

Household behaviour related to water conservation

Diane P. Dupont and Steven Renzetti
Dept. of Economics
Brock University

CRDCN National Conference 2013: Waterloo, Ontario
October 4, 2013

Thank you to the Canadian Water Network and SSHRC for funding
support

1. Motivation/Literature

- Encourage “green behaviour” with respect to water
- Price/non-price conservation measures
- Indoor water demand responsiveness to price/non-price conservation measures (Renwick and Archibald, 1998; Worthington and Hoffman, 2008)
- Use of water-conserving technologies (Millock and Nauges, 2010; Grafton et al., 2011)
 - OECD data; discrete choice models

2. Model

- Household maximizes utility by making water conservation choices
 - Indoor conservation: use low flush toilet/low flow shower
 - Outdoor conservation: frequency of water garden/water lawn (0 to more than 4 times a week)

2. Model

- Factors to explain choices
 - Water price
 - marginal price at 25 m³/month level
 - Volumetric or not?
 - Real price change since 2001 in %
 - Dummy if positive real price change
 - Household income, attitudes, characteristics
 - Government programs to encourage water conservation

3. Data and Estimation

- Statistics Canada's 2006 Households and the Environment Survey (N=28,334)
 - Water conservation choices, characteristics
- Use only households in CMA's (N=19,000) and then only metered (N=8400)
- Geographic information to link to water prices, conservation programs, energy prices climate variables (Environment Canada MUP/MUD)

3. Data and Estimation

- Bivariate probit
 - joint prob of low flush toilet/shower, correlated decisions?

- Bivariate ordered probits
 - joint prob of relative frequency of outdoor lawn watering/relative frequency of outdoor garden watering, correlated decisions?

3. Endogeneity Issue

- 1. Presence of non-linear price schedule
 - Marginal price is function of observed consumption
- 2. Geographic information used for variation
 - Price and non-price policy variables may be endogenously determined

4. Results

- Indoor Conservation
 - Bivariate probit (toilet and shower)
 - w/wo endogeneity correction

- Outdoor Conservation
 - Bivariate ordered probits (frequency of lawn/gardening watering per week, 0 to more than 4 times)
 - w/wo endogeneity correction

4. Results

- Indoor Conservation
 - Positive correlation between two choices (0.236)
 - Higher price – higher prob of low volume toilet (not shower)
 - Non-price conservation measures – no effect on either
 - Income, education, size of hh – higher prob of both
 - Young kids – lower prob of both

4. Results

- Outdoor Conservation
 - Prices not important (but higher impact on lawn than garden)
 - Non-price conservation not important
 - Income, education, size of hh – all increase frequency of watering (so less conservation)
 - Young kids – decrease frequency of watering
 - Climate variables consistent with *a priori* expectations (more rain, less watering; higher degree days, more watering; presence of rain barrel – less lawn watering but more garden watering)
 - Highly correlated choices (0.339)

Final Thoughts

- Valuable to learn about structure of hh decision-making BUT could not be done without use of data made available by RDC
- Many government programs launched without information
- Some evidence of influence by price/non-price policy variables (indoor differs from outdoor)