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A Model to Explain Participation in New York's Agricultural Districts and Use-Value Assessment Program

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ABSTRACT

Based on regression models, the New York Agricultural Districts Law seems consistent with preserving the best farmland because farm size and productivity explain participation. Growth in tax rates and differences in property tax administration explain participation in use-value assessment, indicating tax base erosion as local governments become more dependent on property taxes.

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Since WWII, states and localities have given increased attention to policies and programs designed to mitigate the effect of population growth and economic development on commercial agriculture. These initiatives most often deal with property tax relief for farmland owners but extend to the formation of agricultural districts, purchases or transfers of development rights, right to farm laws and agricultural zoning (NASDA).

Many programs are voluntary but little attention has been given to the factors which condition a landowner's participation. However, recent advancements in statistical methods allow analysts to deal with participation decisions of this kind through binary choice models. Kramer and Pope, for example, examined participation in conventional commodity programs. Capps and Kramer and Ranney have studied food stamps, while participation in the farmers-owned reserve and the dairy diversion programs have been studied by Chambers and Foster and Lee and Boisvert.

In this paper, such models are estimated to investigate factors which influence decisions to enroll farmland in New York's agricultural district program and its attendant provisions for agricultural-value exemptions to local property taxes. The results provide a systematic view of the factors which influence New York's farmland protection efforts and set the stage for evaluation of similar programs in other states. Today, 49 states provide for use-value assessment; 13 of them are experimenting with the creation of agricultural districts (NASDA). Since programs vary by state, this analysis begins with a review of the New York legislation.

Agricultural Districts Legislation

The New York Agricultural Districts Law was enacted in 1971 to protect and encourage the development and improvement of agricultural lands (New York Agricultural and Markets Law §300). Agricultural districts, the formation of which are initiated by landowners who prepare proposals that encompass a minimum of 500 acres, facilitate retention of farmland by: (a) restricting the spending and police power options open to local governments whose boundaries overlap those of the districts; (b) requiring state agencies to alter administrative regulations that otherwise might adversely affect agriculture and (c) limiting the ability of governmental units to impose benefit assessments or special levies on farmland within a district.

The Law allows owners to pay taxes on land's value in an agricultural use. Owners of 10 or more acres which generated average gross sales of at least $10,000 in the preceding two years may make application for use-value assessment of their farm land.[1] If land receiving an exemption is converted to a non-agricultural use, a rollback tax is applicable to converted land to the lesser of the preceding five years or the number of years during which use-value assessments were levied.

Response to the Law from the agricultural community was immediate. Initial proposals led to the creation of 19 districts, involving 173,000 acres; 800,000 acres were added during 1973. By 1982, over 6.7 million acres (22% of New York's land area) were in districts. County legislatures often ratify districts having contiguous boundaries, implying that land other than farmland is in districts. Based on data from the Department of

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[1] The benefit actually is an exemption equal to the tax due on the difference between the assessed value and the use value, multiplied by an equalization rate. Owners not in a district willing to commit land to agriculture for eight years can also apply for the exemption (Gardner).

Agriculture and Markets and the State Division of Equalization and Assessment (E&A), the proportion of farms with sales above $10,000 in districts averaged 60% in 1982 and ranged from zero to nearly 100% (E&A, 1984a). For 51 upstate counties, an estimated 59% of the cropland in farms with sales above $2,500 was in an agricultural district.

In sharp contrast with efforts to create districts, the Law has led to relatively few use-value tax exemptions. In 1977, an estimated 4,000 tax parcels received exemptions (King). By 1982, the number of exemptions had risen to about 14,700 (E&A, 1984b, p. 154) but this is only 9% of the State's farm parcels. The full value of exempt parcels is estimated at $1.2 billion; exemptions total about $352 million or 29% of value.

The Participation Decisions

New York farmland owners are confronted with two separate choices; the decision to put the farm in an agricultural district (AD) and the decision to seek use-value exemptions from property taxes (UVE). As suggested above, there are potential benefits to both actions, although they are more tangible in the case of the UVE. Costs incurred are in terms of foregone opportunities for non-agricultural land uses and the tax roll-backs or penalties associated with premature conversion to another use.

Following Chambers and Foster, the decision to participate in an AD or seek a UVE may be formulated as a binary choice by comparing the utility of non-participation with that of participation. The utility of non-participation for the ith individual is $u_i^0 = F(y_i^0, x_i)$, where y_i^0 is a vector of attributes related to the farm business which are associated with non-participation; x_i is a vector of socio-economic and other characteristics that affect utility. The utility of participation is $u_i^1 = F(y_i^1, x_i)$, where y_i^1 are the farm business characteristics measured at their

values under participation in either AD or UVE. The utility maximizing landowner will participate in one or the other programs or both only if $F(y_i^1, x_i) - F(y_i^0, x_i) > 0$. The two decisions are examined separately because it is possible to participate in UVE without being in an agricultural district and vice versa. The decision to participate in UVE may be influenced by the AD decision, primarily because the rollback provisions etc. are less severe if the land to which the exemption applies is in an agricultural district. This hypothesis is tested below.

A number of other factors could contribute to farmers' decisions to participate in agricultural districts and apply for an agricultural value exemption. One purpose of the legislation was to insulate agricultural operations from government actions in localities where agricultural and non-agricultural interests conflict. Statistical models explaining participation must reflect non-agricultural pressure as well as those characteristics of the local government that affect the incentive to participate. This latter issue is particularly important for the use-value exemption, the benefits from which are in direct proportion to the local government's reliance on the property tax to finance services. These considerations might well be reflected in an overall tax rate, some measure of fiscal capacity or government spending per capita.

Non-farm growth and competition for land may lead to increased land values that, when reflected in the assessments for agricultural land, will increase the financial incentive for participating in use-value assessment. Additionally, one can take advantage of a use-value exemption only if the assessed value of the property is greater than the equalized use value. Since officials in some New York localities work with outdated tax rolls, this is more likely in jurisdictions undergoing a revaluation. Revaluation

can entail disproportionately large increases in assessed value on agricultural land (Boisvert, Bills and Solomon).

Other factors are likely to affect participation. All else equal, one could expect landowners situated on the very best agricultural land to be more likely to join agricultural districts to preserve the long-term potential for agriculture. In marginal farming areas, there may be little incentive to commit land to agricultural uses for an extended period. This tendency could be reflected in measures of land quality, productivity, profitability or scale of operation. Finally, the socio-economic characteristics of the farmers may be important. Age, for example, certainly is related to how long an individual plans to remain in farming, but it could affect an attitude toward participation in any government programs.

Procedures and Sources of Data

If farm level data were available, the utility functions and (0/1) decisions discussed above could be reexpressed for estimation by using logit or probit models. Unfortunately, data for New York are only available for population subgroups in each county, and the use of a qualitative choice model is restricted to predicting the probability of a given choice for groups, each assumed to be composed of identical individuals.[2] For large samples, Pindyck and Rubinfeld (p. 290) show that the estimated parameters of the regression equations are unbiased and consistent.

Lee and Boisvert used this approach to examine the milk diversion program, where the dependent variable was the proportion of farmers participating. However, in this study, the available data show the proportion of cropland in agricultural districts and the proportion of agricultural tax

[2] This assumption is certainly an oversimplification of reality, but is one that is common to most aggregate studies of this kind.

parcels receiving the use-value exemption. Obviously, farmers own more than one acre and often have their land divided into more than one tax parcel; on an individual basis, they can participate at different levels. However, in the aggregate, the results should remain unaffected if, for each county, one treats the decision to place each acre in a district or to request a use-value exemption on each parcel as binary choices made by many farmers assumed to be identical.

Following this line of reasoning, the dependent variable related to participation in agricultural districts is the proportion of cropland in districts in 1982 (CLD82). Another alternative would have been to examine the proportion of farmland in districts but one could legitimately argue that concentrating cropland in districts is of greater interest to policy makers. About 38% of all New York farmland is not used for crop production (U.S. Department of Commerce).

There are two alternative measures of involvement in use-value assessment. The first is the proportion of all agricultural tax parcels receiving an exemption (EXPAR), while the second is the proportion of the full value of agricultural property that is removed from the tax rolls by the exemption (EXVAL). The first measure reflects most directly the participation decision. The proportion of the value that is exempt is indirectly related to participation and is of interest to local governments, particularly those in rural areas where agricultural property is an important component of the total property tax base. These two variables, however, could certainly be related to one another in the sense that the size of the exemption may influence the decision to participate.

The county-level data on these three dependent variables and the several independent variables came from a variety of sources.[3] They are listed in tables 1 and 2, along with the estimated equations.[4]

Empirical Results and Policy Implications

The empirical results are promising. Over 50% of the variation in the dependent variable was explained in each model; with few exceptions, the coefficients on the explanatory variables have the expected sign and the t-ratios are high, many of them over 2. In all cases, there was little difference among the performances of the linear model and the logit and probit transformations. Thus, only the linear and probit models are used to evaluate use-value assessment.

From a methodological perspective, the proportion of cropland in agricultural districts was included as a variable in explaining participation in use-value assessment.[5] When the actual observations were used, the coefficients were positive as expected and the t-ratios were robust. However, if one views the two participation decisions recursively by

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[3] The three dependent variables (denoted P_i, i=1,...,3) can be estimated by a linear regression as a function of exogenous variables which are expected to influence the participation decision. In a linear probability analysis, P_i is problematic because the predicted values, $\hat{P}_i$ may lie outside of the permissible [0,1] range. To avoid this problem, a transformation $\log [P_i/(1-P_i)]$ based on the cumulative logistic probability function and a probit transformation, assuming the probabilities are from the cumulative normal probability function, are also used.

[4] In six of New York's 52 upstate counties, there were no use-value exemptions. They could not be in the logit and probit models. Three counties contain little or no agriculture, and the other three are in sparsely populated Northern New York. Some analysis is limited to the remaining 46. Preliminary analysis with the linear model, however, suggested the results were largely unaffected by the omission.

[5] The equations for EXVAL and EXPAR were also estimated as a system in the event that there was a correlation between the error term across equations. The results had little effect and are not reported.

Table 1. Regression Models for Participation in New York's Agricultural Districts Program, 1982

Independent Variables[a]	Dependent Variable: CLD82[a]					
	Linear[b]		Logit[b]		Probit[b]	
	coef.	t-ratio	coef.	t-ratio	coef.	t-ratio
Intercept	-0.040	-0.302	-3.429 [-0.357][c]	-4.562	-1.908 [-0.263]	-4.508
AVCPA82	0.083	2.548	0.640 [0.160]	3.424	0.342 [0.137]	3.250
VASAPA82	0.346	2.346	2.124 [0.531]	2.518	1.203 [0.481]	2.532
TAXRT81	0.003	0.716	0.026 [0.007]	1.099	0.013 [0.005]	1.004
FED2	0.105	2.329	0.508 [0.127]	1.968	0.305 [0.112]	2.100
FED4	0.144	3.693	0.577 [0.144]	2.591	0.365 [0.146]	2.909
R^2	0.523		0.512		0.521	

[a]The variables are defined as follows (county observations for 51 of New York's upstate counties): CLD82 = proportion of 1982 cropland in agricultural districts (unpublished data from New York State Department of Agriculture and Markets); AVCPA82 = 1982 cropland (100 acres) per farm with sales > $2,500 (U.S. Department of Commerce, 1984); VASAPA82 = 1982 value of sales ($1,000) per acre, for farms with sales > $2,500 (U.S. Department of Commerce, 1984); TAXRT81 = taxes collected for all purposes/$1,000 full value of real property, the latest year for which tax data were available (New York State Office of the Comptroller); FED2 and FED4 = dummy variables for two of five agricultural regions defined by the USDA for generating farm budgets (Giardina and Dyke).

[b]The three models are the linear probability model, a logit transformation and a probit transformation on the dependent variable.

[c]Numbers in brackets are the approximate linear probability equivalent coefficients as described by Madalla (p. 23).

Table 2. Regression Models for Participation in New York's Use-Value Assessment Program, 1982

Independent Variables[a]	Dependent Variable: EXPAR[a]								Dependent Variable: EXVAL[a]					
	Linear[b]				Probit[b]				Linear[b]		Probit[b]			
	coef.	t-ratio	coef.	t-ratio	coef.	t-ratio	coef.	t-ratio	coef.	t-ratio	coef.	t-ratio	coef.	t-ratio
Intercept	1.001	1.105	-0.488	-2.205	-0.496 [0.302][c]	-0.114	0.005 [0.520]	0.001	0.302	0.897	-1.667 [-0.167]	-0.466	-4.831 [-1.432]	-5.487
AVCPA82	-0.110	-1.635			-0.322 [-0.133]	-1.006			-0.051	-2.063	-0.303 [-0.121]	-1.152		
FAVAGE82	-0.026	-1.544			-0.070 [-0.028]	-0.885	-0.087 [-0.035]	-0.968	-0.008	-1.331	-0.049 [-0.020]	-0.758		
POPCG80	0.008	2.415	0.009	2.742	0.030 [0.012]	1.961	0.032 [0.013]	1.934	0.003	2.636	0.025 [0.010]	2.016	-0.026 [0.010]	2.054
TAXRT81	0.012	1.549	0.016	2.250	0.041 [0.016]	1.160	0.060 [0.024]	1.658	0.005	1.763	0.037 [0.015]	1.255	0.511 [0.204]	1.786
EQRATE	0.163	2.136	0.213	2.654	1.116 [0.446]	3.065	1.138 [0.455]	2.737	0.045	1.626	0.671 [0.268]	2.244	0.657 [0.263]	2.052
LRA5	0.331	4.028	0.325	3.719	1.101 [0.440]	2.811	1.265 [0.506]	2.776	0.167	5.505	0.902 [0.361]	2.800	0.899 [0.360]	2.540
SMSANC	0.048	0.747			0.051 [0.020]	0.164	0.194 [0.078]	0.570	0.018	0.768	0.066 [0.026]	0.258	0.133 [0.053]	0.495
CLD82	0.411	1.962	0.045[d]	0.150	3.241 [1.30]	3.240	0.896[d] [0.358]	0.621	0.137	1.775	2.485 [0.994]	3.025	1.799[d] [0.720]	1.472
R^2	0.619		0.532		0.619		0.515		0.683		0.572		0.480	

[a]These variables are county observations for the 46 New York upstate counties with at least one exempt parcel for use-value purposes in 1982. EXPAR = 1982 proportion of agricultural tax parcels partially exempt under use-value assessment; EXVAL = 1982 proportion of value of land and buildings on farms with sales > $10,000 that is exempt from property taxes (E&A, 1984a,b); FAVAGE82 = average age of farm operators, farm with sales > $2,500; POPCG80 = % population change 1970-80 (U.S. Department of Commerce, 1982); EQRATE = assessed value of real property/full value of real property (E&A, 1984a,b); LRA5 = dummy variable for land resource area 144 as defined by the Soil Conservation Service (Giardina and Dyke). SMSANC = SMSA counties excluding those containing the SMSA central city. Other variables are from table 1.

[b]A linear probability model and probit transformation on the dependent variable, respectively.

[c]See footnote c, table 1.

[d]Predicted CLD82, from table 1.

incorporating the predicted value of CLD82 in the equations for EXPAR and EXVAL, the model's performance deteriorates markedly. This probably reflects the fact that only about 50% of the variation of CLD82 is explained by the models in table 1.

In explaining participation in agricultural districts, the important variables are related to farm size and productivity. Two dummy variables representing USDA farm budget production regions are important. Across the three models, a 10-acre increase in cropland per farm would increase the proportion of cropland in districts from between 0.008 (0.8%) to 0.016 (1.6%). Productivity increases, as measured in $10 of farm sales per acre, would increase the proportion of cropland in districts by from 0.003 (0.3%) to 0.005 (0.5%). Neither the overall county tax rate nor any of the other variables reflecting urban pressure or fiscal capacity was important in explaining the proportion of cropland in districts.

The results from the equations explaining participation in use-value assessment are in stark contrast to those for district participation. The important factors in both measures of participation are related to development pressure and fiscal capacity. In counties where population grew more rapidly during the 1970-80 period, participation in the use-value assessment program as measured by EXPAR, increased by between 0.8% to 1.3% for a 1% increase in population, depending on the model (0.3% to 1.0% for EXVAL). The SMSANC variable was included to test the hypothesis that interest in use-value assessment might be higher in those SMSA counties adjacent to counties with central cities that are growing but still have important agricultural sectors. This variable was not important on its own, but when omitted, the t-ratio on other variables dropped.

The equalization rate was also a "significant" factor in participation, lending support to the hypothesis that taxing jurisdictions going through revaluation could expect increased numbers of exemptions. In most of the model specifications, the overall tax rate per $1,000 of full value has an important effect on both the proportion of parcels exempt and exempt value. All else equal, this appears to confirm the hypothesis that farmers do consider the magnitude of the monetary benefits in committing their land to agricultural uses for some period of time.

The effects of agricultural productivity and farm size on participation are less clear. The dummy variable LRA5 is associated with the Hudson Valley between Albany and metropolitan New York City and could reflect urban pressure about as much as differential land productivity. However, it is important to note that productivity measures do not contribute to an explanation of participation in use-value assessment. One reason is that these factors could be reflected indirectly through the inclusion of the variable CLD82.[6] Furthermore, there is no evidence which suggests that assessed values of agricultural land in New York are tailored to differentials in land productivity. Our results can be interpreted to mean that all else equal, the incentive to participate in UVE may be no higher in counties with good land compared with counties with marginal farmland.

The coefficients on the two remaining variables in the equations are not particularly stable across the specifications. The negative effect of farmers' age is consistent with <u>a priori</u> expectations, although some might think that participation in use-value assessment ought to be directly (rather than inversely) related to farm size. Certainly the case for a

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[6] This implication would be more conclusive if more of the variation in CLD82 had been explained by the models in table 1, so that the predicted CLD82 would have performed better in these models.

positive relationship is not as strong here as it is in the case of participation in agricultural districts. The instability of the results may be due to having CLD82 as an explanatory variable as well.

From a broader policy perspective, these results have direct implications for farmland retention efforts geared toward use-value assessment for farmland and farmer initiatives to create agricultural districts. The analysis strongly suggests that such programs are consistent with an objective of protecting the highest quality farmland in that enrollment in districts is directly and positively related to farm size and land productivity. These factors, therefore, also explain indirectly the attractiveness of use-value assessment, although it is apparent that short-term monetary gains associated with the exemption (which is directly related to property tax rates and equalization rates) are important considerations in applying for use-value exemptions. Thus, as local governments become more dependent on the property tax, public officials can look forward to some additional erosion of the tax base via tax preferences for agricultural land. This is also true for taxing jurisdictions that are undergoing revaluation in an attempt to correct tax inequities that are known to exist across property classes in many outdated tax rolls.

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