to one for farmers in moderate financial stress category
FINST3	.144	.351	Dummy variable equal to one for farmers in financially stressed category
FINST4	.109	.312	Dummy variable equal to one for farmers in the financially insolvent category
ACRTOT	466.5	327.14	Total acres in farm operation
GFI	128,210	116,940	Gross farm income in 1986
ACRPERC	.679	.916	Proportion of total acres owned
OFF86	10,859	13,339	Off-farm income in 1986
DEP18	.847	1.28	Number of dependents under 18
NW87	253,100	240,260	Net worth of farmer in Jan. 1987

Table 2. Parameter Estimates and Standard Errors of Variables Associated with Farm Policy Decisions[a/]

	DECOUPLE	CONTPROG	TARGETFS	MANDCONT
CONSTANT	.9063**	.9028*	-.9201**	.0431
	(.4306)	(.4714)	(.4413)	(.4296)
EDUCATION ≤ 12	-.0482	.1073	.1424	.2930**
	(.1244)	(.1290)	(.1263)	(.1278)
SPOUSE EDUCATION ≤ 12	.0167	-.1326	-.2326*	.0096
	(.1208)	(.1257)	(.1232)	(.1220)
YRS ON FARM	-.0125	.0652	.2052***	.0397
	(.0500)	(.0624)	(.0612)	(.0620)
CROPS	-.3881	-.0954	.2418	-.1832
	(.3858)	(.4278)	(.4119)	(.3868)
LVSTK	.0610	-.3318	.2271	-.6395*
	(.3861)	(.4285)	(.4014)	(.3836)
DAIRY	.8540	-.5738	-.1465	.3080
	(.5674)	(.6358)	(.5650)	(.5664)
FINST2	.0144	-.0127	.3040**	-.1014
	(.1376)	(.1415)	(.1375)	(.1461)
FINST3	.0250	-.1359	.6447***	.0080
	(.1706)	(.1719)	(.1650)	(.1708)
FINST3	.2660	-.0676	.8242***	.2526
	(.1945)	(.1911)	(.1966)	(.1975)
ACRTOT	-.4878**	.2683	.0556	.6167**
	(.2422)	(.2168)	(.2523)	(.2613)
GFI	.0222	.0477	.1277*	-.1970**
	(.0723)	(.0604)	(.0741)	(.0932)
ACRPERC	.0148	-.0097	.0218	.0032
	(.0808)	(.0641)	(.0678)	(.0657)
OFF86	.0546	.0025	.0013	-.0274
	(.0435)	(.0478)	(.0437)	(.0473)
DEP18	.0139	-.1057**	.0687	-.0259
	(.0514)	(.0524)	(.0553)	(.0564)
NW87	.0621*	.0199	-.1185***	-.0629*
	(.0355)	(.0316)	(.0331)	(.0369)
μ_2	.9605***	.8919***	.8646***	.7399***
	(.0622)	(.0682)	(.0635)	(.0599)
Log-likelihood	-532.84	-484.28	-498.77	-484.5
Chi-Squared (15)	32.791***	29.099***	82.86***	46.949***

[a/] Standard errors in parentheses. μ_1 set = 0 as a normalization restriction.
* Significant at .10 level.
** Significant at .05 level.
***Significant at .01 level.

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