The Influence of Citizen Characteristics on Willingness to Pay for State Forest Lands

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Bing Ran

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Basis for the Study

• What value do Pennsylvanians place in the state forest system?

• Sluggish government revenue growth (NABSO, 2017)
• Continued citizen demands for improved government services (Donahue & Miller, 2006)
• Public officials must do more with less...
• Importance of citizens’ attitudes towards public services and the value they place in those services (Nabatchi, 2012)
• Identifying value is complex (Bozeman, 2007)
• Particularly complicated for non-priced public goods (e.g., environmental good and services; Carson, 2012)
Measuring Value: Stated Preference Methods

• “any survey-based study in which respondents are asked questions that are designed to reveal information about their preferences or values” (Freeman, Herriges, & King, 2014, p. 383)
• Individual’s “passive-use” value of non-priced public goods or services (e.g., environmental)
• Would you pay $x for …?
• What is the most you would be willing to pay for…?
• Which of the following preferences do you prefer…?
Contingent Valuation (CV)

- One type of stated preference method question
- Typically referred to as “willingness-to-pay”
- Survey responses are “contingent” on hypothetical scenarios that elicit a monetary value for a non-priced good/service
- Bidding game: “Would you pay X?”; how much more or less
- Open-ended question: elicits a direct expression of value (estimated) – “How much would you be willing to pay for X?”
CV in Public Administration Research

• Lowest use among citizen input strategies in the budget process for state agencies (Guo & Neshkova, 2011)
• Minimal coverage in mainstream public administration
  – Chen & Thurmaier (2008): e-government
• “enables a local government to determine the values that residents place on a city’s natural amenities, quality of public services and policies... the values obtained from such a survey could be crucial when... determining which policies to pursue” (Howie, Murphy, & Wicks, 2010, p. 249)
• What about a profile of those residents?
Methodology

• Service being valued: ecological services provided by the Pennsylvania state forest system (e.g., water purification)
  – Multiple CV forest studies conducted globally (e.g., Ninan & Inoue, 2013) and in the United States (e.g., Krieger, 2001)
  – None for state forest land in Pennsylvania – 55% of land is forest, 13% of that is state forest land (2.2 million acres)

• Conduct a CV survey as part of the Penn State Omnibus Poll conducted by the Center for Survey Research at Penn State Harrisburg

• Telephonic poll of 600+ adult (aged 18+) Pennsylvanians

• Random digit dial of two samples – landlines and cell phones

• Reasoning for telephonic poll method:
  – Brief CV survey fits into telephonic poll format
  – Conducted over short period of time
  – Omnibus poll defrays cost of large sample independent survey
Methodology: CV Survey

• 3 parts to a CV surveys
  – Introduction
  – Willingness-to-pay question
  – Supplemental questions

• Introduction – specific, realistic, and easy to understand
  – Next, I would like to ask you a few questions about Pennsylvania state forests. The Pennsylvania state forest system makes up 13 percent of all forests in the state. The state forests provide many natural services that improve the quality of life for Pennsylvanians. These services include cleaning the water Pennsylvanians drink and the air they breathe. State forests also provide natural habitats for plants and animals.
Methodology: CV Survey

• Willingness-to-pay question – hypothetical but real implications
  – How much would you be willing to pay each year in extra state taxes to conserve and expand Pennsylvania’s state forest lands?

• Supplemental questions
  – Attitude: It is important to protect and conserve the state forest land. (Donahue & Miller, 2006)
  – Attitude: The government should require everyone to help pay for environmental improvements. (Wiser, 2007)
  – Experience: In a typical year, how many days do you go to a Pennsylvania state forest for recreational activities? (Rosentraub & Brennan, 2011)
  – Demographics: gender, age, race, education, income, political affiliation, county of residence (rural/urban), zip code
Results

• N = 609

• Cooperation rate: 64.5%

• Responses weighted by age and gender to better represent Pennsylvania’s population (compared to Census estimates)
Willingness-to-pay Question

- 84% response rate to WTP question
- Mean average: $63.12 (± $5.08 MOE)
- Range: $0 - $1000

<table>
<thead>
<tr>
<th>Response Description</th>
<th>Count</th>
<th>%</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not willing to pay anything in extra state taxes</td>
<td>191</td>
<td>31.4%</td>
<td>37.5%</td>
</tr>
<tr>
<td>Willing to pay something in extra state taxes</td>
<td>318</td>
<td>52.2%</td>
<td>62.5%</td>
</tr>
<tr>
<td>Total - valid responses</td>
<td>509</td>
<td>83.6%</td>
<td>100%</td>
</tr>
<tr>
<td>Don't know</td>
<td>84</td>
<td>13.8%</td>
<td>-</td>
</tr>
<tr>
<td>Declined to answer</td>
<td>16</td>
<td>2.6%</td>
<td>-</td>
</tr>
<tr>
<td>Total - missing responses</td>
<td>100</td>
<td>16.4%</td>
<td>-</td>
</tr>
</tbody>
</table>
## Experience Question

In a typical year, how many days do you go to a Pennsylvania state forest for recreational activities? (n=601)

<table>
<thead>
<tr>
<th>Days</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>193</td>
<td>32.1%</td>
</tr>
<tr>
<td>1 day</td>
<td>32</td>
<td>5.2%</td>
</tr>
<tr>
<td>2-11 days (&lt; once a month)</td>
<td>231</td>
<td>38.4%</td>
</tr>
<tr>
<td>12-24 days (one to two times/month)</td>
<td>67</td>
<td>11.2%</td>
</tr>
<tr>
<td>25-51 days (&gt; twice/month, &lt; once/week)</td>
<td>44</td>
<td>7.3%</td>
</tr>
<tr>
<td>52 days or more (Once/week or more)</td>
<td>35</td>
<td>5.8%</td>
</tr>
</tbody>
</table>
### Attitudinal Questions

<table>
<thead>
<tr>
<th></th>
<th>It is important to protect and conserve the state forest land.</th>
<th></th>
<th>The government should require everyone to help pay for environmental improvements.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Count</strong></td>
<td><strong>Percent</strong></td>
<td><strong>Count</strong></td>
<td><strong>Percent</strong></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>13</td>
<td>2.1%</td>
<td>72</td>
</tr>
<tr>
<td>Somewhat disagree</td>
<td>8</td>
<td>1.3%</td>
<td>83</td>
</tr>
<tr>
<td>Somewhat agree</td>
<td>130</td>
<td>21.4%</td>
<td>238</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>453</td>
<td>74.5%</td>
<td>200</td>
</tr>
<tr>
<td>Neither disagree nor agree</td>
<td>4</td>
<td>0.7%</td>
<td>11</td>
</tr>
<tr>
<td>Don't know</td>
<td>0</td>
<td>0.0%</td>
<td>3</td>
</tr>
<tr>
<td>Decline to answer</td>
<td>0</td>
<td>0.0%</td>
<td>2</td>
</tr>
</tbody>
</table>
Logistic Regression: Variables

- **DV:** YES/NO willing-to-pay something ($0 vs. >$0)

- **IVs:**
  - Govt attitude (agree/disagree)
  - Experience (yes/no)
  - Gender (male/female)
  - Race (white/non-white)
  - Age (continuous)
  - Education (college grad/not)
  - Democrat (yes/no)
  - Republican (yes/no)
  - Income < $30,000 (yes/no)
  - Income > $100,000 (yes/no)
  - Rural/urban county of residence
# Logistic Regression: Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>df</th>
<th>p</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Att. Govt.</td>
<td>1.515</td>
<td>.263</td>
<td>33.305</td>
<td></td>
<td>.000</td>
<td>4.551</td>
</tr>
<tr>
<td>Male</td>
<td>.188</td>
<td>.236</td>
<td>.633</td>
<td>1</td>
<td>.426</td>
<td>1.207</td>
</tr>
<tr>
<td>White</td>
<td>.067</td>
<td>.398</td>
<td>.028</td>
<td>1</td>
<td>.867</td>
<td>1.069</td>
</tr>
<tr>
<td>Education</td>
<td>.412</td>
<td>.258</td>
<td>2.540</td>
<td>1</td>
<td>.111</td>
<td>1.510</td>
</tr>
<tr>
<td>Democrat</td>
<td>.533</td>
<td>.293</td>
<td>3.299</td>
<td>1</td>
<td>.069</td>
<td>1.704</td>
</tr>
<tr>
<td>Republican</td>
<td>-.103</td>
<td>.293</td>
<td>.122</td>
<td>1</td>
<td>.727</td>
<td>.903</td>
</tr>
<tr>
<td>Rural</td>
<td>-.217</td>
<td>.267</td>
<td>.658</td>
<td>1</td>
<td>.417</td>
<td>.805</td>
</tr>
<tr>
<td>Age</td>
<td>-.016</td>
<td>.007</td>
<td>5.372</td>
<td>1</td>
<td>.020</td>
<td>.984</td>
</tr>
<tr>
<td>Experience</td>
<td>.689</td>
<td>.257</td>
<td>7.183</td>
<td>1</td>
<td>.007</td>
<td>1.991</td>
</tr>
<tr>
<td>Inc&lt;$30,000</td>
<td>-.600</td>
<td>.326</td>
<td>3.399</td>
<td>1</td>
<td>.065</td>
<td>.549</td>
</tr>
<tr>
<td>Inc&gt;$100,000</td>
<td>-.444</td>
<td>.287</td>
<td>2.397</td>
<td>1</td>
<td>.122</td>
<td>.641</td>
</tr>
<tr>
<td>Constant</td>
<td>-.369</td>
<td>.570</td>
<td>.419</td>
<td>1</td>
<td>.518</td>
<td>.691</td>
</tr>
</tbody>
</table>
So What?

• Provides policy-makers with a value figure (which requires replication)
• Provides public managers with insight into what type of person values their services, and perhaps where to focus outreach efforts
• Odds of being a respondent who was willing to pay anything in extra state taxes to protect and conserve PA’s state forest land...
  – Were 4.5 times higher for agreeing with “The government should require everyone to help pay for environmental improvements.”
  – Were 2 times higher if they typically recreate at least once a year on state forest land
  – Slowly decreased with age (e.g., a 20 year old had 2 times higher odds to be willing to pay than a 44 year old)
Next Steps

• Refine logistic regression models for best accuracy/fit
  – Rural/urban by zip code
  – Different income brackets

• Compare model accuracy to demographic-only models (Wiser, 2007)

• Tobit regression – accounts for large number of zero responses (Freeman et al., 2013)
THANK YOU!

Comments and Questions:
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