AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Read the Label! ENERGY STAR Appliance Label Awareness and Uptake Among U.S. Consumers

Anthony G. Murray and Bradford F. Mills
Department of Agricultural and Applied Economics,
Virginia Tech, Blacksburg, Virginia 24061
amurray@vt.edu, bfmills@vt.edu

Poster prepared for presentation at the Agricultural & Applied Economics Association's 2011 AAEA & NAREA Joint Annual Meeting, Pittsburgh, Pennsylvania, July 24-26, 2011

Copyright 2011 by Anthony G. Murray and Bradford F. Mills. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Read the Label! ENERGY STAR Appliance Label Awareness and Uptake Among U.S. Consumers

Anthony G. Murray and Bradford F. Mills
Department of Agricultural and Applied Economics, Virginia Tech, Blacksburg, Virginia 24061

Introduction

-**ENERGY STAR** label created in 1992 to identify energy efficient appliances for consumers.

-**ENERGY STAR** label managed jointly by the Environmental Protection Agency (EPA) and the Department of Energy (DOE).

Figure 1. ENERGY STAR label: Displayed on all products meeting DOE/EPA guidelines

-**ENERGY STAR** appliances have a higher purchase price, but reduced energy costs. Households average 15% energy savings compared to conventional appliances.

Research Question

-Are there demographic and residential characteristics that affect consumer awareness and adoption of **ENERGY STAR** dishwashers, refrigerators or washing machines?

-EPA and DOE show the **ENERGY STAR** "brand" awareness increased, but does this translate to these specific appliances?

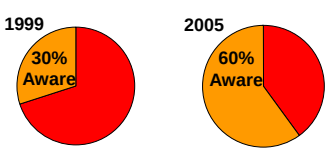

Figure 2. Consumer Awareness of **ENERGY STAR** Brand, 1999 v. 2005

-A large percentage of households have appliances less than 5 years old. Are they adopting **ENERGY STAR** appliances?

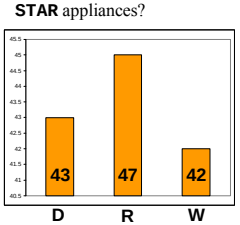

Figure 3. Percentage of households with ≤ 5 yr. old appliances

D = Dishwasher
R = Refrigerator
W = Wash. Machine

Model Specification

-Selection Issue: Consumers must be aware of the appliance classification to answer whether it is an **ENERGY STAR** appliance.

$$\kappa_i^* = Z_i\gamma + \varepsilon_{2i}$$ **Latent Awareness Equation**

$$y_i^* = X_i\beta + \varepsilon_{1i}$$ **Latent Purchase Propensity Equation**

-We cannot observe the latent equations and instead observe κ_i and y_i which indicate

$$\kappa_i = \begin{cases} 1 \text{ if } \kappa_i^* > 0 \\ 0 \text{ if } \kappa_i^* \le 0 \end{cases} \qquad y_i = \begin{cases} 1 \text{ if } y_i^* > 0 \\ 0 \text{ if } y_i^* \le 0 \end{cases}$$

-We jointly estimate a probit selection equation and probit outcome equation.

-Use Full Information Maximum Likelihood (FIML) as the most efficient estimation technique.

$$\prod_{i=1}^{N_1} F(X_i\beta, Z_i\gamma; \rho) \prod_{i=N_1+1}^{N} F(-X_i\beta, Z_i\gamma; \rho) \prod_{i=N+1}^{M} F(-Z_i\gamma)$$

Aware & Own ENERGY STAR | **Aware & Do Not Own ENERGY STAR** | **Unaware of Classification**

Results

-Significantly negative error correlation, ρ, for dishwashers (p = 10%) and refrigerators (p=10%), but insignificant for washing machines.

-Unobserved heterogeneity between **ENERGY STAR** label aware and unaware households could bias **ENERGY STAR** adoption parameter estimates if not controlled for in the estimator.

-Household demographics play a greater role in **ENERGY STAR** awareness than in appliance uptake for all three appliances.

-While general awareness of the **ENERGY STAR** label has improved (Fig. 2), awareness levels for some minority and ethnic groups remain relatively low (Asians & Hispanics).

-Renters and Poor households are less likely to purchase **ENERGY STAR** appliances.

Dishwasher

Awareness		Uptake	
Variable	Observed Sign	Variable	Observed Sign
Gender	(+)	Below 150% Poverty Line	(-)
Married	(+)	Renter	(-)
Household Size	(+)	Regional Effects	(+)
Hispanic	(-)		
Renter	(-)		

Refrigerator

Awareness		Uptake	
Variable	Observed Sign	Variable	Observed Sign
Married	(+)	Below 150% Poverty Line	(-)
Hispanic	(-)	Renter	(-)
Asian	(-)	Regional Effects	(+)
Renter	(-)		
Utilities Included	(-)		

Washing Machine

Awareness		Uptake	
Variable	Observed Sign	Variable	Observed Sign
Married	(+)	Below 150% Poverty Line	(-)
Hispanic	(-)	Renter	(-)
Asian	(-)	Urban	(-)
		Regional Effects	(+)

Tables 1,2,3: Key significant variables for Dishwashers, Refrigerators, and Washing Machines

Conclusions

-Simulations show that reducing the renter, Hispanic, and poverty gaps can provide large benefits in carbon emission reductions.

-Potential monetary savings of over $165,000,000 annually and reductions in CO_2 emissions of almost 1,130,000 tons!

Figure 4. Emissions reductions equate to removing 216,015 cars off the road!

-Any potential future rebates should target the poor and near poor households to improve uptake of "marginal consumers"

-The government cannot target specific ethnic or minority groups for rebates, even though they have lower uptake of **ENERGY STAR** appliances.

-Instead, EPA and DOE need to adopt different marketing schemes to increase adoption and awareness for low adoption groups.

-Owner-renter investment appropriation problem extends to **ENERGY STAR** appliances as well.

-Tax credits to owners of rental properties for adoption of **ENERGY STAR** appliances could increase uptake by offering incentives for landlords to install newer, energy efficient appliances..

For further information

Please contact amurray@vt.edu for more information about this project. The full paper with results will be provided upon request as well.