The Conservation Movement:
Success Through the Selection and Design of Local Referenda

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Abstract

The American electorate demands more conservation. From 1998 to 2006 there were over 1,550 state, county, or municipality ballot measures targeting open-space, wetlands, and forest conservation, of which almost 80% were successful. We analyze which local jurisdictions are most likely to place land-preservation initiatives on the ballot, as a function of local demographics, land uses, and political factors. In addition, we analyze the outcomes of these initiatives, again as a function of these factors as well as initiative-specific details such as financing mechanisms. Our model controls for the selective nature of the sample, both in terms of which communities hold referenda and in terms of which types of referenda they vote on. To do so, we employ a polychotomous sample selection estimator not previously used in this literature.

We find that more educated communities, with fewer children, and voting democratic in presidential elections are more likely to hold and/or vote in favor of open space referenda. We also find that communities are more likely to support referenda financed with bonds, even after controlling for the self-selection of financial mechanisms. Additionally, we find that referenda are more likely to occur in ecologically sensitive areas, though, once on the ballot, there is no evidence that referenda in these areas are more likely to pass. Finally, we find that referenda are indeed occurring in communities where they are most likely to be successful. Taken together, these latter two findings suggest that land trusts as a group, whether by design or by some "invisible hand," are pursuing a successful strategy to protect ecosystem services.

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> You know, if one person, just one person [walks in and sings 'Alice's Restaurant'] they may think he's really sick and they won't take him…. And if three people do it, three, can you imagine, … [t]hey may think it's an organization. And can you, can you imagine fifty people a day, I said fifty people a day walking in singing a bar of 'Alice's Restaurant' and walking out. And friends they may thinks it's a movement....
> —Arlo Guthrie

I. Introduction

From 1998 to 2006, 1550 referenda for the conservation of open space appeared on state, county, and municipal ballots across the United States. Of these, nearly 80 percent passed. By the standards of Arlo Guthrie's "Alice's Restaurant Massacree," we are witnessing a movement. The movement is widespread and encompasses every level of government and over 40 states. And it continues apace, with 134 measures totaling over $29 billion passing in 2006. As noted by Nelson et al. (2006), expenditures authorized through these referenda outpace the Conservation Reserve Program by about 50 percent.

These referenda address a variety of conservation objectives, including the preservation of agricultural lands; the preservation of ecologically valuable wetlands, meadows, and woodlands; and the creation of new recreational areas. Moreover, the sources of these referenda are quite diverse: some stem from popular support at grass-roots levels and others are top-down initiatives introduced by elected officials.

Upon first glance, the support these measures receive at the ballot box is striking. Not only do the vast majority of referenda pass, most do so by a wide margin. Although most only require a simple majority for passage, the median measure receives approximately 60 percent of the vote. What does this support reveal about the electorate's preferences for open space? Which communities support open space protection at the ballot box, and what characteristics of referenda (e.g. bond vs. tax financing) are most appealing to voters? In this paper, we address these questions using the "Land Vote" data set collected by the Land Trust Alliance and the Trust for Public Lands. Our data set comprises all known US open space referenda from 1998 to 2006, and includes information on the financing mechanism, specific designations for funds (e.g. parks and recreation trails vs. farmland), the level of funds to be authorized, and the vote outcome. We match the "Land Vote" data to US census attributes of the community, county-level land use and agricultural data, data on the presence of endangered species, and political variables.

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These additional variables enable us to test hypotheses about which communities are protecting open space.

A second set of questions surrounds the extent to which we can extrapolate the results from the jurisdictions with a referendum to other communities that have not had one. Does the past success of the referenda held to date imply that referenda in other communities would experience similar success? Can we infer that because bond-financed referenda have fared better than tax-financed referenda that the same pattern is to be expected in the future?

To make such inferences is to assume implicitly that referenda occur in a random sample of communities and, likewise, that the financing mechanism is randomly selected. But in fact, these decisions are the result of careful planning. Environmental organizations are likely to target the most promising jurisdictions for conservation referenda. Some, like The Conservation Fund and The Trust for Public Land, have even published manuals that provide detailed guidance on "the how and where" of designing and introducing conservation referenda (Hopper and Cook 2004, McQueen and McMahon 2003). Under such circumstances, communities that hold referenda—and indeed referenda of a particular type—may differ systematically from other communities. Accordingly, we cannot simply take the results from the referenda in our sample as being representative of attitudes or preferences for the country as a whole. The potential for selection bias is too great.

We use a generalized Heckman approach to control for selection bias. Following Dubin and McFadden (1984), we employ a multinomial logistic model of the probability of each community to hold a referendum and, conditional on this decision, the probability of choosing one of three financing options (bond, property tax, or other). A function of these predicted probabilities is used in a second stage regression of referenda outcomes on referenda and community characteristics to control for selection bias.

Non-parametric identification of such selection models requires the presence of variables in the selection equation that are excluded from the outcome equation. We include two sets of identifying variables: state fixed effects and county level voter turnout in the 2000 presidential election. The former captures state signature requirements and other election laws as well as state-level fiscal arrangements and the latter captures political activity, conditional on ideology and party allegiance.

We find that more educated communities, with fewer children, and voting democratic in presidential elections are more likely to hold and/or vote in favor of open space referenda. We also find that communities are more likely to support referenda financed with bonds, even after controlling for the self-selection of the form of finance. Additionally, we find that referenda are more likely to occur in ecological sensitive areas, but, once on the ballot, find no evidence that referenda in these areas are more likely to obtain a more favorable vote. Finally, we find that referenda are indeed occurring in communities where they are most likely to be successful. Taken together, these latter two findings suggest that land trusts as a group, whether by design or by some "invisible hand," are pursuing a successful strategy to protect ecosystem services.

II. Discussion of Research Questions and Previous Research

Our research questions can be divided into two sets, related respectively to the characteristics of communities that hold and pass referenda and to the characteristics of a referendum's design which makes it successful.

With respect to the first set of questions, communities holding and passing open space referenda may differ from other communities in local land uses and household demographics. For example, areas with less open space, or that are losing more open space over time, might be more likely to hold and pass referenda. In terms of demographics, if land conservation is a normal good, we would expect richer communities to be more likely to do so.

A jurisdiction's rate of homeownership is another important factor, and one which is particularly intriguing. In theory, households will vote to support a particular referendum if the stream of conservation benefits provided over time outweighs the stream of costs. As a first approximation, both renters and owners could vote in accordance with this rule. In addition, however, if a referendum has high net benefits, it by definition makes the community passing the referendum a more desirable place to live, relative to other communities.[1] This would increase the demand for living in that community, which would in turn increase land and housing prices. Existing owners would capture this appreciation, and thus be more likely to vote for the measure than would be renters. This logic applies to any public good, but land conservation is a special case, with additional affects. By definition, land conservation also reduces the supply of land available for development, providing a second pathway to rising land values benefiting existing landowners, irrespective of any real public good (Fischel 2001). For these reasons, we might expect communities with high ownership rates to be more likely to hold and pass referenda.

Local land prices are another characteristic of communities, in this case one with offsetting effects. On the one hand, the marginal cost of any conservation proposal is a function of local land prices, so that where land is more expensive, preserving a given amount of open space is more costly. Higher costs could potentially reduce support for conservation measures. On the other hand, land prices are generally higher precisely in those areas where open space is being lost to urban sprawl or, in other words, where conservation of open-space is most needed. When interpreting the role of land prices on referenda, these two offsetting effects must be carefully considered.

Such relationships between community characteristics and the presence or success of referenda may evolve organically, but they may also be exploited by planners. Indeed, the Trust for Public Land points out in its *Conservation Finance Handbook* (Hoper and Cook 2004) that "the first step [in planning a referendum] is to find out precisely who lives and votes in your community" (p. 22). These demographic characteristics of the residents, including their ages, incomes, education, and rates of homeownership, can have

[1] But see Heintzelman (2006) for negative evidence with respect to this premise.

much to do with their predisposition toward conservation issues. Accordingly, our research can also be viewed as an assessment of how well land trusts are targeting communities for conservation.

The second set of research questions relates the characteristics of the referenda to its success. For example, the precise purpose of the referendum, whether to provide recreation, to preserve historic sites, or to protect water quality for instance, may hold differing levels of attraction to residents. In this way, the referenda can provide additional evidence on the public's conservation priorities, supplementing information currently available from surveys (Kline and Wichelns 1996, Rosenberger 1998).

Another critical feature of any conservation measure is the proposed method of finance. Local property taxes or bond issues have funded most of these measures, but in some instances, local governments have turned to increments to local sales taxes or even income taxes. Some states, Massachusetts and New Jersey in particular, have provided matching grants that supplement funds raised locally.

The choice between local property taxes and the issuance of bonds raises intriguing issues. If a community pays for the program with an increase in current property tax levies, it pays the cost immediately. With bond finance, the community borrows the needed funds but takes on the obligation to repay these funds at a future time. The future tax liability associated with the bond issue, however, is now attached to local property, and the current market value of local residences and businesses should be reduced accordingly. Thus, in either case, the cost is immediately borne by property owners.[2]

It is tempting to leap to the conclusion that residents should be indifferent between property taxes and bond financing, under a kind of "fiscal equivalence" analogous to the more famous Ricardian equivalence for national finance (Barro 1974). Kotchen and Powers (2006), in related work on conservation finance, have assumed such equivalence. Banzhaf and Oates (2007) show in a companion paper that capitalization of future debt obligations does *not* necessarily imply community indifference. Briefly, if households are net borrowers and if they borrow at higher interest rates (at the margin) than local governments, then households can use government fiscal policy to smooth their consumption on more favorable terms. In other words, they would prefer the government to do the borrowing rather than to be taxed and adjust to the taxes by borrowing at a higher, personal rate. And in fact, governments do tend to obtain lower interest rates than those available to consumers, because of their power of taxation and because of favorable tax treatments. Thus, any observed preference for bond financing is not inconsistent with rational behavior.

Finally, the interaction between the characteristics of communities and characteristics of referenda is another area deserving further exploration. For example, if renters do not

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[2] Renters will presumably pay these costs eventually, though whether they perceive these costs is a matter of debate, as is the speed at which rental rates do in fact adjust. Renters' preferences for these two finance instruments, relative to other instruments such as sales taxes (which do not discriminate based on land ownership), is thus another issue.

believe that property taxes or real estate transfer taxes will fall on them, they may be more likely to vote for referenda using such financing mechanisms. They may also be more likely to borrow money for larger up-front purchases, especially if they do not intend to live in the community for a long period. Poor or retired households with lower current income may be more likely to vote for referenda employing income taxes. Farmers might be more likely to vote for referenda designed to preserve farmland, and so forth.

Contemporaneous with our project, four other research teams have addressed some of these questions using the land vote data set.[3] In the first of these efforts, Kline (2006) has estimated a simple logit model of the probability of a community approving its referendum. He finds that more urban, richer, and more educated communities are more likely to approve their referenda. Interestingly, he also finds that communities in counties with a large share of federal ownership of lands are less likely to pass referenda, even after controlling for regional fixed effects. Presumably, this signals that existing conservation is a substitute for, rather than complement to, additional open space. Sundberg (2006) extends such analysis to account for the level at which a referendum passes, rather than merely a 0/1 indicator for passing. Sounding a theme consonant with our own results, he focuses on the importance of land trusts in the shaping of conservation referenda, finding that communities with such trusts are more likely to pass open space measures.

As well as studying national outcomes, Kotchen and Powers (2006) offer a more extensive analysis of referenda in New Jersey and Massachusetts, two active states in this area. For these two states, they estimate both logit models of the propensity to hold a referendum and outcome equations, linking them together via a Heckman-type selection model. Kotchen and Powers find that larger and growing communities are more likely to hold referenda. They suggest that less dense communities have greater problems with sprawl and, hence, a higher demand for open space protection. Other characteristics correlated with the propensity to hold open space referenda include fewer children, higher ownership rates, and losses in open space. Similar factors explain the success of referenda once held, as does the finance mechanism, with bonds preferred to taxes, and the jurisdiction, with county-level referenda faring better than municipal-level referenda. In their state models, they find no evidence of selection on unobservables (so that the Heckman selection term is insignificant).

Finally, Nelson et al. (2006) re-estimate these equations for municipalities nationwide, also jointly estimating the propensity to hold referenda and the outcomes of those referenda using a basic Heckman model. They find that larger communities, with lower population density, higher income, and higher education were more likely to hold referenda. They also find that 1990-2000 growth in the housing stock of the surrounding county (a proxy for loss of open space) increased the probability of holding a referendum. Housing ownership decreased the probability. Many of the relationships found in

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[3] For other studies of referenda, see also Kahn and Matsusaka (1997), Kline and Wichelns (1994), Vossler and Kerkvliet (2003) and Vossler et al. (2003).

Kotchen and Powers hold in their outcome equation. They also find that referenda dedicating existing revenues to open space were the most likely to pass, with bond financing second and tax increases the least likely to pass. They did not find that descriptors related to the purpose of the referendum (farmland preservation, recreation, watershed protection, etc.) had any substantial influence on outcomes.

Like Kotchen and Powers, Nelson et al. did not find that controlling for sample selection with a standard Heckman (1979) model affected their results. However, both papers' treatment of selection has limitations. First, neither paper provides exclusion restrictions in the model—variables which affect only the selection probability and not the outcome conditional on selection. Without such exclusion restrictions, the model is identified solely from the functional form assumption of a joint normal error for the two equations. Yet both papers have some variables, such as the finance mechanism, which appear in the outcome equation but not the selection equation. This treatment implicitly imposes the restriction that finance mechanisms are randomly assigned to referenda. That is, there is no systematic selection of referenda of particular types.

Our research expands on these efforts in several respects. First, we explore the selection issue further by expanding the scope of the selection model. In particular, we allow for endogenous selection of the financing mechanism, as well as the presence of the referendum itself. As discussed in more detail below, we also identify the selection equation non-parametrically through exclusion restrictions. In addition, we use this work to evaluate the performance of land trusts in targeting communities for conservation. Second, we use the most comprehensive and up-to-date referenda data available, using nine years of referenda through 2006. Third, our study is the most comprehensive in geographic scope, studying selection in every jurisdiction in the country, rather than only two states (Kotchen and Powers 2006) or a sample of jurisdictions (Nelson et al. 2006).

III. Empirical Strategy

Consider the following model of referenda selection and outcomes:

$$y_{ij} = x_i\beta_j + \varepsilon_{ij}, \tag{1}$$

where y_{ij} is the log-odds ratio of the outcome of a referendum of type j in community i (i.e. ln(pctyes/pctno)) and x_i is a vector of characteristics for community i. For this analysis, the four referenda alternatives are (i) no referendum, (ii) a referendum using bond financing, (iii) a referendum using property taxes, and (iv) a referendum using alternative financing (including income taxes, sales taxes, real estate transfer taxes, and other mechanisms). Because of constitutional and legislative constraints, not all alternatives are available to every community.

y_{ij} is observed for community i if and only if

$$v_{ij} = \max_{k \in J(i)} v_{ik} \text{ and } j \neq 0, \tag{2}$$

where v_{ij} is the "utility" of referendum type *j* in community *i*, *j=0* is the case of not having any referendum, and *J*(*i*) is the set of referendum types available to community *i* (the "choice set"). In other words, we are assuming some communal choice process that selects the most preferred of all possible options. These utilities can be described by the following linear function:

$$v_{ij} \;=\; x_i\gamma_j + z_i\delta_j + u_{ij} \tag{3}$$

where z_i is an additional set of variables. If u_{ij} is distributed Type I extreme value, then the probability of any referendum type (including no referendum) being observed can be estimated with a multinomial logit model. In that case, the probability of observing referendum of type *j* in community *i* is

$$P_{ij} \;=\; \frac{\exp(x_i\tilde{a}_j + z_i\ddot{a}_j)}{\sum_{k\in J(i)}\exp(x_i\tilde{a}_k + z_i\ddot{a}_k)}. \tag{4}$$

Looking at equations (2) and (3), it is clear that any referendum type is more likely to be observed in a community when the unobservable factors in the community are favorable (i.e., when u_{ij} is high). If the u_{ij} are correlated with the ε_{ij}, that is, if the unobservable factors disposing a community to having a referendum (of type *j*) make it more likely to pass a referendum (of type *j*), then least squares estimation of equation (1) will be biased, as the conditional mean of ε_{ij} would not be zero. In the case of a simple choice of whether to hold a referendum, the model of Heckman (1979) corrects for this bias by computing the conditional mean of ε_{ij} given its estimated correlation with u_{ij}.

Two basic models have generalized this intuition to the case of multiple choices, Lee (1983) and Dubin and McFadden (1984). (See Bourguignon et al. 2004 for an excellent review and discussion.) We follow Dubin and McFadden in assuming that the ε's are correlated with a linear function of the *u*'s. Schmertmann (1996) and Bourguignon et al. (2004) have found that, in Monte Carlo simulations, this model is the most robust to violations of the maintained assumptions. Under this restriction, an unbiased version of Equation (1) can be estimated by including a simple correction factor:

$$y_{ij} \;=\; x_i\beta_j + \left(\sum\nolimits_{k/j\in J(i)}\sigma_j\frac{\hat{P}_{ik}\ln\hat{P}_{ik}}{1-\hat{P}_{ik}} + \ln\hat{P}_{ij}\right) + \varepsilon_{ij}, \tag{5}$$

where $\hat{P}$ is the estimated probability as computed by Equation (4) (Dubin and McFadden 1984).

Two factors complicate the application of these approaches to the land vote data. First, our data set is a panel of jurisdictions from 1998 to 2006. Thus, there are nine separate "choice occasions" in which a community might hold a referendum. To address this temporal issue, we include annual fixed effects in our estimation of Equations (3) and (5), but otherwise constrain coefficients to be constant across time. A second complication is the possibility of multiple referenda within a jurisdiction in a single time period or over time. There are 45 jurisdictions that have multiple referenda in a single year. In this case, we treat each referendum as a separate choice occasion and re-weight them so that each community-year still has equal weight in the model.[4]

There are also 321 jurisdictions that have multiple referenda over the entire nine-year period. Multiple referenda over time pose a complication because past referenda are likely to affect the probability of holding additional ones as well as their outcomes. In each jurisdiction-year, we include an indicator variable for the presence of prior referenda. Because our sample only goes back to 1998, however, we do not know the full history. To accommodate this fact, we interact this indicator variable with the year, so that the presence of previous referenda as of 1999 can have a different effect than the presence of previous referenda as of 2006. We also account for the type of referendum held in the past. Patterns of referenda of different types over time might be part of conscious strategy on the part of land trusts. For example, if a tax-financed referendum passes in one year, creating a revenue stream, communities may in a subsequent year create a revenue bond, borrowing against the previously dedicated tax revenues, to conserve more land immediately.[5] Thus, in the selection equation, we differentiate past tax and bond referenda. In the outcome equation, we interact current bond referenda with the existence of past successful bond referenda, to capture the strategy of borrowing against future tax commitments.

IV. Data

In this section, we discuss our data sources and our *x* and *z* variables. Data include the land vote data set on open space referenda, US Census data on local demographics, USDA data on land uses and on the presence of endangered species, and US county-level election data. We discuss each of these data sources in turn.

Land Vote data

As noted previously, the Trust for Public Land's "Land Vote" data set provides the core component of our research.[6] It provides data on the number of yes and no votes cast in each referendum and descriptors about the referendum itself, including the finance mechanism and in some cases the level of funding and the purpose of the preservation. We use data on all open space referenda in the US from 1998 to 2006 at the municipality and county levels.

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[4] We considered modeling multiple referenda as a separate alternative, but there were too few cases to successful identify the propensity for this choice.

[5] We thank Randy Walsh and Phyllis Myers for making this point to us.

[6] These data are available at http://www.tpl.org/tier3_cdl.cfm?content_item_id=12010&folder_id=2386. See Meyers (1999) and Meyers and Puentes (2001) for an introduction to these data and summaries of the raw data for 1999 and 2000, respectively.

The data reveal that the referenda occur nationwide, albeit with a concentration in the Northeast. Figure 1 shows the number of referenda passing in each state. The data also reveal that most referenda pass by a wide margin. Although most require only a simple majority, the median measure obtains approximately 60% of the vote, with a quarter reaching 70% or more and some surpassing even 90%. In Figure 2 we present a histogram indicating the vote counts in the Land Vote data. Each bar depicts the fraction of all elections in which the favorable vote fell within the indicated 5 percent band. Again, it is clear that the majority of referenda pass, and that many do so overwhelmingly.

Before using these data, we reviewed the written descriptions of each proposal and recoded the Land Vote data set where necessary.[7] We also identified seven (possibly overlapping) purposes for which the open space might be intended: agricultural, primitive or general recreation, developed recreation (which includes ball fields and the like), ecological conservation, watershed protection, historic preservation, and other purposes. Two additional variables are the date of the referendum, which we represent with an indicator for Election Tuesday in November, and whether the referendum is purely advisory (that is, non-binding).

Table 1a gives the mean values of each of these variables. Table 1b offers further information on the type of finance mechanism, by type of jurisdiction. It reveals that bonds and property taxes are the two most common mechanisms, and that the vast majority of referenda are at the county or municipal level.

Demographic and land use data

We use the 2000 US Census to collect demographic data on our communities. Variables include population density; household income; age, race, and education profiles; housing ownership rates and mean housing values. Table 2 describes these data at the county level, differentiated by counties with and without referenda.[8]

Studies show that ecological values are the main reason most households desire to protect open space, followed by agrarian values (Kline and Wichelns 1994, 1996). To measure the potential ecological values of preserving open space in a county, we include a

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7 In particular, we recoded a number of tax rates based on the description of the referendum and common sense. We also reclassified and recoded the referenda types.

8 A crucial step for the municipal-level models is to identify the universe of jurisdictions which did or did not hold referenda. For each state, we matched the name of the jurisdiction holding a referendum with a census unit with the same name. Sixteen states were found to have all their referenda in the census geography known as "places." For these states, the set of communities is the set of all places. Twelve states were found to have all the referenda in the census geography known as a "county subdivision." For these states, the set of communities is the set of all county subdivisions. In 6 states, the two geographies were identical, so that the choice was immaterial. And finally, 2 states (Illinois and New York) had a mix of subdivisions and places, with 23 referenda in subdivisions and 10 in places. In these cases, we used the subdivision data (since subdivision referenda were more common) and dropped the place geographies.

measure of the total number of endangered species, obtained from the US EPA.[9] These data may serve as an explanatory variable, or may simply serve to put the referenda to an ecological test.

To measure the rural character of a county, the political clout of farmers, and the extent of an important type of open space, county-level agricultural and land use data were collected from the USDA's Economic Research Service (check). These data include the number of farms, acreage in farming, conservation reserve acreage, the average value of farmland, and the gross value of farm products. Data were collected for 1997 and 2002, and changes were computed for the number of farms and the acres in farming as a measure of pressure on farmland and perhaps other open space as well. (For econometric reasons, ideally we would have used an older lag in this data from a period pre-dating our sample, but older data were not available.) For our study of municipalities, we attach the endangered species and agricultural data from a municipality's surrounding county. Again, these data are summarized in Table 1a.

Election data

The last type of data is 2000 county-level presidential elections data, purchased from USElectionAtlas.org. These data serve two purposes. First, voting patterns in the presidential election is a potential predictor of referendum propensity and success, with more democrat-leaning counties expected to be more likely to pass open space referendum. Second, *conditional* on ideology and party affiliation, within-state differences in voter turnout can serve as a proxy for political activity. Political activity, in turn, is a factor in the propensity for an area to engage in ballot initiatives. Thus, voter turnout can serve as one of the z variables in Equation (3), helping to identify the propensity to hold referenda.

Our other z variables are state fixed effects. Because election laws change discretely at state boundaries, these fixed effects can capture state election laws, home rule, and associated institutions which facilitate (or encumber) ballot initiatives. Our justification for excluding these fixed effects from the outcome equation is that, although location may be a factor in the outcome, we expect these effects to work smoothly through space, rather than having discontinuous impacts at state boundaries. Thus, we control for such effects by controlling for ideology through the presidential voting patterns and by controlling for continuous measures of geography (latitude and longitude). Visual and statistical evidence confirms that state fixed effects are redundant to these continuous measures in explaining outcomes.

Fiscal Context

The final type of data that we collected is information on the choice set available to each community and, more broadly, its fiscal setting. In particular, we identified, for all counties and municipalities in the US, those jurisdictions which do and do not have

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[9] www.epa.gov/espp/database.htm.

income and sales taxes. This information was collected from the US Census of Governments, the USDA, and various state and local web pages. We assume all jurisdictions have bonding authority and a property tax available to them. Because of our division of the choice set, income and sales taxes fall into the category of "other" which also includes real estate transfer taxes and such miscellaneous mechanisms as hotel taxes and lotteries. We also assume that the "other" category is available to all jurisdictions. Consequently, by this division and aggregation of the alternatives, all alternatives are available to all jurisdictions. We account for restrictions on income and sales taxes through indicator variables indicating their unavailability to a particular jurisdiction.

In addition to this qualitative data, we also obtained data on outstanding debt, interest payments, and per-capita tax revenues for all counties from the Tax Foundation and the US Census of Governments. In our county-level model, we include these finance variables as additional controls. A county with high interest payments, for example, might be expected to be less likely to take on additional debt.[10] These variables too are summarized in Table 1a. Finally, we include indicator variables for jurisdictions in New Jersey and Massachusetts, where matching funds are available for open space protection.

V. Results

In this section, we discuss the results from the selection and outcome equations for both the county level referenda and the referenda at the municipality level. For both the county and municipality scales, we include different sets of regressors reflecting differing levels of complexity.

Propensity of communities to hold referenda: Selection Equation

We begin by estimating the polychotomous selection model, which explains the propensity of communities to hold referenda of various types. Tables 3 and 4 display the estimated coefficients for Equation (3) for counties and municipalities respectively. Each column in the table gives the vector of parameters for that referendum type (γ_j and δ_j) from Equation (3). They can be interpreted as the effect of each variable on the likelihood of holding a referendum of that type, relative to no referendum. The models generally have a good fit, with pseudo-R^2s of 0.41 and 0.40 respectively. Table 5 shows the predictions of the models. Although “no referendum” is predicted to be the most likely outcome in all cases, the probability of this outcome is predicted to be highest in those community-years which do not in fact hold referenda. Moreover, the higher values along the diagonal indicate that, for those community-years that do involve a referendum, the model tends to correctly predict the type.

A central purpose of these models is to control for the self-selection of observations in the outcome equation. For this purpose, it is also important that the exogenous

[10] We also obtained these data for municipalities, but there are many missing observations in the Census of Governments data set, and many observations which were impossible to match on the basis of their name. Accordingly, we were not able to use these data in the municipal-level models.

instruments (the z_i in Equation 3) are statistically significant. Our set of instruments includes voter turnout and state fixed effects. Even after including the other variables of the model, these variables are jointly highly significant (p-value <0.01). Moreover, in the corrected regression models of the election outcome (i.e. Equation 5) that follow, we cannot reject the hypothesis that these variables have no effect. Thus, it appears that our set of exclusion restrictions are valid and provide substantial exogenous variation for identifying the joint relationship between the choice of communities to hold a referendum of a given type and the outcome of that referendum.

Aside from just correcting for selection, the results from these models are of independent interest in explaining the pattern of referenda. For example, communities with certain demographic patterns seem more likely to hold such referenda. In particular, communities with lower support for President Bush in the 2000 election are more likely to hold referenda, as are communities with fewer children and higher levels of education. Contrary to what might be predicted from the "homevoter hypothesis" (Fischel 2001), communities with higher rates of home ownership do not seem to have any clear inclination to hold referenda. In the county model, they are less likely to hold property tax referenda, but this result does not hold in the municipality model.

Some of our land-use variables are also significant. Communities that are less dense as of 2000 are more likely to hold referenda, but by the same token so are communities with a greater percentage of the community living in an urbanized area. The rate of loss of farmland from 1997 to 2002 does not seem to be statistically related to the propensity to hold referenda. From an ecological perspective, there is some weak but encouraging evidence that referenda are occurring in strategic locations. Endangered species are positively associated with the presence of referenda and, to a lesser extent, so is a greater percentage of a community's area covered by surface water. Furthermore, recall that as part of a larger model, the endangered species and water variables are estimated holding other factors constant. If instead we estimate a simple probit of the probability of a referendum occurring on only these variables, we find that they are positive and highly significant. As seen in Table 2, county-level referenda occur in counties with more than double the average number of endangered species. Although the difference is not as staggering, municipal-level referenda occur in counties with 10% more endangered species. Thus, coincidence reinforces the trend: whether or not it is a matter of causation, the presence of referenda is statistically correlated with these ecological variables.

Success of the referenda: Outcome Equation

Tables 6 and 7 report the estimates from our outcome equations, regressing the log-odds transformation of the percent voting "yes" in each referendum on a variety of factors. The tables report nine models, three specifications of explanatory variables, each with three approaches to correcting for sample selection bias. Model I is the most parsimonious. Model II considers more subtle effects from the finance variables, such as the interaction between a bond referendum and a previous successful tax referendum (to capture the strategy of a basing a revenue bond on a previously authorized dedicated revenue stream). It also considers interactions between the level of homeownership and the choice of bond or property tax financing. Finally, it adds additional geographic controls (latitude-longitude interactions and the percentage of area covered by water). Model III goes beyond Model II by adding variables that further characterize the referendum, but which were not controlled for in the polychotomous selection model.[11] These additional referendum characteristics include whether the election was held on Election Tuesday in November, and a set of descriptors for the stated purpose of the referendum, the specific type of "Other" referendum (sales tax or income tax), and whether the referendum is advisory only (i.e. non-binding). These last two characteristics are included only in the municipal model, as there is insufficient variation in the data to include them in the county model. We estimate each of these three models, in turn, with no control for selection bias, with a simple Heckman selection model which does not control for the type of referendum (as in Kotchen and Powers 2006 and Nelson et al. 2006), and finally with the polychotomous selection models reported in Tables 3 and 4.

Over-all, the fits of the models are generally good by cross-sectional standards, with R^2s of 0.4 to 0.5 for the county models and about 0.25 for the municipality models, and several interesting patterns emerge. Before examining in detail the effect of various factors on referendum outcomes, we first discuss the issue of selection. Joint tests of the significance of the polychotomous selection terms generally cannot reject the hypothesis of no selection on unobservables. This conclusion is particularly strong for more expansive specifications (with marginal p-values of about 0.11 for county models I and II). Moreover, while introducing the control functions does change the magnitude of some variables, it does not do so by enough to change materially any hypotheses concerning the effects of various factors on outcomes (with a few minor exceptions discussed below). Thus, it appears that controlling for selection based on unobservable factors is not important in these data.

One must be careful in interpreting this result. It does *not* imply that selection is unimportant. It only implies that selection on *unobservable* factors appears unimportant *after controlling for econometrically observable factors*. In fact, our models do imply that communities that hold referenda are precisely the ones more likely to vote in favor of them. Table 8 shows the predicted outcomes for referenda of various types, based on Model II without selection. Each row represents community-years which do not in fact hold referenda, which do hold some type of referenda, and, finally, which hold referenda of each specific type. Each column represents the predicted success of a referendum of a given type. Note that the success rates (the predicted vote "yes") is far lower in those community-years which do not actually hold the referenda. There is less evidence however, that referenda of particular types are in those jurisdictions where that type would be most appealing: bond referenda appear to have the potential to be more successful in all cases.

If we view referenda as arising organically out of the local community, this implies that community leaders are in fact representing and responding to local preferences, especially at the county level. Alternatively, if we view referenda as occurring in neighborhoods targeted by regional or national land trusts, this result implies that these

[11] In contrast, Models I and II include only variables characterizing the community, plus the choice of "bond," "property tax," or "other" financial instrument, controlled for through the selection model.

organizations are quite effective at strategically targeting the time and place for referenda. Under the latter interpretation, the unimportance of the selection terms suggest that these organizations are less effective at identifying additional factors determining success, beyond those included as observables in our own econometric model. That is, they do not seem to be capturing additional local knowledge. Either interpretation is consistent with the finding of Sundberg (2006) that communities with more land trusts are more likely to support conservation at the polls. Thus, rather than being a negative result, we view our selection results to be an interesting finding with economic and policy significance.

Turning now to specific factors which affect the outcomes, bonds appear to be the most preferred financing mechanism and property taxes the least preferred, a result echoed in Table 8. In terms of statistical significance, bonds are preferred to property taxes with a high level of precision in all the municipal models, and in all the county models except for those that account for polychotomous selection, where even the point estimates are very similar. This one exception is the strongest case for the importance of controlling for such selection. Accounting for the strategy of revenue bonding by interacting indicators for past successful tax referenda with a current bond referendum yields mixed results. In the county model, the strategy appears successful, but there is no evidence of this success in the municipal model. Finally, we find no evidence of any preference for sales or income taxes in the municipal Model III.

With respect to the characteristics of the communities, we find that more educated communities and communities with few children are more likely to supported open space referenda, a trend consistent with the selection effects. In the municipality model, we also find that higher density cities are less likely to support the efforts. This may be because such cities have less valuable lands remaining to protect. The price variables, captured in the median housing value and in the average value of farmland, are not significant, perhaps reflecting the offsetting effects of higher marginal costs of protection with greater scarcity of land.

Interestingly and somewhat surprisingly, as in the selection models, we continue to find no effect of home ownership in the models.[12] Also surprisingly, despite the existence of matching funds in New Jersey and Massachusetts, we find little evidence to support the hypothesis that referenda do better in these states. Support appears *lower* in Massachusetts in both models, and only higher in the New Jersey county model.

Finally, we note that there is little evidence that people in more sensitive ecological areas are more likely to support referenda. The number of endangered species is insignificant and has point estimates near zero in all models. Water resources are also insignificant, although marginally so in the municipal model. And a stated ecological purpose is negative (though statistically insignificant) in all models. Nevertheless, recall that the selection models do indicate that referenda are occurring disproportionately in these

[12] Table 6 shows that the variable "PCT Owning Home" is positive and significant, but this must be combined with negative interactions on home ownership with both bond and property tax financing. When taken in the aggregate, the effect of ownership is insignificant.

areas. Accordingly, one should not conclude from this that they cannot be valuable tools for providing ecosystem services.

VI. Conclusions

We have developed a joint model of the presence of open space referenda and the outcomes of these referenda. The model analyzes the consequences, for both presence and outcomes, of local factors, such as demographics and land uses, and factors associated with the referendum itself, such as fiscal mechanisms and conservation purposes. In studying outcomes, we control for the fact that the sample is likely to be selected through the targeting of efforts to those jurisdictions that are most likely to pass the referendum. Using a polychotomous sample selection model (Dubin and McFadden 1984, Bourguignon et al. 2004), we also control for the fact that when a jurisdiction votes on a referendum of a particular fiscal type, it likely has chosen the method of finance most likely to succeed.

We find that observable demographic and land use factors play a significant role in explaining the geographic pattern in open space referenda. However, after controlling for such observables, the propensity for a community to hold a referendum does not seem to be correlated with the referendum's success. One possibility for this outcome is that national and regional organizations are targeting communities for such referenda, using the same observable factors as are available to analysts such as ourselves. If so, they do not appear to be successfully taking into account local factors that would influence outcomes.

Nevertheless, the land conservation movement has apparently been quite successful at targeting communities based on the observable factors. Communities actually holding referenda are predicted by our models to have higher average support than those communities which do not hold them, by 5-7 percentage points at the polls. Moreover, such communities tend to be located in areas with more endangered species and with more surface water resources to protect.

This success does not mean there is not room for improvement, however. Consider the following exercise. For the 240 county referenda occurring between 1998 and 2006, we identify the top 80, or top one-third, which were the most likely to have occurred according to our selection model. This set of communities can be taken to represent the top priorities according to the current practices of the conservation movement as a whole. We also identify the 80 communities most likely to be successful according to our outcome model. This set of communities would be the top priorities if our model were to be used as a planning tool. We find that the 80 most likely to have been selected, according to actual selection practices, receive an average "yes" vote of 62%, with 64 receiving more than 50%. In contrast, the 80 that would have been predicted by our model to be the most successful receive an average “yes” vote of 68%, with 79 of the 80 receiving more than 50%. By the same token, our model identifies numerous untapped communities with high predicted support for conservation. Thus, despite the relative success of the conservation movement in targeting areas where referenda are likely to be successful, our data and model reveal additional opportunities. Accordingly, our research not only sheds descriptive light on the current pattern of land conservation, it also can help inform and guide the activities of land trusts and other stakeholders, as they consolidate and extend the conservation "movement."

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Figure 1. Distribution of Open Space Referenda throughout the United States (1998-2004)

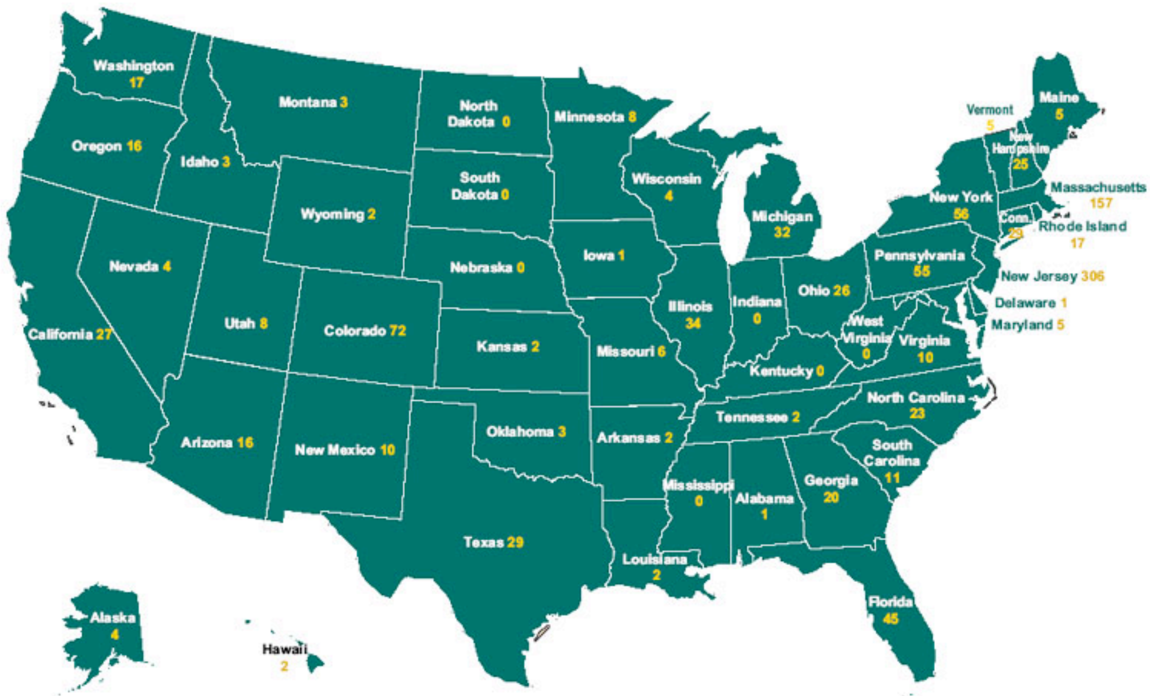

Figure 2. Histogram and Kernal Density of Referenda Outcomes (Percent Voting "For").

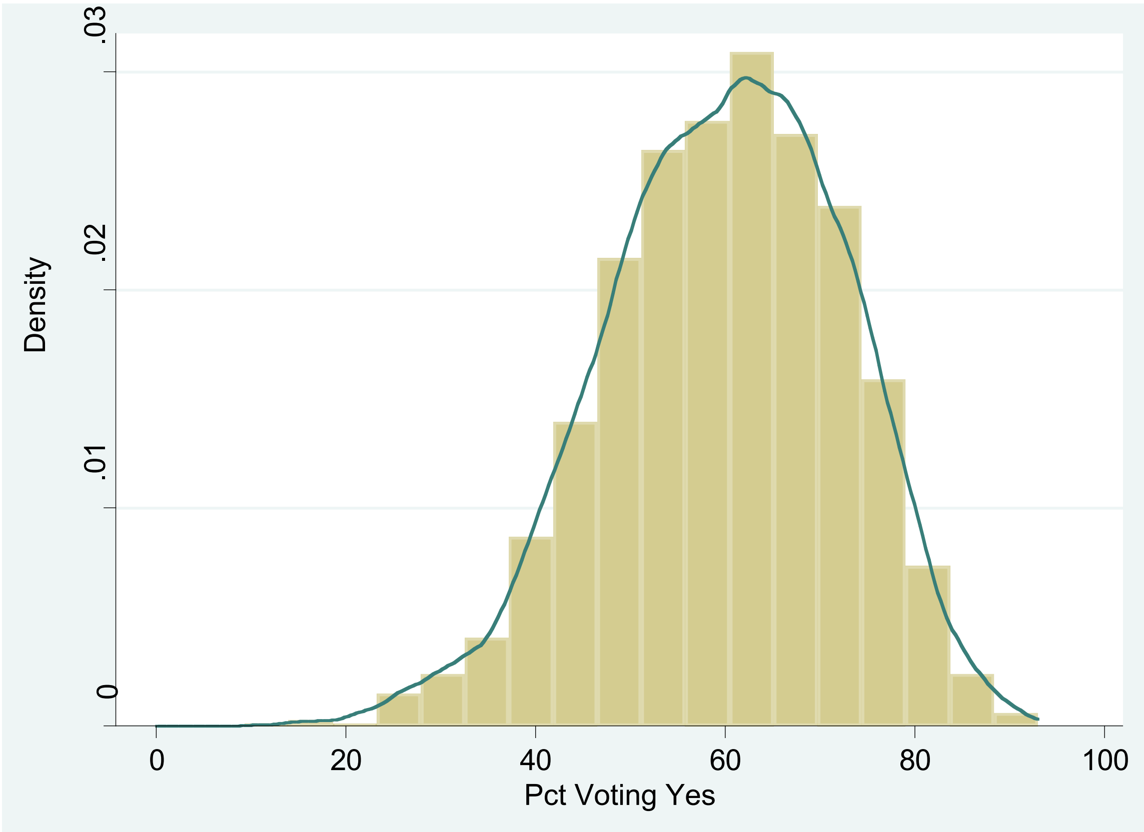

Table 1a. Descriptive Statistics on Ballot Measure Characteristics

Variable	*Mean*	*Std. Deviation*	*Min.*	*Max.*
Outcomes				
Pass (0/1)	0.775	--	0	1
Pct Yes	60.54	12.5	13.7	93.0
Purposes				
Farm/agricult.	0.254	--	0	1
Recreation	0.515	--	0	1
Recreation -- developed	0.046	--	0	1
Ecological Conservation	0.068	--	0	1
Watershed Protection	0.099	--	0	1
Historic Conservation	0.179	--	0	1
Additional Characteristics				
Not Election Tues.	0.287	--	0	1
Advisory/ Non-Biding	0.024	--	0	1

Table 1b. Cross Tabulation of Jurisdictions and Financing Mechanisms

	Jurisdiction				
	County	**Municipal**	**Special District**	**State**	**Total**
Bond	114	404	22	24	564
Property Tax*	86	630	20	0	736
Income tax	0	63	0	0	63
Sales Tax	62	48	0	1	111
Other†	11	50	10	5	76
Total	273	1,195	52	30	1,550

*Includes Property Tax Surcharges
†Includes Real Estate Transfer Tax

Table 2. Demographic, Land Use, Elections, and Finance Data (Mean Values)

Variable	Counties without Referenda	Counties with Referenda	Municipalities without Referenda	Municipalities with Referenda
N	2,895	177	27,274	838
Demographic Data				
Median Hhold Inc	23,200	34,118	39,007	65,058
Median House Value	76,371	153,464	92,474	214,565
Pct Owner-occupied	0.745	0.707	0.779	0.766
Pct Hholds in Pov	16.5	30.1	0.119	0.059
Pct pop >65	0.150	0.121	0.150	0.126
Pct pop <18	0.256	0.250	0.257	0.250
Pct pop White	0.832	0.805	0.892	0.893
Pct no H.S. Degree	0.221	0.144	0.269	0.173
Pct bach. Degree	0.170	0.308	0.167	0.386
Density (Pop / sq mi)	177.7	723.8	818.5	1528.8
Land use Data				
Square Miles	960.6	1053.0	34.2	29.8
Pct Area Water	0.040	0.105	0.028	0.072
Endangered Species	3.32	6.91	3.92	4.33
Pct Pop Urbanizd Area	0.372	0.756	0.309	0.783
Pct Pop on Farm	0.052	0.010	0.054	0.005
Pct land in Farming	0.069	0.015	0.118	0.010
Pct Change farmland 97-02	0.010	-0.093	0.013	-0.087
Val of Farmland ($/acre)	1,659	4,185	2,051	7,958
Value of Farm Produce	62,991	82,457	95,963	76,544
Political variables				
Pct Vote Bush 2000	0.575	0.507	0.534	0.432
Pct Voter Turnout	0.548	0.580	0.561	0.596
Finance variables				
Per-capita taxes	0.341	0.449	N/A	N/A
Per-capita interest paymnts	0.028	0.044	N/A	N/A
Tax info unavailable (0/1)	0.051	0.023	N/A	N/A
Int. info unavailable (0/1)	0.264	0.050	N/A	N/A

Table 3. Results from County Multinomial Selection Equation

	Coefficients for Each Referendum Type, Relative to No Referendum		
	Bond	Property Tax	Other
Voter turnout	-9.5021**	-3.4040	6.8078
	(0.020)	(0.437)	(0.321)
Pct voting Bush	-6.9657***	-1.5570	-2.0255
	(0.002)	(0.513)	(0.416)
Latitude	1.2934	0.0870	-0.6093
	(0.133)	(0.912)	(0.503)
Longitude	-0.4042	0.3140	0.2173
	(0.255)	(0.271)	(0.441)
Latitude*Longitude	0.0136	0.0012	-0.0053
	(0.162)	(0.886)	(0.505)
Land area (Sq Miles)	-0.0002	-0.0005**	0.0001
	(0.388)	(0.049)	(0.784)
Pct area water	-1.5053	-0.0445	2.3482
	(0.269)	(0.980)	(0.106)
Tax Revenues	-0.9097*	-0.0016	0.1730
	(0.080)	(0.998)	(0.714)
Interest Payments	-3.4852	0.7147	-1.2587
	(0.406)	(0.456)	(0.350)
Missing Tax Revenues Dummy	-1.9472	0.2739	-40.8428***
	(0.373)	(0.815)	(0.000)
Missing Interest Payment Dummy	0.1139	-0.6487	-0.5318
	(0.912)	(0.395)	(0.284)
Presence of County Sales Tax	0.1263	-0.1504	-0.4798
	(0.713)	(0.805)	(0.160)
Median Household Income ($1000s)	0.0605	0.1064**	0.1241
	(0.239)	(0.030)	(0.112)
Pct in Poverty	-0.0165	-0.0102	-0.0724*
	(0.434)	(0.341)	(0.070)
Pct No High School Degree	-19.2776***	-9.2812*	4.5797
	(0.000)	(0.090)	(0.199)
Pct Bachelor Degree	4.1403*	-3.2543	6.3068
	(0.062)	(0.483)	(0.299)
Median House Value ($1000s)	0.0073	-0.0016	-0.0082
	(0.301)	(0.639)	(0.337)
Pct Owning Home	7.0389	-7.0698**	-2.2931
	(0.191)	(0.035)	(0.696)
Pct White	2.0493	1.7785	5.2647*
	(0.269)	(0.637)	(0.059)
Pct Age > 65	6.4455	3.0280	-4.2600
	(0.245)	(0.755)	(0.610)
Pct Age < 18	-5.1275	-11.2139*	-10.2390
	(0.540)	(0.057)	(0.581)
Pct Living in Urbanized Area	3.0471	-0.8941	3.3552**
	(0.153)	(0.214)	(0.040)
Pct Farmers	-39.9804	-22.0812	-2.9873
	(0.263)	(0.217)	(0.877)
Pop Density	0.1953**	-0.6514	-0.2931
	(0.015)	(0.162)	(0.366)

Cont'd

Table 3 Cont'd

Value of Farmland ($1000s)	-0.0237 (0.215)	0.1158 (0.289)	0.0599* (0.069)
Value of Farm Produce ($1000s)	0.0007 (0.425)	0.0021*** (0.006)	-0.0001 (0.934)
Δ pct farmland	-0.1636 (0.612)	-0.1613 (0.793)	1.5232** (0.017)
Pct area farmland	-0.7584 (0.540)	0.4458 (0.577)	1.3067 (0.348)
Endangered Species	0.1201** (0.012)	0.0010 (0.989)	0.0070 (0.715)
Prior Open Space Referendum	0.1609 (0.814)	3.2101 (0.110)	2.1794*** (0.003)
Prior Tax Ref	0.1339 (0.813)	-0.7157 (0.124)	-0.8182 (0.146)
Constant Term	-42.8571 (0.141)	20.3081 .	11.6650 (0.712)

Note: State Fixed Effects, year fixed effects, and year/prior interactions not shown. P-values in Parentheses.

Table 4. Results from Municipality Multinomial Selection Equation

	Coefficients for Each Referendum Type, Relative to No Referendum		
	Bond	Property Tax	Other
Voter turnout	4.6168*** (0.003)	3.5593*** (0.001)	3.7762 (0.234)
Pct voting Bush	-3.9276*** (0.000)	-0.5941 (0.675)	-4.3137*** (0.007)
Latitude	-0.2850 (0.531)	-1.3086 (0.324)	-2.0891 (0.160)
Longitude	0.2208 (0.299)	1.0884 (0.104)	1.4113** (0.048)
Latitude*Longitude	-0.0032 (0.475)	-0.0149 (0.294)	-0.0231* (0.097)
Land area (Sq Miles)	0.0029*** (0.000)	0.0006 (0.102)	0.0055 (0.266)
Pct area water	0.1265 (0.855)	0.3596 (0.150)	2.1719* (0.080)
Median Household Income ($1000s)	-0.0137*** (0.005)	0.0072 (0.224)	-0.0106* (0.086)
Pct in Poverty	-4.5673*** (0.001)	-5.0904 (0.129)	-0.6543 (0.594)
Pct No High School Degree	-0.4557 (0.679)	-0.3175 (0.279)	-1.0554 (0.241)
Pct Bachelors Degree	4.2298*** (0.000)	2.9016** (0.014)	2.2329** (0.037)
Median House Value ($1000s)	0.0004 (0.734)	-0.0025*** (0.001)	0.0021** (0.020)
Pct Owning Home	-0.5672 (0.162)	0.4407 (0.152)	-0.8320** (0.040)
Pct White	-0.2359 (0.519)	-0.2965 (0.339)	-0.1808 (0.774)
Pct Age > 65	-8.1743*** (0.000)	-2.9117* (0.062)	-6.5995** (0.025)
Pct Age < 18	-2.1804 (0.110)	-3.2018 (0.443)	-1.0992 (0.403)
Pct Living in Urbanized Area	2.1361*** (0.000)	0.3121 (0.168)	1.3186** (0.038)
Pct Farmers	-21.0223*** (0.008)	0.0927 (0.975)	-0.5132 (0.814)
Pop Density	-0.1673*** (0.002)	-0.2393*** (0.000)	-0.3000* (0.077)
Value of Farmland ($1000s)	0.0084 (0.204)	0.0143*** (0.000)	0.0210 (0.137)
Value of Farm Produce ($1000s)	0.0008 (0.206)	0.0004 (0.770)	0.0013*** (0.000)
Δ pct farmland	-0.0714 (0.750)	0.0886 (0.798)	0.7181*** (0.005)
Pct area farmland	-0.2204 (0.307)	-2.0055** (0.011)	-0.1201 (0.254)

Cont'd

Table 4 Cont'd

Endangered Species	0.0277* (0.075)	0.0531 (0.184)	0.0990** (0.013)
Prior Open Space Referendum	1.1080*** (0.003)	0.5068 (0.297)	0.3685 (0.449)
Prior Tax Ref	-0.7899** (0.025)	-1.0514*** (0.000)	0.2320 (0.736)
Constant Term	17.4139 (0.457)	83.5224	134.9377 (0.079)

Note: State Fixed Effects, year fixed effects, and year/prior interactions not shown. P-values in Parentheses.

Table 5a. Predicted Probabilities by Actual Outcomes (County-level model)

Actual Outcome	Average Predicted Probability of			
	None	Bond	Prop. Tax	Other
None	0.985	0.006	0.005	0.004
Bond	0.827	0.143	0.006	0.023
Prop. Tax	0.856	0.009	0.128	0.007
Other	0.843	0.023	0.014	0.120
Unconditional	0.986	0.006	0.005	0.003

Table 5b. Predicted Probabilities by Actual Outcomes (Municipality-level model)

Actual Outcome	Average Predicted Probability of			
	None	Bond	Prop. Tax	Other
None	0.996	0.001	0.002	0.001
Bond	0.940	0.049	0.004	0.007
Prop. Tax	0.896	0.002	0.101	0.006
Other	0.953	0.010	0.002	0.035
Unconditional	0.996	0.001	0.002	0.001

Table 6. Results from County Outcome Equation

	Model I			Model II			Model III		
	No Selection	Simple Selection	Polychot. Selection	No Selection	Simple Selection	Polychot. Selection	No Selection	Simple Selection	Polychot. Selection
Bond	0.36255***	0.35181***	0.63561***	0.47795	0.48447	0.90963	0.60108	0.62914	0.94165
	(0.0068)	(0.0069)	(0.0018)	(0.42)	(0.42)	(0.18)	(0.20)	(0.19)	(0.12)
Bond*				-0.35088	-0.36484	-0.59053	-0.57622	-0.62852	-0.80563
Pct Own				(0.68)	(0.67)	(0.51)	(0.39)	(0.36)	(0.28)
Rev. Bond				0.24227	0.22859	0.14195	0.40474**	0.38830**	0.28263*
				(0.14)	(0.19)	(0.43)	(0.017)	(0.023)	(0.076)
Property	0.04022	0.06359	0.56259**	0.57950	0.66467	0.75654	0.18333	0.28675	0.36929
Tax	(0.78)	(0.66)	(0.010)	(0.58)	(0.53)	(0.47)	(0.85)	(0.76)	(0.70)
Property				-0.80764	-0.90633	-0.39997	-0.30524	-0.42137	0.10854
Tax*Own				(0.58)	(0.54)	(0.80)	(0.82)	(0.75)	(0.94)
Tax				0.14905	0.12599	0.20326	0.13825	0.10260	0.17152
Revenue				(0.41)	(0.50)	(0.35)	(0.44)	(0.58)	(0.45)
Interest				-1.28853**	-1.2985**	-0.93189*	-1.42241*	-1.47391**	-1.03234
Payments				(0.019)	(0.014)	(0.097)	(0.055)	(0.035)	(0.14)
Missing				0.49596**	0.38518	0.61508*	0.62793**	0.46124	0.56088
Tax Rev				(0.048)	(0.21)	(0.090)	(0.026)	(0.16)	(0.18)
Missing				0.04396	0.04563	0.01902	-0.03383	-0.03406	-0.03237
Interest				(0.81)	(0.81)	(0.92)	(0.86)	(0.87)	(0.88)
Interest*				2.66446**	2.73644**	1.93640	2.72916**	2.84484**	2.14843
Bond Ref				(0.036)	(0.029)	(0.19)	(0.037)	(0.026)	(0.17)
Not Election							-0.01688	-0.02469	-0.02083
Tues.							(0.86)	(0.81)	(0.85)
Pct Voting	0.33496	0.07834	0.41824	0.26430	0.16398	0.33972	0.17601	-0.00139	0.29991
for Bush	(0.40)	(0.84)	(0.31)	(0.49)	(0.68)	(0.41)	(0.67)	(1.00)	(0.48)
Latitude	0.01169	0.00402	0.01117	0.10105***	0.08896**	0.09154**	0.11500***	0.09560**	0.10186**
	(0.14)	(0.58)	(0.18)	(0.0066)	(0.022)	(0.027)	(0.0041)	(0.031)	(0.022)
Longitude	-0.00043	-0.00110	-0.00215	-0.03819**	-0.03512*	-0.03795*	-0.04058**	-0.03554*	-0.03788*
	(0.89)	(0.69)	(0.42)	(0.036)	(0.055)	(0.058)	(0.029)	(0.073)	(0.068)
Lat*Lon				0.00093**	0.00085**	0.00087*	0.00107**	0.00093**	0.00095*
				(0.026)	(0.046)	(0.066)	(0.014)	(0.048)	(0.052)
Land area	0.00002	0.00002	0.00001	0.00002	0.00002	0.00000	0.00002	0.00002	0.00001
(Sq Miles)	(0.17)	(0.14)	(0.51)	(0.24)	(0.21)	(0.76)	(0.19)	(0.16)	(0.56)
Pct area				0.11638	0.11760	0.14099	-0.02005	-0.02411	-0.03531
Water				(0.49)	(0.48)	(0.36)	(0.92)	(0.91)	(0.86)
Med. Hhold	-0.00660	-0.00514	0.00034	-0.00886	-0.00840	-0.00309	-0.00647	-0.00528	-0.00062
Inc ($1000s)	(0.38)	(0.47)	(0.97)	(0.31)	(0.32)	(0.69)	(0.50)	(0.56)	(0.95)
Pct in	-0.00155	-0.00166	-0.00295	-0.00265	-0.00244	-0.00464	-0.00538	-0.00515	-0.00742*
Poverty	(0.56)	(0.53)	(0.32)	(0.40)	(0.44)	(0.22)	(0.11)	(0.13)	(0.076)
Pct No	1.27827	1.02336	0.88395	1.15997	1.01940	0.64536	0.76065	0.57421	0.24374
HS Degree	(0.23)	(0.33)	(0.49)	(0.21)	(0.26)	(0.59)	(0.41)	(0.52)	(0.82)
Pct Bach	1.37131*	1.72484**	1.03518	1.49299**	1.63653**	1.32814	1.30382*	1.52597**	1.13479
Degree	(0.053)	(0.015)	(0.16)	(0.048)	(0.027)	(0.14)	(0.064)	(0.038)	(0.23)
Med House	0.00047	0.00052	-0.00004	-0.00032	-0.00017	-0.00064	0.00022	0.00048	0.00004
Val ($1000)	(0.67)	(0.64)	(0.97)	(0.77)	(0.89)	(0.60)	(0.84)	(0.70)	(0.97)
Pct Owning	1.61737	2.03581*	2.01216*	2.29719*	2.49783*	2.67112**	2.27381*	2.58500**	2.66216**
Home	(0.18)	(0.085)	(0.093)	(0.080)	(0.076)	(0.041)	(0.073)	(0.049)	(0.028)
Pct White	-0.55583	-0.37004	-0.76314*	-0.50822	-0.44387	-0.71318	-0.37167	-0.27156	-0.57209
	(0.16)	(0.31)	(0.065)	(0.11)	(0.19)	(0.10)	(0.31)	(0.48)	(0.20)
Pct Age >	-1.33436	-1.67770	-2.83873*	-1.57200	-1.69542	-2.79495	-1.66821	-1.86253	-2.79939*
65	(0.44)	(0.33)	(0.089)	(0.37)	(0.34)	(0.11)	(0.25)	(0.20)	(0.061)
Pct Age <	-4.14965*	-4.62261**	-7.1849***	-4.50928**	-4.6278**	-6.7388***	-4.46613**	-4.64437**	-6.6726***
18	(0.052)	(0.034)	(0.0028)	(0.030)	(0.028)	(0.0076)	(0.022)	(0.017)	(0.0044)

Cont'd

Table 6 Cont'd

Pct Living Urb Area	0.39823	0.56738*	0.69144**	0.46423	0.53400	0.74137**	0.42354	0.54301*	0.69969**
	(0.23)	(0.097)	(0.026)	(0.16)	(0.17)	(0.013)	(0.14)	(0.087)	(0.012)
Pct Farmers	-4.34786	-4.01656	-4.02833	-4.68748	-4.54755	-3.99345	-4.24302	-4.06553	-3.80769
	(0.20)	(0.20)	(0.34)	(0.18)	(0.19)	(0.31)	(0.23)	(0.22)	(0.30)
Pop Density	0.08291	0.07213	0.03496	0.04909	0.04787	0.00221	0.05473	0.04827	0.01516
	(0.19)	(0.23)	(0.57)	(0.45)	(0.47)	(0.97)	(0.27)	(0.31)	(0.80)
Val Farmland ($1000s)	0.00199	0.00142	0.00625	-0.00081	-0.00140	0.00533	-0.00725	-0.00785	-0.00416
	(0.75)	(0.80)	(0.41)	(0.88)	(0.80)	(0.43)	(0.39)	(0.37)	(0.68)
Value Farm Produce ($k)	-0.00016	-0.00009	-0.00007	-0.00019	-0.00016	-0.00009	-0.00004	0.00001	0.00012
	(0.50)	(0.65)	(0.76)	(0.43)	(0.45)	(0.74)	(0.87)	(0.97)	(0.67)
Pct Δ farmland	0.17017**	0.16689**	0.17857***	0.20489***	0.20436***	0.21331***	0.20641***	0.20197***	0.21706***
	(0.017)	(0.013)	(0.0042)	(0.0030)	(0.0026)	(0.0011)	(0.0055)	(0.0049)	(0.0028)
Pct area farmland	0.25772	0.23880	0.26095	0.22528	0.22145	0.26099	0.15269	0.13875	0.12566
	(0.19)	(0.20)	(0.21)	(0.38)	(0.38)	(0.36)	(0.55)	(0.57)	(0.65)
Endangered Species	0.00624	0.00625	0.00758	0.01215	0.01145	0.01071	0.00938	0.00804	0.00806
	(0.47)	(0.45)	(0.31)	(0.16)	(0.19)	(0.20)	(0.24)	(0.30)	(0.33)
NJ	0.28520***	0.33373***	0.20564	0.43218***	0.45731***	0.35591***	0.53708***	0.57174***	0.49067***
	(0.0075)	(0.0018)	(0.13)	(0.0012)	(0.00075)	(0.0030)	(0.0013)	(0.00078)	(0.0014)
MA	-0.40100**	-0.5713***	-0.41582**	-0.56557**	-0.63962**	-0.54985**	-0.86626**	-0.9787***	-0.9086***
	(0.047)	(0.0090)	(0.031)	(0.040)	(0.042)	(0.045)	(0.016)	(0.0076)	(0.0082)
Prior Referendum	0.53757	0.50183	0.53968	0.40810	0.40296	0.43456	0.06239	0.03531	0.09637
	(0.31)	(0.31)	(0.27)	(0.44)	(0.44)	(0.38)	(0.88)	(0.93)	(0.81)
Agricultural Purpose							-0.20932**	-0.21548**	-0.25614**
							(0.026)	(0.024)	(0.014)
Ag Purp* Farmers							-5.98608	-5.83922	-3.84303
							(0.37)	(0.39)	(0.52)
Recreation Purpose							-0.17356*	-0.19260*	-0.15468
							(0.086)	(0.056)	(0.11)
Rec Develop							-0.02633	-0.02800	-0.04052
							(0.80)	(0.78)	(0.59)
Ecological Purpose							-0.07042	-0.05396	-0.09689
							(0.39)	(0.51)	(0.26)
Historical Purpose							0.01020	0.01882	0.06330
							(0.93)	(0.87)	(0.62)
Watershed Purpose							0.08528	0.08445	0.16666
							(0.42)	(0.43)	(0.14)
Watershed* Pct water							0.34712	0.34961	0.37930
							(0.53)	(0.51)	(0.42)
Contrl Funcn Bond			-0.03248			-0.02767			-0.00961
			(0.39)			(0.56)			(0.86)
Contrl Funcn Prop Tax			-0.10297**			-0.09295			-0.10738*
			(0.029)			(0.10)			(0.059)
Contrl Funcn Other			0.05106			0.03835			0.02766
			(0.17)			(0.29)			(0.36)
Contrl Funcn Heckman		0.16324*			0.07755			0.12591	
		(0.052)			(0.51)			(0.26)	
Constant	-0.85855	-1.22235	-0.93028	-4.61518**	-4.46732**	-4.58796**	-4.64358**	-4.38888**	-4.51009**
	(0.30)	(0.15)	(0.24)	(0.017)	(0.019)	(0.030)	(0.020)	(0.033)	(0.042)
N	250	250	240	250	250	240	250	250	240
R^2	0.392	0.401	0.445	0.431	0.432	0.468	0.474	0.478	0.518

Note: Year fixed effects and prior/year fixed effect interactions not shown. P-values in Parentheses.

Table 7. Results from Municipal Outcome Equation

	Model I			Model II			Model III		
	No Selection	Simple Selection	Polychot. Selection	No Selection	Simple Selection	Polychot. Selection	No Selection	Simple Selection	Polychot. Selection
Bond	0.18514** (0.011)	0.19414*** (0.0051)	0.42611*** (0.0067)	0.22162 (0.32)	0.17647 (0.42)	0.45270 (0.17)	0.23120 (0.28)	0.15300 (0.48)	0.38709 (0.26)
Bond* Pct Own				-0.01608 (0.96)	0.05722 (0.85)	-0.05228 (0.87)	0.01024 (0.98)	0.10446 (0.78)	0.00388 (0.99)
Rev. Bond				-0.13834 (0.28)	-0.15402 (0.23)	-0.11324 (0.39)	-0.14917 (0.28)	-0.16202 (0.23)	-0.12111 (0.38)
Property Tax	-0.2202*** (0.00071)	-0.1861*** (0.0044)	-0.08440 (0.66)	-0.4708*** (0.0099)	-0.44074** (0.015)	-0.34390 (0.37)	-0.46493** (0.021)	-0.46175** (0.027)	-0.37570 (0.38)
Prop. Tax* Own				0.32575 (0.12)	0.33263 (0.12)	0.24950 (0.36)	0.37195 (0.25)	0.39535 (0.22)	0.30718 (0.43)
Sales Tax							0.03633 (0.69)	-0.00025 (1.00)	0.02096 (0.84)
Inc Tax							0.05938 (0.68)	0.04637 (0.75)	0.04721 (0.76)
Advisory Only							0.12659 (0.14)	0.13637* (0.094)	0.11982 (0.21)
Not Election Tues.							0.01702 (0.66)	0.02562 (0.50)	0.01582 (0.68)
Pct Voting For Bush	0.13354 (0.70)	0.30076 (0.44)	0.18685 (0.59)	0.07389 (0.83)	0.23179 (0.56)	0.11853 (0.73)	-0.01632 (0.96)	0.13997 (0.70)	0.03449 (0.91)
Latitude	-0.00757 (0.52)	-0.00897 (0.43)	-0.00857 (0.46)	0.08460** (0.029)	0.08062** (0.027)	0.07905** (0.035)	0.08469** (0.037)	0.08095** (0.038)	0.07963** (0.047)
Longitude	0.00549*** (0.0078)	0.00382* (0.064)	0.00480** (0.027)	-0.03696** (0.029)	-0.03715** (0.019)	-0.03555** (0.031)	-0.03667** (0.045)	-0.03710** (0.033)	-0.03560* (0.050)
Lat*Lon				0.00101** (0.012)	0.00098*** (0.0094)	0.00096** (0.013)	0.00100** (0.018)	0.00097** (0.016)	0.00096** (0.022)
Land area (Sq Miles)	0.00044 (0.27)	0.00032 (0.40)	0.00035 (0.38)	0.00016 (0.68)	0.00008 (0.84)	0.00011 (0.79)	0.00017 (0.67)	0.00009 (0.82)	0.00011 (0.78)
Pct area Water				0.15010 (0.12)	0.10157 (0.35)	0.15897 (0.10)	0.17770* (0.087)	0.12566 (0.30)	0.17733 (0.11)
Med. Hhold Inc ($ks)	-0.00399 (0.10)	-0.00246 (0.28)	-0.00379* (0.092)	-0.00305 (0.25)	-0.00191 (0.44)	-0.00287 (0.26)	-0.00290 (0.27)	-0.00181 (0.46)	-0.00267 (0.28)
Pct in Poverty	-0.06933 (0.91)	0.42888 (0.55)	0.09916 (0.87)	-0.12802 (0.84)	0.35953 (0.63)	0.03282 (0.96)	-0.15703 (0.81)	0.35039 (0.64)	0.02033 (0.97)
Pct No HS Degree	0.10325 (0.91)	-0.05784 (0.94)	-0.00668 (0.99)	-0.15901 (0.84)	-0.29228 (0.69)	-0.22483 (0.77)	-0.25897 (0.73)	-0.39768 (0.58)	-0.31801 (0.67)
Pct Bach Degree	0.89509*** (0.0059)	0.51823 (0.17)	0.78932*** (0.0096)	0.79247*** (0.0078)	0.44661 (0.23)	0.72924** (0.012)	0.77017*** (0.0075)	0.42112 (0.24)	0.70075** (0.012)
Med House Val ($ks)	0.00028 (0.40)	0.00015 (0.65)	0.00031 (0.37)	0.00011 (0.77)	0.00003 (0.92)	0.00012 (0.74)	0.00014 (0.71)	0.00007 (0.84)	0.00015 (0.68)
Pct Owning Home	0.38567 (0.41)	0.37182 (0.41)	0.40801 (0.39)	0.19000 (0.72)	0.16272 (0.75)	0.26774 (0.60)	0.13451 (0.80)	0.09791 (0.85)	0.19143 (0.72)
Pct White	-0.69084 (0.10)	-0.73723* (0.074)	-0.70885* (0.077)	-0.73414* (0.076)	-0.77529* (0.056)	-0.75163* (0.061)	-0.76698* (0.056)	-0.80291** (0.042)	-0.77833** (0.045)
Pct Age>65	0.00896 (0.98)	0.58127 (0.26)	0.12875 (0.77)	0.15420 (0.72)	0.68931 (0.15)	0.24062 (0.56)	0.15152 (0.72)	0.68967 (0.14)	0.24747 (0.56)
Pct Age<18	-1.49243 (0.14)	-1.25966 (0.20)	-1.45483 (0.16)	-1.50465 (0.16)	-1.29040 (0.21)	-1.47429 (0.18)	-1.50003 (0.14)	-1.28267 (0.19)	-1.46634 (0.16)
Pct Living in Urb Area	-0.08372 (0.41)	-0.18956* (0.052)	-0.11465 (0.28)	-0.08787 (0.40)	-0.18604* (0.073)	-0.11008 (0.33)	-0.06806 (0.47)	-0.16292* (0.083)	-0.09126 (0.36)
Pct Farmers	-2.72292** (0.015)	-2.54731** (0.013)	-2.81602** (0.011)	-2.58163** (0.016)	-2.43321** (0.012)	-2.65866** (0.012)	-3.73904* (0.095)	-3.56995* (0.089)	-3.74863* (0.086)

Cont'd

Table 7 **Cont'd**

Pop Density	-0.03893** (0.018)	-0.02327 (0.13)	-0.03434** (0.024)	-0.0378** (0.014)	-0.02307 (0.15)	-0.0358** (0.011)	-0.040*** (0.0036)	-0.02417* (0.100)	-0.0368*** (0.0023)
Val Farmland ($1000s)	0.00149 (0.25)	0.00027 (0.84)	0.00112 (0.34)	0.00151 (0.25)	0.00044 (0.75)	0.00123 (0.32)	0.00146 (0.26)	0.00039 (0.78)	0.00115 (0.34)
Value Farm Prod ($k)	-0.00029 (0.18)	-0.00038** (0.046)	-0.00029 (0.19)	-0.00025 (0.19)	-0.00033** (0.044)	-0.00025 (0.20)	-0.00021 (0.27)	-0.00029* (0.072)	-0.00022 (0.27)
Pct Change Farmland	0.06677 (0.51)	0.06307 (0.52)	0.06089 (0.56)	0.08714 (0.43)	0.08294 (0.44)	0.08142 (0.47)	0.07860 (0.50)	0.07663 (0.49)	0.07335 (0.54)
Pct area farmland	0.00042 (0.99)	0.00853 (0.73)	-0.00185 (0.94)	-0.01272 (0.53)	-0.00568 (0.77)	-0.01273 (0.56)	-0.01219 (0.59)	-0.00462 (0.83)	-0.01105 (0.64)
Endangered Species	-0.00046 (0.91)	-0.00000 (1.00)	-0.00130 (0.77)	-0.00422 (0.34)	-0.00367 (0.41)	-0.00469 (0.28)	-0.00444 (0.31)	-0.00420 (0.35)	-0.00490 (0.26)
NJ	0.12283* (0.075)	-0.04171 (0.68)	0.10380 (0.33)	0.14080* (0.067)	-0.01693 (0.88)	0.15221 (0.25)	0.11744 (0.19)	-0.04265 (0.73)	0.11715 (0.42)
MA	-0.12476 (0.11)	-0.26829*** (0.0018)	-0.13225 (0.24)	-0.14259* (0.091)	-0.2786*** (0.0034)	-0.12181 (0.37)	-0.09359 (0.38)	-0.2354** (0.033)	-0.08154 (0.59)
Prior Referendum	-0.34042* (0.058)	-0.33331* (0.092)	-0.18600** (0.033)	-0.36425* (0.073)	-0.35731* (0.096)	-0.1895** (0.041)	-0.38417* (0.096)	-0.38061 (0.11)	-0.17295* (0.062)
Agricultural Purpose							0.07292** (0.041)	0.07607** (0.028)	0.07826** (0.022)
Ag Purp* Farmers							1.90273 (0.36)	1.92821 (0.34)	1.76770 (0.38)
Recreation Purpose							0.04307 (0.45)	0.04202 (0.46)	0.04014 (0.49)
Rec Develop							-0.05588 (0.56)	-0.03740 (0.71)	-0.03805 (0.70)
Ecological Purpose							-0.09364 (0.45)	-0.09078 (0.44)	-0.08768 (0.48)
Historical Purpose							-0.11676 (0.19)	-0.11516 (0.19)	-0.11865 (0.19)
Watershed Purpose							0.08304 (0.30)	0.08709 (0.29)	0.08256 (0.31)
Watershed* Pct water							0.07785 (0.81)	0.04740 (0.88)	0.07273 (0.82)
Contrl Funcn Bond			-0.01983 (0.33)			-0.02152 (0.37)			-0.01496 (0.55)
Contrl Funcn Prop Tax			0.00413 (0.86)			0.00785 (0.75)			0.01009 (0.71)
Contrl Funcn Other			0.03316 (0.15)			0.02405 (0.36)			0.02131 (0.40)
Contrl Funcn Heckman		-0.16997* (0.099)			-0.15877 (0.12)			-0.16123 (0.11)	
Constant	1.84786*** (0.0049)	2.01309*** (0.0026)	1.75638*** (0.0072)	-1.76860 (0.29)	-1.47820 (0.35)	-1.71480 (0.28)	-1.75999 (0.31)	-1.46125 (0.38)	-1.67105 (0.31)
N	1111	1111	1110	1111	1111	1110	1111	1111	1110
R^2	0.234	0.240	0.238	0.243	0.247	0.245	0.253	0.257	0.255

Note: Year fixed effects and prior/year fixed effect interactions not shown. P-values in Parentheses.

Table 8a. Predicted Outcomes by Actual types (County-level model)

Actual Type	Average predicted pct yes		
	Bond	Prop. Tax	Other
None	0.58	0.49	0.49
Some Ref	0.65	0.56	0.56
Bond	0.65	0.56	0.56
Prop. Tax	0.66	0.57	0.57
Other	0.64	0.56	0.55

Table 8b. Predicted Outcomes by Actual Types (Municipality-level model)

Actual Type	Average predicted pct yes		
	Bond	Prop. Tax	Other
None	0.60	0.51	0.55
Some Ref	0.66	0.56	0.61
Bond	0.66	0.55	0.61
Prop. Tax	0.67	0.57	0.62
Other	0.65	0.55	0.60