Forecasting Support for Rural Land Use Policies: The Role of Preference Asymmetries

by

Robert J. Johnston

Department of Agricultural and Resource Economics
University of Connecticut

Short Abstract:
This paper explores the extent to which preference asymmetries occur in Likert-scale indicators of support or opposition to rural land use policies, and implications for methods used to model policy support. Data are drawn from responses to the *Rhode Island Rural Land Use Survey*.

Keywords: Strength of preference, Preference asymmetry, Focus shift

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Introduction

Research addressing support for environmental or natural resource policies often relies upon Likert-scale ratings applied to policy tools or statements regarding environmental perceptions or preferences (e.g., Danielson et al. 1995; Johnston et al. 2003; Kline and Wichelns 1998; Lynne et al. 1988; Talen 2001; Variyam et al. 1990). Likert-scale questions are widely used within stated preference surveys, and indeed are one of the more common tools used by economists to assess policy preferences (Bateman et al. 2002). However, as strength of preference scales often include the option to express either support or opposition to policy statements, there is the possibility that responses will reflect preference asymmetries of the type identified by Yamagishi and Miyamoto (1996), Shafir (1993), and Johnston and Swallow (1999)—also denoted focus shifts. Preference asymmetries typically imply that different factor weightings determine the extent to which respondents support versus oppose otherwise identical statements. Such patterns are particularly relevant in cases where ordered response models are used to assess statistical determinants of Likert-scale responses.

When one estimates a single parametric model to forecast stated measures of policy preference (e.g., Likert-scale responses) as a function of independent variables, an implicit assumption is made that fixed weights (or parameter estimates) apply whether one is forecasting strength of support or strength of opposition. That is, one typically assumes that the weight given to specific independent variables is approximately constant over the range of possible outcomes, subject to increasing or decreasing returns and/or interactions captured by the chosen functional form. A corollary to this assumption is that respondents choose a strength of preference "score" using a single-stage choice process. However, an alternative possibility is that respondents first choose whether they "support" or "oppose" a statement in general, then choose their relative strength of support or opposition. Such a two-stage decision process may generate preference asymmetries of the type noted above.

If preference asymmetries occur, then independent variables may have a different impact on stated strength of preference, depending on where the response lies on the strength of preference continuum. Typical preference asymmetries occur between the “accept” or “support” segment of the scale, the “reject” or “oppose” segment (Yamagishi and Miyamoto 1996; Johnston and Swallow 1999). In such cases, the fixed functional form of typical ordered response models may misspecify respondents’ choice behavior, leading to improper inferences regarding the impact of independent variables on respondents’ policy support.

This paper explores the extent to which preference asymmetries occur in stated support for rural land use policies, and implications for methods used to model policy support. Emphasis is placed on the existence and practical implications of such effects for applied research. We also emphasize implications for land use policy preferences that may be obscured by standard approaches to Likert-scale data. Data are drawn from responses to the *Rhode Island Rural Land Use Survey*—designed to assess Rhode Island rural residents’ tradeoffs among attributes of residential development and conservation, and their support for associated land use policies.

A Simple Strength of Preference Model

Following standard practice, we assume that a respondent’s strength of preference for a given policy tool is determined by the anticipated utility that would result from the application of that tool, compared to the utility generated by the status quo. We further assume that strength of preference for each tool is measured on a standard five-point Likert-scale, ranging from “strongly oppose” (1) to “strongly support” (5). Given that the attributes of each specified policy tool are fixed, we suppress the characteristics of each tool within the utility function. Hence, utility is specified as a sole function of characteristics of the individual or household. That is, for each particular management tool *i*, the difference in utility resulting from the application of that tool is specified

$$dU_i = dv_i(\mathbf{D}) + \theta_i \tag{1}$$

where $dv_i(\mathbf{D})$ is the deterministic or observable component of the utility difference, **D** is a vector of variables characterizing demographic and other characteristics of the individual or household, and θ_i is the unobservable or stochastic element of the utility difference. Hence, (1) models heterogeneity in preferences for specific policy tools, as a function of individual and household characteristics.

The ordered response model assumes that the individual assesses this utility difference dU_i associated with a particular policy tool, then indicates within which of five intervals the utility difference falls, with each interval corresponding to a specific Likert-scale response. The respondent's answer is represented by the strength of preference indicator variable I_j, which takes a value of one if the respondent provides strength of preference answer *j*. Hence:

$$\begin{aligned} I_j &= 1 \text{ if } \alpha_{j-1} < dU \le \alpha_j \\ &= 0 \text{ otherwise.} \end{aligned} \tag{2}$$

The respondent's strength of preference answer, with a potential range from “strongly oppose” to “strongly support”, is represented by the preference interval indicator I_j, where j = {1, 2, ..., 5}. For example, if the respondent “strongly opposes” a management tool, then $I_1 = 1$, and $I_2 = ... = I_5 = 0$. Following Johnston and Swallow (1999), equations (1) and (2) allow one to estimate the probability that a respondent provides a particular strength of preference response (i.e., that the difference in utility between two environmental plans is in category *j*).

$$\Pr(\alpha_{j-1} < dU \leq \alpha_j) = \Pr(dU \leq \alpha_j) - \Pr(dU \leq \alpha_{j-1}) \text{ for } j = 1, 2, \ldots, 5. \quad (3)$$

$$= [1 - \Pr(dv - \alpha_{j-1} \leq \theta)] - [1 - \Pr(dv - \alpha_j \leq \theta)]$$

$$= \Pr(\theta < dv - \alpha_{j-1}) - \Pr(\theta < dv - \alpha_j)$$

where Pr is the probability operator. While the α are unobserved, maximum likelihood estimation treats them as parameters, so that the ordered response model may leverage the information represented by the indicator variables (Maddala 1983; Johnston and Swallow 1999).

In order to estimate the random utility model characterized by equations (1) through (3), it is necessary to make assumptions regarding the functional form of the utility difference function. Theory provides little guidance regarding the choice of functional form. However, the utility difference function is often assumed to be linear in the parameters. In this application, trials with common functional forms result in negligible differences in fundamental model results. Therefore, the simple linear model is illustrated. Disturbances are assumed to have a Weibull distribution, leading to the standard ordered logit model.

Preference Asymmetries in Strength of Preference Data

The common approach to modeling Likert-scale responses exemplified by (1)-(3) above presumes that individuals choose a continuous strength of preference response based on a single underlying and fixed preference function—or weighting of independent variables. However, an alternative possibility is that respondents first choose whether they oppose or support a policy tool, then choose their strength of support or opposition. In such cases, preference asymmetry occurs when judgments of *how strongly do you support* result in a different choice mechanism or component weighting than judgments of *strongly do you reject*, following a binary choice in which an option is either supported or rejected (Yamagishi 1996; Yamagishi and Miyamoto 1996; Johnston and Swallow 1999). Although Likert-scale questions do not formally require two-stage decisions, it is possible—and perhaps even probable—that respondents apply two-stage decision processes when faced with such questions.

Unlike the typical approach to Likert-scale data, which assumes a single utility difference function such as (1), a model incorporating preference asymmetry would allow the utility difference function to vary, depending on whether one is making an inferiority or a superiority judgment. That is, the model defines two categories of dU_i, depending on whether one considers an "oppose" strength of preference (an inferiority judgment) or a "support" strength of preference (a superiority judgment). Accordingly, the preference asymmetry model replaces equation (1) with:

$$dU_{oi} = dv_{oi}(\mathbf{D}) + \theta_{oi} \qquad (4)$$

$$dU_{si} = dv_{si}(\mathbf{D}) + \theta_{si} \qquad (5)$$

where dU_{oi} is the utility difference function that is referenced to determine how strongly one opposes an inferior policy (compared to the status quo), and dU_{si} is the utility difference referenced to determine how strongly one supports a superior plan (again compared to the status quo), subject to a prior decision in which the respondent determines whether she supports or opposes tool i.

For example, assume that dv_{oi} and dv_{si} are linear in the parameters:

$$dv_{oi}(\mathbf{D}) = \boldsymbol{\beta}_{\mathrm{oi}}(\mathbf{D}), \qquad (6)$$

$$dv_{si}(\mathbf{D}) = \boldsymbol{\beta}_{\mathrm{si}}(\mathbf{D}). \qquad (7)$$

where $\boldsymbol{\beta}_{oi}$ and $\boldsymbol{\beta}_{si}$ are conforming coefficient vectors associated with the vector of household attributes **D**. The linear form is chosen for simplicity and convenience only– the concept holds regardless of the functional form chosen. The standard modeling of Likert-scale strength of preference results imposes the equality $\boldsymbol{\beta}_{oi} = \boldsymbol{\beta}_{si}$, such that $dv_{oi}(\mathbf{D}) = dv_{si}(\mathbf{D}) = dv_i(\mathbf{D})$. A preference asymmetry occurs when $\boldsymbol{\beta}_{oi} \neq \boldsymbol{\beta}_{si}$, subject to a prior decision regarding whether the policy is supported or opposed.

For example, assume that one is considering preference for impact fees to offset the costs of community services associated with new residential developments. Standard ordered response models assume that a demographic indicator (e.g., age) will retain the same marginal effect on strength of preference regardless of whether the respondent on average opposes or supports impact fees (subject, of course, to increasing or decreasing returns and/or interactions captured by the functional form). A preference asymmetry could lead to a situation in which age has a different impact on the strength of preference, depending on whether the respondent on average opposes or rejects impact fees. Older respondents might, for example, have more extreme opinions than younger residents—tending to indicate stronger *opposition* to disliked policies and stronger *support* to favored policies. Such patterns would be concealed by standard strength of preference models, leading to the potential for misleading inferences regarding the determinants of policy support.

The Data

The *Rhode Island Rural Land Use* survey was designed to assess rural residents' tradeoffs among attributes of residential development and conservation. Survey development required over eighteen months, including background research; interviews with policy makers and residents; and focus groups (Johnston et al. 1995; 2002). Surveys were mailed to 4000 randomly selected residents of four Rhode Island rural communities (Burrillville, Coventry, Exeter, and West Greenwich) following the total survey design method (Dillman 2000). Of 3702 deliverable surveys, 2157 were returned, for a response rate of 58.2%. Response rates ranged from 50.4% (Coventry) to 58.7% (West Greenwich). Further details of the survey and its administration are provided by Johnston et al. (2002; 2003).

Survey respondents were asked to indicate their degree of opposition to, or support for twenty-one different land use management policy options, on a five-point Likert scale ranging from 'strongly oppose' (1) to 'strongly support' (5). Policy options included zoning changes, fee-based land preservation techniques, tax policies, housing caps, impact fees, and other land use policy tools common in Rhode Island rural communities. Based on the results of focus groups, all policies were described in simple, non-technical terms.

Table 1 lists the policy options rated by respondents, and the mean support ratings associated with each option in each of the four communities. Mean scores above 3.0 indicate that the average respondent supports the policy option, with higher scores indicating greater mean support. Mean scores below 3.0 indicate that the average respondent opposes the policy option, with lower scores indicating greater mean opposition.

As expected, respondents expressed general support for conservation policy options, and general opposition to policy options that encourage development (Table 1). However, the specific characteristics of policy tools are relevant. For example, tools that encourage conservation through explicit tax increases (e.g., tools 5 and 9) are generally opposed by residents, compared to other conservation options which, in general, receive strong support. Results also illustrate that opposition to policies encouraging residential development (e.g., tools

2 and 12) exceeds opposition to otherwise analogous policies encouraging commercial development (e.g., tools 1 and 13). Given the high degree of consistency in policy support ratings across the four communities sampled, subsequent models pool observations across the four communities.

Empirical Models and Results

For each of the twenty-one tools, three ordered logit models are estimated:

a] a base model in which policy support (1-5 scale) is estimated as a function of independent variables. This model constrains parameter estimates to a fixed value over the full range of Likert-scale responses, and represents a standard approach to such data;

b] an analogous model containing only observations in which the response falls in the oppose (1-3) range of the Likert scale;

c] an analogous model containing only observations in which the response falls in the support (3-5) range of the Likert scale.

That is, a total of 63 models are estimated, including three for each policy tool. Independent variables include length of residency in the rural community, standard demographic descriptors characterizing age, income, and education, and other indicators such as membership in environmental organizations or ownership of a local home (table 2). Observations of the magnitude, sign, and statistical significance of parameter estimates associated with these variables permit preliminary assessments of cases in which preference asymmetries occur. Specifically, divergences in coefficient signs, magnitudes, or statistical significance among statistical models a], b] or c] above would provide initial evidence of preference asymmetry in associated Likert-scale responses.

Results are illustrated in table 3. For each tool, the label ‘F’ refers to the model including the full range of data; the label ‘S’ refers to the model of support responses only; the label ‘O’ refers to the model of oppose responses only. Of the 63 models estimated (F,S, and O for each policy tool), 62 are statistically significant at $p<0.10$ (table 3). Bold type indicates those models/variables for which an estimated marginal effect is statistically significant in both the oppose and support models, but in which the sign (+/-) of the marginal effect changes between the two models. Such cases represent the clearest and most unambiguous manifestation of preference asymmetry.

For example, self-identified members of business groups who support tool #8 (purchase and preservation of undeveloped land with public funds) tend to indicate stronger Likert-scale support ($p<0.001$). In contrast, business group members who oppose tool #8 tend to indicate stronger Likert-scale opposition ($p<0.001$). Given these two highly significant and opposing effects, the full model indicates a statistically insignificant effect of business membership on support for this policy tool ($p<0.713$). Hence, a standard ordered response modeling of Likert-scale data would obscure a statistically significant behavioral pattern, or preference asymmetry, of potential policy relevance. That is, while a standard ordered response model would indicate no statistically significant impact of business group membership on preferences, a model sufficiently flexible to incorporate preference asymmetry would reveal a tendency towards stronger preferences (opposition or support) among members of this particular group.

Of the 21 policy tools modeled, 15 contain at least one instance of clear preference asymmetry (i.e., sign changes in statistically significant marginal effects between the support and oppose models). Other possible but less clear manifestations of preference asymmetry include cases in which an independent variable has a statistically significant effect on strength of preference in either the "support" or "oppose" model, but has an insignificant effect in the remaining model. Such potential manifestations of preference asymmetry are more common, occurring at least once in all 21 tools modeled.

An Indirect Likelihood Ratio Test

Results shown in table 3 illustrate evidence of attribute-level preference asymmetry. However, these findings do not represent a set of formal, equation-level (i.e., joint) hypothesis tests. The hypothesis of joint preference asymmetry for each of the 21 Likert-scale questions may be tested using an indirect likelihood ratio test (Elnageeb and Florkowski 1994; Johnston and Swallow 1999; Mazzotta and Opaluch 1995). To construct the test statistic, 'neutral' responses (Likert-scale response = 3) are dropped from the support (S) and oppose (O) model data, leaving two datasets of binary strength of preference responses. The support (S) model includes all "support" and "strongly support" responses; the oppose (O) model includes all "strongly oppose" and "oppose" responses. The resulting support and oppose models are then vertically "stacked", or pooled into a single ordered binary model, such that the directional effect of the utility difference on strength of preference is preserved.[1] This pooled model imposes identical parameter estimates on both the support and oppose models.

The null hypothesis of no preference asymmetry (no change in parameter estimates between the support and oppose strength of preference models) is given by:

$$H_o: \quad \boldsymbol{\beta}_{oi} = \boldsymbol{\beta}_{si} \qquad (8)$$

[1] The 'neutral' responses are dropped to avoid overlapping observations in the support and oppose models, which are then stacked to create the 'pooled' model necessary for the indirect likelihood ratio test.

representing equality among all model parameters, as assumed by the standard ordered strength of preference model, and imposed by the pooled model. The likelihood ratio test statistic for H_o is

$$-2[L(\boldsymbol{\beta}_{\mathbf{fi}}) - \sum_{g} L(\boldsymbol{\beta}_{\mathbf{gi}})] \tag{9}$$

where $L(\boldsymbol{\beta}_{\mathbf{fi}})$ represents the log likelihood value for the pooled model, $L(\boldsymbol{\beta}_{\mathbf{gi}})$ is the log of the sub-likelihood function for the g^{th} model, and $g = [S, O]$ represents the binary support and oppose models estimated individually. The test statistic is distributed chi-square with $\Sigma K(g)\text{-}K$ degrees of freedom, where K is the number of coefficients on attributes in the comparison (Johnston and Swallow 1999; Mazzotta and Opaluch 1995). Test results are shown in table 4. The null hypothesis that the coefficients do not change between the support and oppose models can be rejected at greater than the p=0.0001 significance level in all cases where the test statistic is well-defined.[2] Accordingly, we reject the null hypothesis of a single preference function underlying both the support and oppose models, in favor of the preference asymmetry model which allows different functions to determine support and oppose strength of preference.

Discussion and Conclusions

Model results indicate numerous instances in which preference asymmetries are apparent—cases in which parameter estimates (i.e., weights on independent variables) vary depending on whether one models strength of opposition or strength of support—even though these simply represent different "sides" of the same Likert scale. Comparing ordered logit

[2] For tools 3, 11, 12, and 15, linear dependencies, near-perfect collinearity, or perfect correlation between an independent variable and the dependent variable required the exclusion of either independent variables or observations from one or more of the models. For these models, the reported χ^2 is no longer strictly valid, and significance levels are not reported.

results for support responses to those for oppose responses (for the same policy tools) reveals that changes in parameter magnitude, sign, and statistical significance are common (table 3). Indirect likelihood ratio tests further support the notion that parameter estimates differ across the support and opposition ranges of Likert-scale policy preference measures. In sum, model results suggest that, for most policy tools considered by the survey, different attributes and weightings determine strength of opposition and strength of support.

Results strongly suggest that the use of traditional ordered response models to estimate and forecast policy support over the full range of oppose and support values may result in misleading inferences, particularly where linear functional forms are specified. Model results also suggest that demographic and other attributes may have strong and significant impacts on support and/or opposition to particular land use policy instruments, but that these effects may be obscured by typical statistical models which do not allow parameter estimates to vary across oppose and support responses.

Beyond these general conclusions, model results reveal specific patterns of heterogeneity in policy support that may be of interest to policymakers. Although all findings are relative to our case study, they characterize a range of potential preference asymmetries that may occur in stated preference surveys applying Likert-scale questions. For example, respondents' age often has a statistically significant impact on strength of preference for management tools (table 3). However, the models that allowed for preference asymmetry often revealed an additional statistically significant correlation between age and a tendency to state stronger opinions—older respondents tend to both support *and* oppose management tools more strongly than their younger counterparts. This pattern manifests in approximately one-quarter of management tools assessed. Such patterns are also prevalent for members of business groups, occurring in over half of policy tools assessed. Again, business group members tend to both support *and* oppose management tools more strongly than other respondents. Such tendencies towards more extreme Likert-scale ratings are only apparent if one allows for preference asymmetry in model results.

In other cases, model results reveal a tendency towards more moderated opinions among certain demographic groups. For example, when considering tool #11 (impact fees to offset environmental damages related to residential developments), female respondents tend to state more moderate preferences than male respondents—both supporting *and* opposing tool #11 less strongly than male respondents (table 3).

In most cases these apparent tendencies towards more extreme or more moderate strength of preference ratings among different respondent groups occur in conjunction with a general tendency towards policy support or opposition. For example, female respondents tendency towards more moderate preferences for tool #11 is couched within a more general marginal effect towards the opposition of such tools ($p<0.063$; table 3). However, in other cases, marginal effects that are of opposite signs on the "support" versus "oppose" sides of the Likert-scale "wash out" in the final model—leading to an overall marginal effect that appears statistically insignificant. In such instances, traditional approaches to Likert-scale data may lead to inappropriate conclusions that specific independent variables have no statistical influence on strength of preference responses. In fact, such variables may have a strongly significant influence—yet one not easily captured by a single, often linear-in-the-parameters specification of utility difference.

Estimation Alternatives and Future Research

Likert-scale questions can provide important information regarding respondents preferences towards a wide range of environmental policy tools. Indeed, the results presented here suggest that such questions may provide more detailed, nuanced information than is often recognized. However, given the apparent likelihood of preference asymmetries in Likert-scale responses, researchers may wish to consider alternative modeling approaches that are able to capture the more nuanced information resulting from preference asymmetries.

One promising avenue of future research includes the use of nested discrete-choice models (e.g., nested logit) to explicitly model the two-stage decisions implied by preference asymmetry models. Assuming that preference asymmetries were indeed present, such models—if appropriately specified—would likely generate a more appropriate and revealing model of respondent behavior. However, specification of nested models is not trivial: such approaches require both specification of the nesting structure of the decision "tree" and the independent variables relevant at each decision level. Hence, specification of nested decision models can represent a significant challenge. The authors are currently exploring the use of nested logit specifications to model the data presented here.

Another promising area for future work includes the development of question formats that explicitly recognize the potential for two-stage decisions and associated preference asymmetries. For example, one might ask an initial question to assess whether a respondent supports or opposes a particular statement or management tool, then subsequent questions to assess the relative strength of that support or opposition. One example of such questions is provided by Johnston and Swallow (1999). The explicit nesting of such question formats could greatly simplify specification of nested models of the type discussed above.

Potential benefits of such approaches include both avoidance of misspecification in statistical models of Likert-scale data, and improved comprehension of the determinants of environmental preferences and policy support—particularly with regard to preference heterogeneity among different respondent groups. However, even in the absence of new modeling approaches, simple awareness of the potential for preference asymmetries of the type discussed here—relatively common among psychologists but uncommon among economists—can only improve economists' ability to model underlying policy preferences.

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Table 1. Likert-Scale Strength-of-Support Ratings for Land Use Policy Options[a]

Option	Description (survey text)	Burrillville Mean Rating (n=528)	Coventry Mean Rating (n=504)	Exeter Mean Rating (n=538)	West Greenwich Mean Rating (n=587)
1	Attract new commercial development to your town by offering tax incentives	2.69 (1.29)	2.52 (1.23)	2.46 (1.28)	2.32 (1.21)
2	Attract new residential development to your town by offering tax incentives	2.03 (1.02)	1.92 (0.98)	1.74 (0.86)	1.79 (0.91)
3	Encourage preservation by reducing property taxes on undeveloped land	4.14 (0.83)	4.14 (0.84)	4.06 (0.94)	4.12 (0.84)
4	Encourage new development by expending public water and sewer services	2.53 (1.07)	2.57 (1.16)	2.08 (1.04)	2.09 (1.04)
5	Discourage people from moving into your town by increasing the tax rate	2.00 (0.88)	1.93 (0.88)	1.91 (0.87)	1.97 (0.92)
6	Revitalize town or village centers using new public funds	3.77 (0.89)	3.43 (0.95)	3.17 (1.05)	3.10 (1.06)
7	Purchase and preserve undeveloped land with private funds (e.g., land trust donations)	4.06 (0.76)	4.06 (0.82)	4.11 (0.78)	4.12 (0.84)
8	Purchase and preserve undeveloped land with public funds (e.g., public bond issues)	3.63 (0.97)	3.62 (1.04)	3.51 (1.09)	3.58 (1.05)
9	Purchase and preserve undeveloped land through a new real estate sales tax	2.64 (1.14)	2.64 (1.15)	2.72 (1.14)	2.74 (1.21)
10	Collect fees from developers to offset costs of additional public services for new developments	4.10 (0.83)	4.14 (0.85)	4.18 (0.83)	4.18 (0.88)
11	Collect fees from developers to offset additional environmental damages from new developments	4.24 (0.78)	4.27 (0.86)	4.29 (0.81)	4.30 (0.85)
12	Encourage residential development by decreasing zoning restrictions	1.94 (0.94)	1.91 (0.95)	1.74 (0.95)	1.62 (0.80)
13	Encourage commercial development by decreasing zoning	2.11 (1.07)	2.00 (1.03)	2.00 (1.11)	1.73 (0.88)

	restrictions				
14	Require new developments to preserve some undeveloped land	4.15 (0.78)	4.19 (0.75)	4.22 (0.78)	4.23 (0.75)
15	Require trees and shrubs between new houses and roads	3.96 (0.84)	4.17 (0.80)	4.16 (0.80)	4.17 (0.79)
16	Further protect water resources by increasing zoning restrictions	4.03 (0.78)	4.10 (0.80)	4.08 (0.85)	4.12 (0.90)
17	Further protect wildlife resources by increasing zoning restrictions	4.01 (0.83)	4.09 (0.86)	4.00 (0.87)	4.11 (0.90)
18	Require new commercial development to occur along major roadways	3.81 (0.94)	3.64 (1.03)	3.74 (1.02)	3.82 (1.03)
19	Require new commercial development to occur within town or village centers	2.85 (1.09)	2.96 (1.19)	3.12 (1.11)	3.05 (1.17)
20	Institute a cap on the total number of new homes allowed to be built each year	4.06 (0.90)	4.15 (0.88)	4.04 (0.96)	4.14 (0.93)
21	Tighten enforcement of existing zoning and subdivision regulations	3.92 (0.84)	4.07 (0.82)	4.01 (0.86)	4.09 (0.85)

[a] Measured on a five-point Likert-scale in which 1 = "strongly oppose" and 5 = "strongly support." Numbers in parentheses are standard deviations.

Table 2. Variables Included in the Strength of Preference Models

Variable Name	Description	Units and Measurement	Mean (Std. Dev.)
Residence Year	Length of residency in the community in which a respondent currently resides.	Number of Years	16.59 (15.55)
Age	Reported age of survey respondent.	Number of Years	47.28 (12.44)
Gender	Dummy variable distinguishing male and female respondents.	Binary (0,1), 1 = female; 0 = male.	0.33 (0.47)
Household Size	Size of household, including children.	Number of individuals.	2.93 (1.30)
Rent Home	Dummy variable identifying those who indicate that they rent their principle residence (versus ownership).	Binary (0,1), 1 = home renter.	0.09 (0.28)
High Educate	Dummy variable identifying those respondents with at least a four-year college education.	Binary (0,1), 1 = four-year college or greater education.	0.34 (0.47)
High Income	Dummy variable identifying those respondents with reported household income above $39,999 per year.	Binary (0,1), 1 = income > $39,999.	0.53 (0.49)
Environ. Group	Dummy variable identifying those indicating membership in environmental groups (Audubon Society, land trusts, etc.).	Binary (0,1), 1 = environmental group member.	0.19 (0.39)
Business Group	Dummy variable identifying those indicating membership in business organizations (chambers of commerce, etc.).	Binary (0,1), 1 = business group member.	0.20 (0.40)

Table 3. Strength of Support and Opposition to Land Use Policy Tools: Ordered Logit Results

Model [a]	Parameter Estimates and Statistical Significance (p-value in parentheses)										
	Resid. Year	Age	Gender	Household Size	Rent Home	High Educate	High Income	Environ. Group	Business Group	Model χ^2 (p-value)	Summary
Tool 1 (F)	0.0184	**0.0116**	-0.1587	0.0256	-0.2355	-0.1392	0.0574	-0.3189	**0.1948**	271.17	Tax incentives to attract
	(0.001)	**(0.001)**	(0.004)	(0.231)	(0.013)	(0.017)	(0.328)	(0.001)	**(0.005)**	(0.001)	commercial development
Tool 1 (S)	0.0080	**0.0258**	-0.4347	0.0124	-0.7122	0.1326	0.1487	-0.4056	**0.7507**	205.91	
	(0.006)	**(0.001)**	(0.001)	(0.746)	(0.001)	(0.187)	(0.144)	(0.001)	**(0.001)**	(0.001)	
Tool 1 (O)	0.0102	**-0.0053**	0.1011	0.0437	0.0342	-0.2043	-0.0498	-0.0939	**-0.2452**	56.85	
	(0.001)	**(0.100)**	(0.133)	(0.087)	(0.760)	(0.004)	(0.480)	(0.247)	**(0.004)**	(0.001)	
Tool 2 (F)	-0.0102	-0.0093	0.2737	-0.0003	0.4529	-0.1838	-0.2351	-0.4447	**-0.2314**	223.28	Tax incentives to attract
	(0.001)	(0.001)	(0.001)	(0.990)	(0.001)	(0.002)	(0.001)	(0.001)	**(0.001)**	(0.001)	residential development
Tool 2 (S)	-0.0001	-0.0019	0.2231	-0.1640	0.2182	-0.2997	-0.0835	-0.5673	**0.6323**	35.38	
	(0.978)	(0.766)	(0.107)	(0.005)	(0.274)	(0.072)	(0.595)	(0.013)	**(0.001)**	(0.001)	
Tool 2 (O)	-0.0095	-0.0069	0.1967	0.0405	0.3916	-0.1166	-0.1670	-0.3289	**-0.3181**	141.34	
	(0.001)	(0.015)	(0.002)	(0.087)	(0.001)	(0.067)	(0.010)	(0.001)	**(0.001)**	(0.001)	
Tool 3 (F)	0.0011	-0.0113	0.0474	-0.0678	0.3266	0.0330	-0.0467	0.7821	-0.1030	172.84	Reduce property taxes on
	(0.601)	(0.001)	(0.421)	(0.003)	(0.001)	(0.591)	(0.454)	(0.001)	(0.146)	(0.001)	undeveloped land
Tool 3 (S)	-0.00003	-0.0108	0.0036	-0.0836	0.2161	0.0412	-0.0425	0.7215	-0.0511	139.07	
	(0.990)	(0.001)	(0.954)	(0.001)	(0.037)	(0.521)	(0.514)	(0.001)	(0.491)	(0.001)	
Tool 3 (O)	0.0079	-0.0025	0.1331	0.0707	0.6382	0.0076	0.0072	0.3760	-0.2740	11.24	
	(0.153)	(0.733)	(0.445)	(0.262)	(0.172)	(0.963)	(0.966)	(0.137)	(0.146)	(0.260)	
Tool 4 (F)	0.0071	**0.0009**	0.1371	-0.0275	**0.2246**	-0.0344	-0.1643	-0.9518	0.2821	278.67	Expand water and sewer to
	(0.001)	**(0.736)**	(0.015)	(0.211)	**(0.020)**	(0.558)	(0.006)	(0.001)	(0.001)	(0.001)	encourage development
Tool 4 (S)	-0.0011	**0.0101**	-0.0535	-0.0378	**-0.2874**	-0.0545	-0.2466	-0.6295	0.3766	47.54	
	(0.732)	**(0.024)**	(0.593)	(0.366)	**(0.073)**	(0.610)	(0.025)	(0.001)	(0.002)	(0.001)	
Tool 4 (O)	0.0060	**-0.0058**	0.1580	-0.0174	**0.2915**	-0.0399	-0.0847	-0.7107	0.1109	135.96	
	(0.007)	**(0.052)**	(0.014)	(0.478)	**(0.010)**	(0.545)	(0.205)	(0.001)	(0.153)	(0.001)	
Tool 5 (F)	0.0047	-0.0025	0.0410	-0.1030	0.1680	0.1416	-0.1169	0.2802	0.0494	71.45	Increase tax rate to
	(0.019)	(0.344)	(0.481)	(0.001)	(0.088)	(0.018)	(0.056)	(0.001)	(0.476)	(0.001)	discourage pop. growth
Tool 5 (S)	-0.0017	0.0006	-0.1335	-0.1801	0.1133	0.0276	0.0227	0.2009	-0.3214	14.81	
	(0.742)	(0.929)	(0.410)	(0.009)	(0.668)	(0.869)	(0.892)	(0.242)	(0.097)	(0.0963)	
Tool 5 (O)	0.0053	-0.0036	0.0443	-0.0772	0.1817	0.1568	-0.1143	0.2278	0.0792	150.02	
	(0.011)	(0.195)	(0.464)	(0.001)	(0.077)	(0.012)	(0.072)	(0.002)	(0.272)	(0.001)	
Tool 6 (F)	**0.0129**	-0.0149	0.2752	**0.0379**	0.4018	**0.0211**	-0.0056	0.0697	**0.2235**	126.86	Revitalize town centers w/
	(0.001)	(0.001)	(0.001)	**(0.094)**	(0.001)	**(0.724)**	(0.926)	(0.307)	**(0.001)**	(0.001)	public funds
Tool 6 (S)	**0.0179**	-0.0077	0.1192	**0.0835**	0.4366	**0.2201**	0.0206	-0.0771	**0.3472**	117.36	
	(0.001)	(0.012)	(0.073)	**(0.001)**	(0.001)	**(0.002)**	(0.772)	(0.336)	**(0.001)**	(0.001)	
Tool 6 (O)	**-0.0063**	-0.0156	0.3242	**-0.0800**	0.0216	**-0.3506**	-0.0110	0.2709	**-0.2279**	73.18	
	(0.048)	(0.001)	(0.001)	**(0.029)**	(0.901)	**(0.001)**	(0.908)	(0.014)	**(0.038)**	(0.001)	
Tool 7 (F)	-0.0039	0.0025	0.0187	-0.0109	-0.2952	**0.5428**	0.0616	0.7054	0.1194	260.06	Purchase and preserve land
	(0.057)	(0.361)	(0.756)	(0.640)	(0.005)	**(0.001)**	(0.329)	(0.001)	(0.095)	(0.001)	w/ private funds
Tool 7 (S)	-0.0022	0.0068	0.0465	-0.0046	-0.2381	**0.5823**	0.0449	0.6764	0.1273	241.49	
	(0.298)	(0.020)	(0.459)	(0.849)	(0.031)	**(0.001)**	(0.494)	(0.001)	(0.085)	(0.001)	

Tool 7 (O)	-0.0091	-0.0225	-0.0295	-0.0219	-0.2647	**-0.5360**	-0.1496	0.3639	-0.0403	27.68	
	(0.082)	(0.001)	(0.867)	(0.739)	(0.293)	**(0.010)**	(0.441)	(0.206)	(0.858)	(0.025)	
Tool 8 (F)	0.0014	**-0.0040**	0.0880	-0.0429	-0.0283	0.3163	0.0488	1.0032	**-0.0259**	276.69	Purchase and preserve land
	(0.463)	**(0.130)**	(0.129)	(0.056)	(0.770)	(0.001)	(0.419)	(0.001)	**(0.713)**	(0.001)	w/ public funds
Tool 8 (S)	0.0029	**0.0081**	0.0090	-0.0003	-0.1597	0.2800	-0.0044	1.0509	**0.3307**	269.80	
	(0.202)	**(0.008)**	(0.892)	(0.990)	(0.154)	(0.001)	(0.949)	(0.001)	**(0.001)**	(0.001)	
Tool 8 (O)	0.0008	**-0.0275**	0.3488	-0.0843	0.3778	0.3371	0.0387	-0.0647	**-0.7177**	125.55	
	(0.811)	**(0.001)**	(0.001)	(0.032)	(0.038)	(0.004)	(0.732)	(0.674)	**(0.001)**	(0.001)	
Tool 9 (F)	-0.0032	-0.0121	-0.1460	-0.0190	0.1783	0.4893	0.0346	0.6087	-0.2002	251.68	Purchase and preserve land
	(0.101)	(0.001)	(0.009)	(0.387)	(0.059)	(0.001)	(0.560)	(0.001)	(0.003)	(0.001)	w/ real estate transfer tax
Tool 9 (S)	0.0001	-0.0085	-0.1380	-0.0719	-0.0840	0.6628	0.0733	0.6825	-0.0718	174.15	
	(0.968)	(0.035)	(0.109)	(0.028)	(0.559)	(0.001)	(0.405)	(0.001)	(0.475)	(0.001)	
Tool 9 (O)	-0.0017	-0.0112	-0.0164	0.0154	0.2471	0.0424	-0.0503	0.0874	-0.1564	38.06	
	(0.460)	(0.001)	(0.810)	(0.567)	(0.034)	(0.559)	(0.490)	(0.328)	(0.057)	(0.005)	
Tool 10 (F)	-0.0007	**0.0063**	-0.2266	**0.0702**	-0.4134	0.2968	-0.0436	0.3696	**0.0832**	121.23	Impact fees to offset new
	(0.695)	**(0.020)**	(0.001)	**(0.002)**	(0.001)	(0.001)	(0.485)	(0.001)	**(0.247)**	(0.001)	community service costs
Tool 10 (S)	0.0006	**0.0095**	-0.3037	**0.0965**	-0.2820	0.2741	0.0178	0.3856	**0.1568**	137.30	
	(0.783)	**(0.001)**	(0.001)	**(0.001)**	(0.010)	(0.001)	(0.785)	(0.001)	**(0.036)**	(0.001)	
Tool 10 (O)	-0.0109	**-0.0210**	0.8939	**-0.1277**	-0.7847	0.4268	-0.9075	0.0871	**-0.1748**	72.24	
	(0.056)	**(0.008)**	(0.001)	**(0.058)**	(0.001)	(0.029)	(0.001)	(0.695)	**(0.387)**	(0.001)	
Tool 11 (F)	-0.0043	0.0074	**-0.1112**	**0.0290**	-0.2458	0.3581	-0.0745	0.5528	**0.0149**	134.85	Impact fees to offset
	(0.034)	(0.007)	**(0.063)**	**(0.217)**	(0.017)	(0.001)	(0.237)	(0.001)	**(0.838)**	(0.001)	environmental damages
Tool 11 (S)	-0.0027	0.0091	**-0.2109**	**0.0601**	-0.1302	0.4053	-0.0145	0.4965	**0.1405**	145.16	
	(0.208)	(0.001)	**(0.001)**	**(0.014)**	(0.228)	(0.001)	(0.825)	(0.001)	**(0.064)**	(0.001)	
Tool 11 (O)	-0.0139	-0.0067	**0.8906**	**-0.1878**	-0.6575	-0.1457	-0.4758	0.4558	**-0.4764**	54.34	
	(0.020)	(0.432)	**(0.001)**	**(0.009)**	(0.027)	(0.491)	(0.033)	(0.119)	**(0.026)**	(0.001)	
Tool 12 (F)	0.0001	-0.0005	0.1106	0.0287	0.6288	-0.3182	-0.2015	-0.8124	**-0.1748**	292.00	Decrease residential zoning
	(0.969)	(0.846)	(0.063)	(0.212)	(0.001)	(0.001)	(0.001)	(0.001)	**(0.016)**	(0.001)	restrictions
Tool 12 (S)	0.0007	-0.0097	-0.0949	-0.0836	-0.1111	-0.5809	0.0561	0.1293	**0.5922**	18.39	
	(0.873)	(0.129)	(0.540)	(0.192)	(0.624)	(0.002)	(0.743)	(0.614)	**(0.004)**	(0.030)	
Tool 12 (O)	-0.0001	0.0022	0.1348	0.0476	0.6654	-0.2503	-0.2191	-0.7736	**-0.2468**	255.62	
	(0.965)	(0.453)	(0.032)	(0.049)	(0.001)	(0.001)	(0.001)	(0.001)	**(0.001)**	(0.001)	
Tool 13 (F)	0.0115	0.0086	-0.1783	0.0737	0.5042	**-0.2415**	-0.2949	-0.5877	**-0.0371**	323.07	Decrease commercial zoning
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	**(0.001)**	(0.001)	(0.001)	**(0.604)**	(0.001)	restrictions
Tool 13 (S)	0.0116	0.0145	-0.4566	-0.0095	0.7306	**0.2429**	-0.0520	-0.2828	**0.6016**	74.32	
	(0.003)	(0.007)	(0.001)	(0.860)	(0.001)	**(0.096)**	(0.716)	(0.108)	**(0.001)**	(0.001)	
Tool 13 (O)	0.0065	0.0030	-0.0292	0.0804	0.3151	**-0.2885**	-0.2720	-0.5569	**-0.2432**	200.57	
	(0.004)	(0.312)	(0.645)	(0.001)	(0.004)	**(0.001)**	(0.001)	(0.001)	**(0.002)**	(0.001)	
Tool 14 (F)	-0.0007	**0.0062**	0.0830	0.0046	0.1901	0.3060	**0.2167**	0.6290	-0.0592	150.56	Require developers to
	(0.725)	**(0.025)**	(0.173)	(0.846)	(0.071)	(0.001)	**(0.001)**	(0.001)	(0.418)	(0.001)	preserve undeveloped land
Tool 14 (S)	-0.0028	**0.0084**	0.1298	0.0075	0.2162	0.2200	**0.2650**	0.6273	-0.0575	141.75	
	(0.188)	**(0.003)**	(0.038)	(0.758)	(0.045)	(0.001)	**(0.001)**	(0.001)	(0.443)	(0.001)	
Tool 14 (O)	0.0226	**-0.0226**	-0.2937	-0.0401	0.0456	1.3928	**-0.7219**	-0.2165	0.1704	41.76	
	(0.015)	**(0.017)**	(0.183)	(0.634)	(0.900)	(0.001)	**(0.002)**	(0.505)	(0.527)	(0.001)	
Tool 15 (F)	-0.0101	-0.0075	0.2400	-0.0663	-0.0341	0.2026	0.0828	0.3041	-0.1747	149.32	Require tree/shrub buffers on

	(0.001)	(0.005)	(0.001)	(0.004)	(0.735)	(0.001)	(0.180)	(0.001)	(0.013)	(0.001)	new developments
Tool 15 (S)	-0.0088	-0.0074	0.1790	-0.0582	0.0431	0.2235	0.0745	0.2574	-0.1617	116.83	
	(0.001)	(0.007)	(0.003)	(0.012)	(0.675)	(0.001)	(0.237)	(0.001)	(0.025)	(0.001)	
Tool 15 (O)	-0.0114	-0.0042	0.7225	-0.1022	-0.6931	-0.1271	-0.0014	0.7555	0.0292	29.29	
	(0.079)	(0.670)	(0.004)	(0.225)	(0.030)	(0.571)	(0.995)	(0.019)	(0.904)	(0.001)	
Tool 16 (F)	-0.0093	0.0105	0.3650	-0.0696	-0.2002	0.0300	-0.0581	**0.5275**	**0.0945**	153.01	Increase zoning restrictions to protect water resources
	(0.001)	(0.001)	(0.001)	(0.002)	(0.050)	(0.625)	(0.349)	**(0.001)**	**(0.183)**	(0.001)	
Tool 16 (S)	-0.0073	0.0079	0.2751	-0.0025	-0.0725	0.0332	-0.1047	**0.5728**	**0.1761**	113.85	
	(0.001)	(0.005)	(0.001)	(0.917)	(0.496)	(0.602)	(0.105)	**(0.001)**	**(0.017)**	(0.001)	
Tool 16 (O)	-0.0156	0.0202	0.6013	-0.3731	-0.2990	-0.1328	0.3396	**-0.4427**	**-0.3559**	78.54	
	(0.008)	(0.017)	(0.003)	(0.001)	(0.262)	(0.445)	(0.057)	**(0.051)**	**(0.064)**	(0.001)	
Tool 17 (F)	-0.0109	0.0008	0.3730	-0.0861	-0.0412	-0.0934	-0.0723	0.7638	-0.2089	229.20	Increase zoning restrictions to protect wildlife
	(0.001)	(0.759)	(0.001)	(0.001)	(0.683)	(0.125)	(0.241)	(0.001)	(0.003)	(0.001)	
Tool 17 (S)	-0.0085	0.0001	0.2977	-0.0360	0.0155	-0.0979	-0.1006	0.7816	-0.0606	173.03	
	(0.001)	(0.980)	(0.001)	(0.131)	(0.882)	(0.124)	(0.119)	(0.001)	(0.415)	(0.001)	
Tool 17 (O)	-0.0142	0.0058	0.3099	-0.2665	-0.3103	-0.0155	0.0422	-0.2293	-0.4532	48.29	
	(0.004)	(0.433)	(0.086)	(0.001)	(0.260)	(0.922)	(0.797)	(0.297)	(0.006)	(0.001)	
Tool 18 (F)	0.0072	-0.0015	-0.3530	0.0537	-0.3057	**-0.1189**	0.1592	0.3275	0.2144	123.75	Limit commercial development to main roads
	(0.001)	(0.587)	(0.001)	(0.018)	(0.002)	**(0.049)**	(0.009)	(0.001)	(0.002)	(0.001)	
Tool 18 (S)	-0.0005	0.0032	-0.2620	0.0091	-0.2483	**-0.2227**	0.1749	0.2237	0.3006	73.93	
	(0.809)	(0.269)	(0.001)	(0.713)	(0.026)	**(0.001)**	(0.009)	(0.003)	(0.001)	(0.001)	
Tool 18 (O)	0.0311	-0.0109	-0.2389	0.2036	-0.1286	**0.2602**	0.0826	0.2967	-0.2011	78.61	
	(0.001)	(0.039)	(0.036)	(0.001)	(0.479)	**(0.035)**	(0.494)	(0.058)	(0.160)	(0.001)	
Tool 19 (F)	-0.0040	0.0010	-0.1830	**0.0213**	0.3400	0.5337	-0.0162	**0.3284**	-0.0805	159.89	Limit commercial development to town centers
	(0.036)	(0.697)	(0.001)	**(0.320)**	(0.001)	(0.001)	(0.783)	**(0.001)**	(0.232)	(0.001)	
Tool 19 (S)	-0.0036	-0.0002	-0.0669	**-0.0646**	0.2783	0.2623	0.0809	**0.5554**	-0.0212	89.46	
	(0.169)	(0.944)	(0.369)	**(0.020)**	(0.026)	(0.001)	(0.308)	**(0.001)**	(0.811)	(0.001)	
Tool 19 (O)	0.0011	0.0030	-0.2107	**0.1163**	0.1511	0.3421	-0.0428	**-0.1887**	-0.0822	46.74	
	(0.658)	(0.382)	(0.005)	**(0.001)**	(0.253)	(0.001)	(0.580)	**(0.048)**	(0.357)	(0.001)	
Tool 20 (F)	-0.0050	-0.0006	0.2445	-0.0542	-0.2764	-0.0817	-0.1940	0.5490	**0.1236**	114.33	Institute cap on number of new homes per year
	(0.011)	(0.828)	(0.001)	(0.016)	(0.005)	(0.179)	(0.002)	(0.001)	**(0.080)**	(0.001)	
Tool 20 (S)	-0.0040	0.0027	0.1559	-0.0324	-0.2178	-0.0331	-0.1506	0.5132	**0.2507**	84.79	
	(0.061)	(0.341)	(0.011)	(0.179)	(0.040)	(0.608)	(0.020)	(0.001)	**(0.001)**	(0.001)	
Tool 20 (O)	-00038	-0.0228	0.4759	-0.0486	-0.2126	0.0727	-0.3605	-0.1901	**-0.4516**	43.82	
	(0.412)	(0.001)	(0.003)	(0.359)	(0.386)	(0.625)	(0.027)	(0.354)	**(0.007)**	(0.001)	
Tool 21 (F)	-0.0060	0.0096	0.0698	-0.0797	-0.4301	0.1217	0.0399	0.6576	**0.0398**	176.59	Tighten enforcement of existing zoning
	(0.003)	(0.001)	(0.223)	(0.001)	(0.001)	(0.046)	(0.516)	(0.001)	**(0.571)**	(0.001)	
Tool 21 (S)	-0.0032	0.0100	0.0311	-0.0561	-0.4340	0.1487	0.0911	0.5851	**0.1309**	150.02	
	(0.117)	(0.001)	(0.607)	(0.017)	(0.001)	(0.018)	(0.153)	(0.001)	**(0.072)**	(0.001)	
Tool 21 (O)	-0.0121	-0.0090	0.3006	-0.1229	-0.1062	-0.1543	-0.4715	0.7551	**-0.3451**	43.96	
	(0.017)	(0.216)	(0.089)	(0.031)	(0.693)	(0.374)	(0.008)	(0.009)	**(0.066)**	(0.001)	

[a] Models are specified as follows: 'F' refers to the full model including all observations and responses ranging from 'strongly oppose' to 'strongly support'; 'S' refers to the support model and includes only those observations in which the associated response lies between 'neutral' and 'strongly support,' inclusive; 'O' refers to the oppose model and includes only those observations in which the associated response falls between 'neutral' and 'strongly oppose,' inclusive. Note that 'neutral' responses are incorporated in both the 'S' and 'O' models. Directional effects are preserved in all models, such that a positive parameter estimate always indicates a stronger positive preference for the policy tool.

Table 4. Indirect Likelihood Ratio Tests of Equivalence Between Strength of Support and Strength of Opposition Models

Policy Tool	Log Likelihood Pooled	Log Likelihood Support	Log Likelihood Oppose	Chi-square††	Prob > $|\chi^2|$
1	-2755.84	-621.16	-1892.85	483.67	0.0001
2	-2837.79	-108.28	-2614.03	230.96	0.0001
3	-2897.86	-2692.21	-134.19	142.92 †	--
4	-2639.32	-402.19	-2028.42	417.44	0.0001
5	-2728.58	-149.79	-2540.17	77.24	0.0001
6	-2177.32	-1195.02	-558.19	848.23	0.0001
7	-2784.72	-2595.08	-79.77	219.74	0.0001
8	-2466.75	-1687.30	-418.45	721.98	0.0001
9	-2538.67	-741.84	-1437.86	717.95	0.0001
10	-2947.87	-2763.34	-128.47	112.12	0.0001
11	-3057.31	-2909.86	-118.95	56.98 †	--
12	-2870.53	-109.66	-2671.20	179.34 †	--
13	-2824.30	-178.57	-2469.83	351.82	0.0001
14	-2944.34	-2845.96	-57.11	82.55	0.0001
15	-2766.33	-2654.31	-24.99	174.08 †	--
16	-2785.50	-2597.28	-78.72	219.01	0.0001
17	-2760.96	-2534.97	-90.08	271.81	0.0001
18	-2557.91	-2076.74	-330.00	302.33	0.0001
19	-2388.36	-953.76	-1040.39	788.41	0.0001
20	-2909.30	-2663.73	-163.82	163.48	0.0001
21	-2642.21	-2458.69	-86.74	193.56	0.0001

† For tools 3, 11, 12, and 15, linear dependencies, near-perfect collinearity, or perfect correlation between an independent variable and the dependent variable required the exclusion of either independent variables or observations from one or more of the models. Accordingly, hypothesis test results are no longer strictly valid, and significance levels are not reported.

†† Test statistic calculated as $-2[L(\beta) - \Sigma L(\beta_g)]$, where $g = \{s,o\}$ subscripts the individual support and oppose models.