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Consumer Preferences for Refrigerators Manufactured by "Climate Leaders"

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Background

The Environmental Protection Agency (EPA) has become known for its consumer product energy efficiency labeling program, the Energy Star (ES) Program. A 2010 study found that over 80% of consumers recognized the ES label and used it in purchasing decisions, with 43% of all households knowingly purchasing an ES product in the past year. In 2002, EPA established another voluntary program called the Climate Leaders Program (CL Program). The CL Program was designed as a voluntary program for organizations to complete a corporate greenhouse gas (GHG) inventory, set a goal for reducing GHG emissions, and achieve that goal. Unlike the ES Program, the CL Program was never implemented as a product labeling program. In 2010, EPA announced it would phase out the CL Program and work with firms and organizations to transition to similar programs offered by states and non-governmental organizations. This study addresses the question of ***whether the CL Program could have been effectively used as a consumer product labeling program similar to the successful ES program to assist consumers in choosing products manufactured by firms that have voluntarily set and achieved targeted GHG emission reductions***.

Study Purpose

Given the phase out of the CL Program, an interesting question is whether the program could have been implemented as a product labeling program similar to the ES Program. One key measure of successful implementation as a labeling program from the program participants' viewpoint is whether consumers would pay premiums for CL Program labeled products. Hence, the purpose of this study is to measure consumers' preferences for CL labeled products, in this example, willingness to pay (WTP) for a CL labeled refrigerator.

Economic Model

Utility can be expressed such that both heterogeneity of preferences for individual product attributes and scale heterogeneity of preferences can be incorporated:

$$U_{ij} = [\sigma_i\beta + \gamma\eta_i + (1-\gamma)\,\sigma_i\eta_i]\,X_{ij} + \varepsilon_{ij} \qquad (1)$$

Where

X_{ij} = vector of observed attributes

β = vector of mean attribute utility weights

η_i = vector of individual specific deviations from these mean values

σ_i = individual-specific scale parameter

γ = weighting parameter that governs how the variance of residual preference heterogeneity varies with scale

ε_{ij} = error term

The vector of individual-specific coefficients to be estimated in Generalized Multinomial Logit Model (GMNL) is

$$\beta_i = \sigma_i\beta + [\gamma + \sigma_i(1-\gamma)]\,\eta_i \qquad (2)$$

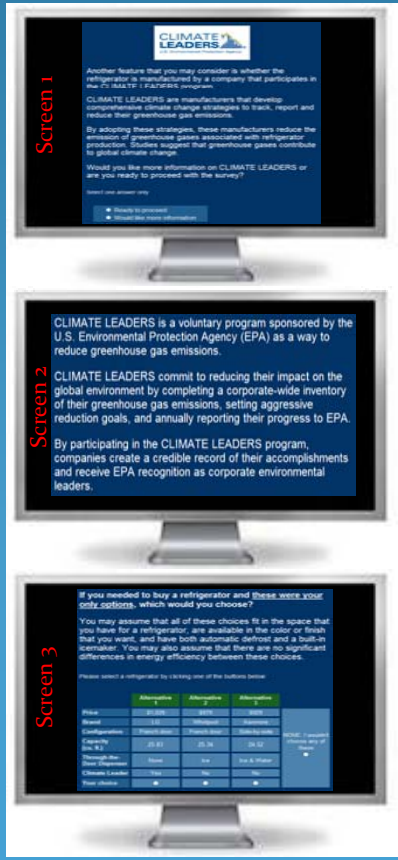
GMNL can be estimated in WTP space, with WTP being normally distributed, by setting γ equal to zero and the coefficient on the cost variable (*price* in this study) to -1 (Hensher and Greene, 2011; Scarpa et al., 2012). Once estimated in WTP space, the estimated coefficient on each product attribute represents WTP for that attribute. The GMNL module (Gu, Hole, and Knox, in press) in Stata was used to estimate the model. A regression of these WTP estimates on demographics and attitudes then provides insights into market segments of consumers who may be willing to pay more for the attribute of interest, in this case, the CL label.

Data

- Data were collected through an online survey hosted by Knowledge Networks® (KN) during March and April of 2009.
- KN recruits a respondent panel using methods designed to represent the general population, including random digit dialing. Panel members with a home computer and Internet access take surveys using own equipment and Internet connection. Other panel members are provided a computer and monthly Internet access.
- Invitations to participate in the study were sent to a random sample of 2,195 members of the panel, and 1,395 responses were collected before the survey was closed, providing a response rate of 64%. Four different versions of the survey were fielded and respondents were randomly assigned to one of the four different versions, with 353 respondents completing the version (CL) relevant to this study.
- Each respondent was provided with information about the CL Program(Screens 1 and 2).
- The contingent choice experiment, comprised of 14 choice tasks with 3 refrigerator alternatives and one none option, followed the information screens (Screen 3).
- Attitude and behavioral questions followed the choice tasks.

"We are members of many state, local and international leadership programs, but ones that carry the USEPA 'stamp' are prestigious and recognizable and, thus, desirable."

Quote from a CL Program Participant's Letter to the Assistant Administrator of EPA

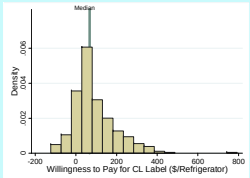


Results

Variable Names, Definitions, and Means for GMNL Model

Variable	Definition	Mean
Chosen	Whether alternative is chosen (1 if chosen, 0 if not)	0.250
Price	Price of Refrigerator in $	715.88
Capacity	Capacity of refrigerator (cubic feet)	18.631
Dummy Variables	1 if Yes, 0 if No	
Label	Climate Leaders label	0.385
French Door	French door	0.384
LG	LG brand	0.201
GE	GE brand	0.184
Kenmore	Kenmore brand	0.183
Ice	Ice maker in door	0.201
Water	Water in door	0.184
Ice and Water	Ice and water in door	0.182
ASC[a]	Alternative specific constant	0.250

[a]*The ASC is included to control for unobserved attributes.*



Estimated GMNL Model [a]

Variable	Est. Coeff.	Std. Err.	t
Mean			
Price/100	1.000	-	-
Capacity	0.266	0.014	19.63***
Label	**0.700**	**0.093**	**7.56*** **
French Door	-0.350	0.152	-2.31**
LG	-0.236	0.101	-2.35**
GE	-0.259	0.103	-2.51**
Kenmore	-0.025	0.108	-0.23
Ice	0.837	0.137	6.11***
Water	0.501	0.116	4.32***
Ice and Water	2.301	0.183	12.59***
ASC	-2.896	0.444	-6.52***
Het			
const	0.265	0.080	3.30***
SD			
Capacity	0.062	0.010	6.27***
Label	1.064	0.146	7.30***
French Door	3.513	0.266	13.22***
LG	-0.067	0.226	-0.30
GE	0.671	0.157	4.28***
Kenmore	0.929	0.115	8.08***
Ice	1.157	0.140	8.27***
Water	0.724	0.149	4.86***
Ice and Water	-2.170	0.171	-12.71***
ASC	-3.974	0.305	-13.04***
τ	-0.763	0.081	-9.46***
N=15,520	Wald X^2(w/ 11df)=2965.12***		
LLF=-3478.340			

[a]****=significant at α=.01, **=significant at α=.05.*

Regression of WTP on Demographics and Attitudes[a]

Variable Name	Definition	Mean	Est. Coef.	Std. Err.	t
Intercept			0.258	0.35	0.74
Dummy Variables	1 if Yes, 0 if No				
Female	Female	0.548	0.163	0.146	1.12
AgeGt65	Age greater than 65	0.194	0.558	0.229	2.44**
CollGrad	College Graduate	0.325	0.107	0.135	0.79
Inc5075	Income $50K-$74.9K	0.234	-0.256	0.150	-1.71*
Child612	Children 6 to 12 years old	0.143	0.485	0.183	2.65***
Mtn	Reside in mountain state	0.075	0.582	0.241	2.42**
Advertisement	Used TV, radio, or print advertisement when most recently shopped for a refrigerator	0.159	-0.441	0.176	-2.51**
ConsBuyGuide	Used consumer buying guides when most recently shopped for a refrigerator	0.111	0.389	0.205	1.90*
Lowest BillGt100	Lowest monthly electricity bill greater than $100	0.472	0.265	0.130	2.04**
Less Energy	Using less energy to produce refrigerators has the potential to lead to the greatest reduction in GHG emissions	0.056	0.076	0.277	0.27
Green Energy	Using renewable or green energy to produce refrigerators has the potential to lead to the greatest reduction in GHG emissions	0.234	0.522	0.151	3.45***
Other Variables					
FemAgeGt65	Interaction Female*AgeGt65	0.079	-0.459	0.328	-1.40
CLFutureGen	Buying products from companies that participate in CL makes me feel like I am helping the environment for future generations. (1=strongly disagree, …, 5=strongly agree)	3.520	0.176	0.063	2.81***
ConserveBills	I try to conserve energy only when it helps lower my utility bills (1=strongly disagree, …, 5=strongly agree)	3.068	-0.158	0.05	-3.15***
Regulate	We need more regulations to force people to protect the environment (1=strongly disagree, …, 5=strongly agree)	2.960	0.128	0.052	2.46**
Familiar	Familiarity with CL before survey (1=not at all, 2=somewhat, 3=very familiar)	1.187	-0.263	0.152	-1.74*

Model F (w/16, 235 df)=4.39***, R-squared = 0.2300, N=252

[a]****=significant at α=.01, **=significant at α=.05, *=significant at α=.10.*

Conclusions

In response to growth in state programs offered by states and NGO's to recognize manufacturing practices that reduce GHG emissions, EPA has chosen to phase out the CL Program. While the CL Program was never used as a labeling scheme, results from this study suggest that consumers would pay a premium of about $70 for a CL labeled refrigerator. Regression of the WTP estimates on demographics and attitudes suggests that consumer demographics and viewpoints do influence WTP the premium for a CL labeled refrigerator. Specifically, WTP is positively correlated with age (older than 65), having children aged 6 to 12 in the household, positive feelings about effect of CL labels on the environment, desire to see more environmental regulation, use of consumer buying guides in making refrigerator purchases, positive views of the importance of using green energy in manufacturing to reduce GHG, and lowest electricity bill (at least $100). WTP was negatively correlated with moderate incomes ($50K to $75K), energy conservation solely for the purpose of lowering bills, and reliance on mass media advertising to make refrigerator purchase decisions. Further research might examine how consumers view an EPA sponsored GHG-related labeling program versus one from a state agency or NGO.