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Property Tax Distortions and Participation in Federal Easement Programs: An Exploratory Analysis of the Wetlands Reserve Program

Gregory L. Poe

Higher property taxes and uncertainty about post-easement tax levels may create a disincentive for landowners to participate in federal easement programs such as the Wetlands Reserve Program, and thus may distort participation levels in a manner inconsistent with the environmental benefits associated with individual parcels. Support for this hypothesis is provided in an exploratory analysis of state level participation in the Wetlands Reserve Program. If such distortions prove to be policy relevant, then either they should be accounted for in the bid acceptance process of future federal easement programs, or individual states and localities should correct property tax differentials and post-easement tax uncertainty.

Environmental policy through the late 1990s and into the next century will be shaped by competing societal demands. On one hand, public support for the environment has broadened and proven to be an issue of enduring concern (Dunlap 1995). Combined with the emergence of the New Federalism, this increased interest has led to greater environmental policy interventions at all levels of government (Lester 1995; Ringquist 1993). Tempering this broad-based environmental support are ever-present concerns about budget constraints, benefit-cost relationships, and takings issues.

This tension is evident in policies to protect and restore wetlands, of which, at the national level, 83% are on privately-owned land (Wiebe and Heimlich 1995). Despite apparent public support for wetlands protection (Environmental Opinion Studies, Inc. 1991; Roper 1992; USDA/NRCS 1995) and a national political goal of ending wetlands loss, recent data suggest that wetlands continued to disappear at a net rate of 177,000 acres

per year from 1985 to 1995 (Cushman 1997). Notably, the U.S. Fish and Wildlife Service estimated that over this period, 965,000 acres were converted to agricultural lands. Continued loss of wetlands acreage in the face of public support for protection might signal pressure for greater regulations. However, public support for regulating private wetlands without compensation has been mixed (Roper 1992; Hart 1994; Duda, Young, and Graham 1995), and efforts in Congress and the courts are presently challenging existing wetlands protections. As Wiebe and Heimlich (1995, p. 13) argue, "political realities have encouraged a shift towards positive incentives to protect and restore wetlands." These incentives include easement programs, which have long been used in targeted priority areas such as the prairie pothole region, and have more recently been extended nationally through the Wetlands Reserve Program (WRP).

Voluntary easement approaches have many desirable features in light of the current policy situation, and thus offer a potential area of future policy expansion. Such "partial interests" provide a way to influence private land use without incurring the "political costs of regulations or the full financial costs of outright land acquisition" (Wiebe, Tegene, and Kuhn 1995, p. 629; 1997). Voluntary easement programs also offer the potential for targeting enrollment towards the most environmentally important parcels by using appropri-

Gregory L. Poe is an assistant professor in the Department of Agricultural, Resource, and Managerial Economics at Cornell University.

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verted and farmed wetlands. While this figure represents only about 1.5% of hydric cropland in the contiguous United States, it approximates the estimated wetlands acres converted to agricultural uses in the last decade. Congress reaffirmed support for this voluntary easement approach in the Federal Agricultural Improvement and Reform Act of 1996 (the 1996 Farm Bill) by continuing the WRP through 2002. In 1992, the USDA initiated a nine-state pilot program to enroll 50,000 farmed wetland acres in California, Louisiana, Iowa, Minnesota, Mississippi, Missouri, New York, North Carolina, and Wisconsin. In 1994, this pilot program was expanded to twenty states, and then to all fifty states in 1995 and subsequent years. Through 1995, over 284,000 acres had been enrolled in the program, and agricultural demand for the program had greatly exceeded enrollment caps.

WRP enrollments have varied widely across states. For example, of the states involved in all of the 1992–95 signups, Louisiana had the highest acres enrolled/acres eligible ratio of 2.7%. This relatively high proportion contrasts with Minnesota's low acre enrolled/acre eligible rate of 0.05%. To some extent, this divergence in enrollment reflects the bid acceptance criteria used by the USDA, but it is also significantly correlated with the number of acres submitted by landowners for enrollment consideration ($r = 0.47$).¹ Divergence in submission rates across states may also be attributed, in part, to constraints imposed by the timing of the signup period, the agricultural systems in the region, and the topographical features of the agricultural land and wetlands (American Farmland Trust 1993). Submission rates are also likely to be dominated by individual and parcel-specific comparisons of the opportunity costs with the expected benefits of participation.

In choosing whether to submit a land conservation program, a utility maximizing landowner should compare the stream of net returns and “intangible” benefits and costs of maintaining the land privately (Pr) with those of enrolling (E) in the program. Net returns should not only include standard financial returns (R), input costs (C), restoration cost sharing (RC), and easement payments (P) as has been done in past evaluations of land-use decisions, but should also separately consider relative property taxes (PT) under privately held and enrollment scenarios. In addition, farmers will have their own perception of net intangible (I) ben-

efits and costs of enrolling in the program: enrollment might impose perceived costs associated with loss of sovereignty as well as personal benefits associated with fulfilling altruistic and stewardship motives. Conceptually this comparison might be depicted in a simple, discrete time framework:

$$(1) \quad \sum_{T=0}^T \left(\frac{1}{1+i} \right)^T * f(R_T^{Pr} - C_T^{Pr} - PT_T^{Pr}, I_T^{Pr}) \\ \geq \sum_{T=0}^T \left(\frac{1}{1+i} \right)^T * f(R_T^E - C_T^E - PT_T^E \\ - (1-\gamma)RC_T^E + P_T, I_T^E),$$

where T indicates the time period, i is a relevant discount rate, $f(\cdot)$ is an aggregation and expectation function, and γ indicates the federal cost-sharing proportion. In this simple model, the landowner would hold the land privately if the opportunity costs of doing so, as depicted on the left-hand side of the equation, exceeded the discounted stream of net benefits associated with participation on the right-hand side of the equation. Changes in relative return and cost flows would shift the likelihood of enrolling in obvious directions.

Importantly, property taxes appear on both sides of the equation, and thus have the potential to exert both a positive and a negative influence on participation. The prominence of agricultural property taxes in land use decisions has long been recognized in the use value or farmland assessment literature as a tool to slow agricultural land conversion to developed uses (Anderson and Bunch 1989; Parks and Quimo 1996), and as a “carrot” in localized conservation programs (Smith 1994). Yet property taxes have almost universally been ignored in economic analyses of participation in the WRP (Heimlich, Carey, and Braze 1989; Heimlich 1994; Parks and Kramer 1995; Parks, Kramer, and Heimlich 1996).

A dominant effect of property taxes on easement application decisions may be isolated by imposing simplifying assumptions that correspond to program characteristics. In the WRP, one such assumption is the requirement that the easement payment cannot exceed “the fair market value of the same type of agricultural land in the county or parish” (Iowa State University Extension 1992). Under capitalization value theory, the fair market value should approximate the discounted stream of private, *after tax*, returns to the property. As such, equation (1) reduces to a comparison of a function of intangible benefits associated with maintaining the land privately, and the discounted stream of benefits and costs (excluding the easement payment) of maintaining the conservation easement:

¹ This correlation coefficient is based on WRP applications and acreage enrolled in the first year the program was offered in each state. See discussion below for using these data.

$$\begin{aligned}
 (2) \quad & \sum_{T=0}^T \left(\frac{1}{1+i} \right)^T * f(I_T^{Pr}) \\
 & \geq \sum_{T=0}^T \left(\frac{1}{1+i} \right)^T * f(R_T^E) \\
 & < C_T^E - PT_T^E - (1-\gamma)RC_T^E, I_T^E.
 \end{aligned}$$

Note that revenues and costs are now absent from the left side of the equation and easement payments are no longer present on the right side. Under this fair market value assumption, the effect of property taxes will be unambiguous. Regardless of prior tax levels on the unencumbered land, the higher the easement tax burden, the less likely a landowner will be to participate in the program. While this result may seem counterintuitive, focus group studies and one-on-one interviews indicate that post-easement property taxes are of practical concern to potential and actual participants. A multistate Soil and Water Conservation Society study conducted after the 1992 Wetlands Reserve Pilot Program concluded that "economic concerns were overriding in the minds of many focus-group participants who opted to withdraw from the program. These concerns related to ongoing property tax and maintenance obligations" (Soil and Water Conservation Society 1994, p. 7).

For those participants who remained in the program, "nearly all expressed concern about the ongoing obligation to pay property taxes on land that offered little potential for generating any significant income (Soil and Water Conservation Society 1994, p. 9). A Natural Resources Conservation Service-commissioned study in New York similarly found that those who withdrew from the program "did so because they did not consider the easement payments and the tax breaks worthwhile" (Chan et al. 1996, p. 13). The reformulation in equation (2) also demonstrates that participation decisions will depend highly on intangible motives—a factor that is widely ignored in conservation planning (see Prato et al. 1996). It appears to be the case that individual landowners either are subsidizing public environmental benefits associated with wetlands or are finding other personal benefits associated with restoration worthwhile.

In the above formulation, post-easement property taxes are depicted as a known value in the participation decision. While there is little quantitative evidence documenting how individual states and localities will tax wetlands conversions, there are indicators that assuming certainty about post-easement taxes is erroneous. In general, there is not a standard formula for assessing the value of conservation easements, and such assessments are nei-

ther always fair nor guaranteed (Stockford 1990). Specific to the WRP, participants apparently have a great degree of uncertainty about the implications of enrollment on their property taxes (Soil and Water Conservation Society 1994). Valuation tends to proceed on a case-by-case basis, varying by tax unit as well as the use and management practices on the converted and adjacent land. Moreover, in spite of promotional materials suggesting that property assessments (e.g., New York State Soil and Conservation Services 1992) and thus property taxes (e.g., Iowa State University Extension 1992; Soil and Water Conservation Society 1994) are reduced, limited evidence suggests that WRP lands are not receiving a reduced assessment. In a survey of twenty-two New York WRP participants, for example, Chan et al. (1996) found that only one participant had realized a reduced property assessment. Other factors contribute to increased uncertainty about post-easement taxes. Continuing with the New York example, the uncertainty associated with having the wetlands parcel revalued is compounded by the fact that assessors may also offset any reductions in use value associated with wetlands by updating, and perhaps adjusting upward, the value of the assessment on the remaining property (New York State Department of Environmental Conservation 1990). It is also important to note that even if uniform assessment is adopted, tax rates can vary substantially by locality, implying differential assessments and participation rates within the state.

In all, easement property taxes can best be regarded as having a distribution, rather than a single known value. Under the assumption that increases in the spread of the distribution are mean preserving, such uncertainty will reduce the expected utility of participation. Indirectly, this will have the effect of lowering participation incentives. In lieu of precise knowledge about the level of post-easement assessments, it is assumed here that taxes on restored wetlands will vary across states in proportion to the current level of agricultural land taxation. In other words, in making their enrollment decisions, landowners believe that their taxes will be a fixed proportion ($d = PT_T^E/PT_T^{Pr}$) of their current assessed value, regardless of region. Although this assumption is a simplistic approach adopted here for the purpose of assuming away the impact of easement tax uncertainty on participation decisions, it is argued that such an assumption is reasonable for cross-region comparisons. It is unlikely that the property assessment of wetlands will be driven to zero, even when this land is placed under a permanent conservation easement. Establishment of an easement does not necessarily pre-

clude economic activity (e.g., hunting, fishing, other recreation, and silviculture) as long as the proposed use is consistent with the long-term protection and enhancement of wetlands resources for which the easement was established and federal funds expended (Federal Register 1996). And, as indicated above, many parcels are not reassessed following the easement. As such, regions with higher private land tax rates might reasonably be assumed to have higher restored wetlands tax rates on average.

Based on this fixed proportion assumption that d is a constant, a wide variation in post-easement taxes is expected across states. As indicated in figure 1, the average agricultural tax rates relative to land values very substantially across states. In Wisconsin, for instance, the average tax per hundred dollars of full market value in 1994 was \$2.00 as compared with \$0.08 in Delaware during the same period. In capitalized terms, the respective values for Michigan and Delaware translate to \$40.00 and \$1.60 per hundred dollars of value ($i = .05$). Given that the average value of land in the contiguous forty-eight states was \$574 in 1994 (Wastenbarger and Barnard 1997), these differential impacts of property taxes across states could be substantial.

Differential Property Taxes and Participation: Evidence from State Level Participation in the 1992–1995 WRP

The hypothesis that there is a relationship between state enrollment in the WRP and relative tax rates is supported using tax data provided in figure 1, enrollment information and soils data provided by the USDA Economic Research Service, and linear regressions relating participating acres (as a proportion of hydric cropland in the state) to property tax rates and total hydric acres. To minimize spurious effects that may be associated with wide variation in land values and development opportunities across states, the rates are expressed on a \$/100 value basis. Thus, the tax values used here are not directly affected by their development opportunities, which would affect the expected opportunity cost of land in equation (1). To further concentrate on the tax effects, other variables remaining in equation (2) are assumed to not vary systematically across states included in the regressions. Although done to facilitate the analysis, such assumptions may be realistic. For example, Heimlich (1994) suggests that while wetlands restoration costs vary widely across regions, such variance is attributed to the extent of drainage installed rather than inherent regional differences. Similarly,

there is little reason to expect that the relative stream of revenues, costs, and intangible features will vary systematically by state.

Efforts to estimate relationships between enrollment and property tax are complicated by the sequential nature of the WRP introduction. Ideally, a cross-state comparison would have a consistent starting point, independent of prior enrollment efforts and individual decisions with respect to this program. Such a pure decision situation only existed for the first nine states enrolled in the 1992 Wetlands Reserve Pilot Program, which would provide an extremely limited set of observations. Another alternative might be to assume that the program has reached a mature equilibrium level of annual enrollments. But clearly the limited number of signups to date and the likelihood of time dependency preclude that approach. Facing these data limitations, two necessarily ad hoc formulations are relied upon here. The first examines only the acreage of WRP applications for the first year the program was offered in each state. Thus, for example, if a state did not participate in the 1992 program but was included in the 1994 and 1995 signups, only the data from 1994 would be used. In part, this was done because information about repeat submissions across years is limited. Focusing only on the first available year for signups in each state creates a relatively comparable individual decisionmaking framework across states and years. The second approach uses average annual enrollment in each state for the 1992–95 signups as the dependent variable. Binary year variables for 1992 and 1994 are included in each approach to adjust for any year specific effects.

As demonstrated in table 1, significant regressions were obtained from simple ordinary least squares models containing only tax rates, hydric crop acres, and years as explanatory variables. More important, the estimated coefficients are significant and of the expected sign. The negative coefficient on relative levels of taxation corresponds with the conceptual framework above. Similarly, the negative coefficient on total hydric crop acres is consistent with the hypothesis that there are institutional limitations on the amount of extension education that could be conducted prior to the signup periods and on the amount of land that could be processed by overburdened field offices.

Similar regression results were obtained for the ratio of average enrolled acres to total eligible acres as the dependent variable. Recall, however, that enrolled acres will depend not only on landowners' decisions to bid, but also on the acceptance selection process, of which the bid price and environmental benefits are instrumental in the

Table 1. Property Value Taxation and Participation in Federal Easement Programs: OLS Results for the 1992–95 WRP

Dependent Variable	Obs.	R ² F	Constant	Tax/\$100 Value of Farmland ^b	Total Hydric Crop Acres ^c [,000,000]	Binary Variable 1992 WRPP	Binary Variable 1994 WRP
Acres submitted/total hydric cropland acres, 1992–95 “first year” programs ^a	39	0.25 2.77**	0.038*** (0.008)	−0.020** (0.007)	−0.0037* (0.0020)	0.014 (0.009)	−0.008 (0.008)
Acres enrolled/total hydric crop land acres, average of all years ^a	39	0.22 2.33*	0.0057*** (0.001)	−0.0023* (0.001)	−0.00053** (0.00026)	0.00076 (0.0014)	0.00022 (0.0013)

NOTE: *, **, and ***refer to significance levels of 10%, 5%, and 1% respectively, using two-tailed t-tests. Numbers in parentheses are standard errors.

^aOf the 48 contiguous states, this analysis excluded states that did not have any WRP enrollement in 1992–95 (AZ, FL, ND, NM, NV, RI, UT, WV). Oklahoma was also excluded as an outlier in this analysis because its reported ratio (1.96) of hydric to nonhydric acres far exceeds the average of 1.09 across all 48 contiguous states. The next highest ratio is 1.30 (MT).

^bSource: Wastenbarger and Barnard 1997.

^cSource: USDA ERS 1992, as adapted from Soils-5 NRI data.

ranking formula that divides a “wetland score” by the easement and restoration costs (Thompson 1993). Thus, the dependent variable will depend upon factors beyond those presented in equations (1) and (2). Nevertheless, the results are consistent with the hypotheses launched in the model and reflect the findings for the submitted acres. This further lends support to the suggestion that individual decision factors will systematically affect enrollment patterns in easement programs.

While the relationships demonstrated in the statistical analysis are suggestive, they remain speculative. Correlation does not imply causation, and there are likely to be a number of relevant variables omitted in this simple analysis (just as property taxes have been omitted in previous research). For example, in the 1992 WRP, standing crops in Iowa made site work relatively difficult in that state, while the relatively high cost of surveying required to delineate wetlands was felt acutely in California (American Farmland Trust 1993). Characteristics of wetlands themselves may also affect participation rates in the sense that wetlands in some states such as Louisiana might be of a more contiguous nature than wetlands in Minnesota. Finally, the winnowing of the variables in the equations is admittedly ad hoc. Nevertheless, the current analysis does support the hypothesis that property taxes have a negative effect on participation decisions. Should such a finding be supported by future research, this has some potentially important policy ramifications if society is to rely on easements as a primary conservation tool of private environmental resources.

Discussion

With the New Federalism and continued public support for environmental protection, it is expected that intervention in agricultural land use decisions will continue, and perhaps expand, at all levels of government. Greater coordination across policy levels needs to be taken in order to assure that conflicting signals are not sent. To an extent, recent federal actions indicate that this policy interdependence has been explicitly recognized in various forms for some of the more visible nonpoint source pollution programs. For example, the Environmental Protection Agency’s proposed strategy on the management of nonpoint source pollution includes “top down” provisions to help states in developing better enforceable environmental tools, such as NPDES/SPDES permits for animal agriculture (Bureau of National Affairs 1997). An alternative “negotiating” strategy between individual states and federal agencies to develop state-specific watershed protection programs has been utilized under the 1990 Coastal Zone Act Reauthorization Amendments (Poe 1995). A more “collaborative” approach is being used by the USDA and Maryland in coordinating Conservation Reserve Program funding with the goals and funding of the state of Maryland’s Chesapeake Bay program (USDA 1997b). Beyond these highly visible programs, the results from this analysis suggest there is a more subtle, yet perhaps pervasive, need to ensure that interventions are incentive-compatible across policy levels, even for policies that do not appear to be directly related.

More specifically, the results from this analysis suggest that property taxes create a disincentive for participation in federal easement programs. To the extent that environmental benefits are not correlated with tax rates, then such tax distortions could cause deviations from the objective of maximizing national environmental benefits. Should future research demonstrate that property tax distortions cause policy relevant diversions from optimal distributions of land conversion in the absence of property tax distortions, then future policy design of federal easement programs should acknowledge the role of property taxes in state participation levels. At the federal level, minimal regional enrollment acreage might be established in order to assure interregional equity and to maximize environmental benefits. However, as Heimlich (1994) has demonstrated, this will have a substantial upward impact on per acre enrollment costs. Thus, it is questionable if the additional costs of ensuring regional enrollments would cause a deviation from the 1996 Farm Bill mandate of "maximizing the environmental benefits" per federal dollar expended. A second, equally costly, "second best" federal alternative might be to explicitly account for post-easement taxation in evaluating and ranking bids, or for states to supplement financial incentives for enrollment as Maryland has done. Finally, the federal agencies and the states might work together to directly reduce such property tax distortions and to establish more a priori certain levels of post-enrollment land values and taxation levels. In particular, individual states might consider providing a tax holiday or otherwise reduce property tax uncertainty on enrolled lands. Such an incentive program has been suggested to be particularly effective in encouraging landowners who are land-rich and cash-poor to participate in easement programs (Stockford 1990). State-level property tax intervention, if permitted by the state's constitution, could serve a secondary purpose of relieving fiscally burdened localities, and might also be consistent with agricultural property tax relief proposals being considered in several states (Harvey 1997). Along these lines, states such as Wisconsin, Michigan, and New York may need to consider how the adoption of circuit breakers that cap property tax obligations relative to income levels affect participation decisions.

The simple exploratory analysis of property tax/easement relations is also intended to signal a need for researchers and policymakers to identify the incentive compatibility of policies at all levels. The concern that policies create conflicting environmental incentives has been widely discussed within policy decision levels (Runge 1994; Lynch

and Smith 1994; Poe 1997). This paper suggests that it is necessary to extend this concern across policy levels. Thus, the analysis raises a challenge to future research in the design of easement programs, but also extends to all land use decisions affected by multiple levels of intervention. Much research is warranted in order to answer basic questions concerning critical financial and "intangible" factors affecting participation/non-participation decisions and to better design mutually incentive compatible programs across policy levels.

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