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Measuring Consumer Preference for Socially Responsible Products: An Application of the Multinomial Adjacent-Categories Logit Random Effects Model

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The authors use the multinomial adjacent-categories logit (ACL) random effects model to explore preferences for products reflecting various socially responsible practices. The ACL model is uniquely appropriate to an experimental choice situation in which subjects make repeated choices among alternatives in multiple purchasing situations and more than two choice alternatives are fully ordered. Subjects were presented with a choice between socially responsible and more conventional but lower priced versions of a product in each of nine purchasing situations. Subjects were then asked to repeat the choice task under two different relative price conditions. Subjects therefore could choose the more socially responsible product never, once (at the lowest price differential), twice, or three times (at the highest price differential). The ACL model allows the comparison of selection odds across these ordered categories, providing insights that are not otherwise available.

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Companies sometimes explicitly set out to follow and promote strategies that purport to be socially responsible. Some of these involve the sponsorship of particular causes; others simply reflect practices that are pursued for reasons other than profit. The literatures on corporate social responsibility (Drumwright, 1994; Osterhus, 1997; Sen and Bhattacharya, 2001), "enviropreneurial" (Menon and Menon, 1997) or "green" marketing (McDaniel and Rylander, 1993; Sheth and Parvartiyar, 1995), business sustainability (Veleva and Ellenbecker, 2001), and cause-related marketing (Varadarajan and Menon, 1988) share the notion that customers may choose products for reasons other than the way the products themselves are expected to perform. For example, customers may choose to buy a product that claims to have been made with less damage to the environment even if there is no advantage in quality or performance. Some products confound unobservable benefits of social responsibility with actual product characteristics. For example, organically grown produce may be chosen not only because of a belief that pesticides hurt the environment, but because consumers think products grown without pesticides taste better. Products also can reflect more than one socially responsible practice. Organic shade-grown coffee purports to help the environment, personal health, and human rights. Often, more socially responsible versions of a product carry a price premium which implicitly reflects higher costs associated with socially responsible business practices. Many consumers say they are willing to pay such premiums, depending on whether a particular practice falls within a domain that they support (Sen and Bhattacharya, 2001). Estimating price-attribute trade-offs in product choice has a long tradition in the marketing literature, although little of it has examined socially responsible or sustainable choices. The most common methods for examining the effect of trade-offs between price and other attributes have employed conjoint analysis (Carroll and Green, 1995). A more recent approach incorporated willingness to pay and various attitudinal variables into a discrete choice model as latent variables (Ashok, Dillon, and Yuan, 2002). Although multinomial choice models are well-established in the marketing literature (e.g. Guadagni and Little, 1983; Gensch, 1985; Gönül and Srinivasan, 1993; Jain, Vilcassim, and Chintagunta, 1994; Kamakura and Russell, 1989; Kanninen, 2002; Louviere, 1984; Swait and Louviere, 1993), the current study employs a version of the model that is new to this literature. The multinomial adjacent-categories logit (ACL) random effects model (Hartzel, Agresti, and Caffo, 2001) has a unique combination of advantages in this study. Subjects were presented with a choice between a socially responsible product (SRP) and a conventional, lower priced version of that product in each of nine purchasing situations. Subjects then repeated the choice task under two different relative price conditions. Subjects therefore could choose the SRP never, once (only at the lowest price differential), twice, or three times (including at the highest price differential). Comparisons between these ordered categories reflect interesting and complex choice trade-offs. Unlike more common baseline-category logit models in which logits pair each response category with an arbitrary baseline-category (e.g. Chintagunta, Jain, and Vilcassim, 1991), the ACL model reflects the ordinal nature of choice alternatives such as occurs in the current study. Cumulative-category logit models also can be used for ordered categories; however cumulative logits cannot be transformed into the more easily interpreted baseline logits. In the current application, we fit the data using the ACL model, then transform the results to baseline-category logits for more intuitive interpretation. Finally, the current situation logically requires that the model include differential random effects by logit. Since cumulative-category logit models incorporate ordered intercepts, modeling random effects in this context is computationally intractable since the intercepts must be re-parameterized to ensure that their ordering is not

violated. ACL models are not restricted in this way and thus can be used to model random effects. Previously described consumer choice models do not explicitly model selection odds across ordered categories of choices. Although other techniques may better estimate overall effects of choice variables, comparisons across ordered categories can produce insights that are not otherwise available. Results concerning socially responsible choices also are interesting in themselves, especially given the dearth of research on such choices. Choices in the current study indicate consistent preferences for socially responsible benefits across purchasing situations. However, there are differential effects for comparisons at different points in the continuum of choice alternatives, represented here by the number of times a subject chose the SRP over the conventional version.

The remainder of this article is organized as follows. The next section describes the experimental study that was designed to explore preferences for SRPs. The following section presents the ACL model and outlines the estimation and assessment of this model when fit to the survey data. The last two sections provide a detailed presentation of the empirical results in both tabular and graphical form, along with a discussion of the implications and limitations of the research.

EXPERIMENTAL STUDY

Data were collected using an online self-administered sample survey from undergraduate business majors enrolled in an introductory business administration class during the Spring 2002 quarter at a large U.S. university. 579 subjects were given the opportunity to complete the survey for course credit; 395 subjects submitted valid surveys giving a response rate of 68 percent. A more extensive pilot survey was first critiqued by an undergraduate marketing research class and then pre-tested online in order to improve comprehension and verify realism (Carson et al., 1994). This process resulted in a shorter, less complex survey which then went online in the last week of May, 2002. The survey is reproduced in the Appendix.

Subjects were asked to consider nine purchasing situations and for each select which of two products they would most likely choose to buy if they were faced with the situation in question. For each situation, one product had characteristics that related to socially responsible benefits, such as having been produced following strict environmental guidelines or having features that reduce its energy requirements during use. The alternative product was described as having conventional characteristics that did not address those same socially responsible benefits. For example, one situation concerned a 4-door compact sedan car. The SRP was described as a "hybrid" gas/electric 4-door compact sedan that gets 52/45 miles per gallon city/highway, while the alternative was described as a conventional 4-door compact sedan that gets 25/30 miles per gallon city/highway. Subjects were told to assume that each pair of products was identical in all respects other than the particular features mentioned (i.e. comparable size, quality, and other features not mentioned).

The SRP benefits were designed to fit into the following six categories: natural resources, reduced pollution, organic agriculture, human health, workers' rights, and animal welfare. The first four of these are consistent with a multidimensional view of environmentalism (Zimmer, Stafford, and Stafford, 1994); the last two have been described in previous research as ethical or socially responsible product attributes (Sriram and Forman, 1993).

For each situation, subjects were asked to select one of the two products in a choice set where

each had a stated price that could be expected in today's North American market. In particular, the SRP was always offered at a price 50 percent higher than that of the conventional product. The factor of 50 percent was based on average "social responsibility premiums" for typical current prices for the nine purchasing situations, and was chosen to be the same across all situations to avoid confounding any product choice effects with price effects from proportional increases (effects due to absolute price differences may still be present however). For example, the socially responsible car's price was listed as $20,700, while the conventional car was listed as $13,800. The same pair of products was then offered at the same prices in a second choice set, but with the SRP including some kind of purchase incentive to reduce its cost to the consumer, for example the consumer has an in-store coupon, or the product is on sale, or an income tax credit is available. The monetary value of the incentive was always such that it reduced the social responsibility premium to $33\frac{1}{3}$ percent (from 50 percent with no incentive). For example, buying the socially responsible car entitled the consumer to $2,300 off their income taxes. Finally, the same pair of products was offered in a third choice set, this time with the monetary value of the incentive such that it reduced the social responsibility premium to $16\frac{2}{3}$ percent. For example, buying the socially responsible car entitled the consumer to $4,600 off their income taxes.
The order of the products in relation to whether they are socially responsible or conventional was randomized. This was to encourage subjects to carefully read the product descriptions and make more realistic choices, rather than realizing that the SRP was always listed first (say) and subsequently always picking the first product regardless of its description. The order of the choice sets in relation to the existence and size of any purchase incentive was also randomized for a similar reason.
Each subject could make eight (2^3) possible combinations of responses for the three choice sets in each of the nine situations. However, only four of the eight constituted rational choices, while the remaining four involved irrational decisions. For example, in the situation above, selecting the socially responsible car when the incentive is $2,300 off income taxes but switching to the conventional car when the incentive for buying the socially responsible car increases to $4,600 off income taxes would most likely indicate that subjects were checking boxes thoughtlessly just to receive course credit. Since the model used for this study analyzes only the four rational choice combinations, subjects submitting surveys that contained any irrational choice combinations were offered the opportunity to re-submit their survey; an additional 28 valid surveys were received in this way. Also, 34 subjects submitted more than one valid survey; only the first received survey was used in such cases. 333 subjects submitted a single valid survey, giving 333 + 34 + 28 = 395 valid surveys in total; the results discussed in this article are based on these 395 surveys. To check that the results have not been adversely affected by the manner in which we identified valid surveys, we also ran the same analyses on just the 333 single valid surveys; results were substantively very similar to those obtained from the full set of 395 surveys.
The nine purchasing situations involved consumer products that run the spectrum from food items (apples, coffee, eggs, wine), to non-food, non-durable items (laundry detergent, athletic shoes), to durable goods (washing machine, car), to services (mutual fund investment). For each situation, the SRP could be chosen:

- in all three choice sets,
- in the two choice sets with incentives but not the choice set with no incentive,

- in the choice set with the large incentive but not the choice sets with the small incentive or no incentive, or
- in none of the three choice sets

Figure 1 provides a graphical representation of how often the SRP was chosen over the conventional version by the 395 subjects. Situations are ordered in this figure by the total number of times the SRP was chosen.

[FIGURE 1 ABOUT HERE]

The popularity of the SRPs varied considerably across purchasing situations. In particular, subjects preferred products that could save them money in the future (i.e. the car and washer with lower running costs) over products that offered them no tangible continued advantage over the conventional version (i.e laundry detergent and athletic shoes). Intermediate were products that may or may not be considered to provide consumer benefits (i.e. increased returns for the socially responsible mutual fund or improved taste for the food products).
Subjects were then asked to indicate whether they had actually purchased the socially responsible versions of the products. In particular, they were asked to select "sustainable," "conventional," or "don't know" for the product choices they had made most often in the last year. Figure 2 provides a graphical representation of how many subjects made each selection for each situation. Situations are ordered in this figure by their average score across subjects, where "sustainable" scores 1, "don't know" scores 0, and "conventional" scores -1.

[FIGURE 2 ABOUT HERE]

Subjects were also asked to consider the major potential benefits of their purchasing one type of product over another for each of the nine situations. In particular, they were asked to think about the following benefits: natural resources, reduced pollution, organic agriculture, workers' rights, human health, and animal welfare. To ensure consistency of definition across subjects, all six benefits were described—see the Appendix. Subjects were then prompted to select up to three of the benefits for each situation. Figure 3 provides a graphical representation of how often each major potential benefit was selected for each situation. Numbers are represented in this figure by the areas of the circles, where the largest circle, for "shoes" and "workers' rights," represents 362 subjects, and the smallest circle, for "car" and "organic agriculture," represents 6 subjects.

[FIGURE 3 ABOUT HERE]

Finally, subjects were asked to provide some personal information so that potential systematic differences between (say) males and females could be modeled. In particular, subjects were asked for their age, gender, year at the university (freshman, sophomore, etc.), and student status (domestic or international). They were also asked to select a category that describes the degree to which they consider sustainability issues when making purchasing decisions: never, rarely, sometimes, often, nearly always, always, or "don't know."
Ages ranged from 17 to 38, with a sample mean of 19.7. The sample was split 45 percent female, 55 percent male, and was comprised mostly of freshmen (58 percent); for the analysis the "year" variable was therefore dichotomized into "freshman" and "other." 93 percent of subjects claimed to be domestic and so the "student status" variable was not used in the analysis. The "sustainability issues" variable was re-coded for the analysis: "never" or "don't know" was used

as the reference level, with indicator variables for "rarely," "sometimes," and "often" (which also includes "nearly always" and "always"). Figure 4 provides details of these subject-level covariates included in the analysis.

[FIGURE 4 ABOUT HERE]

MODEL SPECIFICATION

We use the ACL random effects model of Hartzel, Agresti, and Caffo (2001), which development can be traced back to the pioneering work in discrete-choice modeling of McFadden (1973). McFadden's conditional logit model, more commonly referred to now as a multinomial logit model, restricts the odds of choosing one category over another to be independent of other alternatives (and their covariate values) in the choice set, a property known as "independence from irrelevant alternatives." Multinomial logit models that incorporate random effects can avoid this problem and more realistically account for subject-level heterogeneity (see Allenby and Rossi, 1999; Chen and Kuo, 2001; Dubé et al., 2001; Fischer and Nagin, 1981; Gönül and Srinivasan, 1993; Jain, Vilcassim, and Chintagunta, 1994; Layton and Brown, 2000; McFadden and Train, 2000; Revelt and Train, 1998, 2000; Rossi, McCulloch, and Allenby, 1996, for further discussion and applications). Hartzel, Agresti, and Caffo (2001) extend the work of Tutz and Hennevogl (1996) to specialize such models for use with ordinal categories.

In particular, let Y_{ij} denote the response of subject i for the jth situation, $i = 1, \ldots, 395$, $j = 1, \ldots, 9$. Y is categorical, with the ordered categories representing the $r = 4$ (rational) response combinations described above, i.e. SRP selected three, two, one, or zero times. The response probabilities are denoted $\pi_{ijr} = \Pr(Y_{ij} = r), r = 1, \ldots, 4$.

Let $\boldsymbol{w}_{ij}$ denote a column vector of explanatory covariates for the products and $\boldsymbol{x}_i$ denote a column vector of explanatory covariates for the subjects. In this case, $\boldsymbol{w}_{ij}$ consists of eight indicator variables for the different purchasing situations (relative to the car reference category) together with six indicator variables to represent the presence or absence of major potential benefits for each SRP; $\boldsymbol{x}_i$ consists of the continuous variable Age, plus two indicator variables for Gender and Year, and three indicator variables for Rarely, Sometimes, and Often (relative to the "never considers sustainability issues" reference category).

The ACL random effects model has the form

$$\text{(1)} \qquad \text{logit}_{ijr} = \log\left(\frac{\pi_{ijr}}{\pi_{ij,r+1}}\right) = \alpha_r + \boldsymbol{w}_{ij}^T\boldsymbol{\beta}_r + \boldsymbol{x}_i^T\boldsymbol{\theta}_r + u_{ir}, \quad r = 1, 2, 3$$

where α_r are intercept parameters, $\boldsymbol{\beta}_r$ are product covariate effects, $\boldsymbol{\theta}_r$ are subject covariate effects, and u_{ir} are subject-level random effects. Random effects are appropriate here because the unit of analysis for these data is at the product (or situation) level, but the data are clustered by subject. In particular, product choices are likely to be strongly related within subjects so that the homogeneity assumption required to fit a multinomial logit model to unclustered data is unlikely to be satisfied. The random effects allow any heterogeneity across subjects to be explicitly modeled. A more general extension of this model permits covariate random effects in addition to the intercept random effects given here, but for this application a barely perceptible improvement in model fit fails to justify the substantial increase in complexity required to fit covariate random effects.

Equation (1) allows for a range of models of varying complexity. Product covariate effects can vary with the logits or be common across logits. Similarly, subject covariate effects can vary or remain common. Also, $\boldsymbol{w}_{ij}$ can include product-subject interactions if, for example, males might be expected to respond differently to females with respect to a perceived reduction in pollution. The multinomial likelihood linking equation (1) to the Y_{ij} responses can be written

$$\text{likelihood} = \prod_{i,j} \prod_{r=1}^{4} \pi_{ijr}^{\mathrm{I}(Y_{ij}=r)} \tag{2}$$

where

$$\pi_{ij,1} = 1/(1 + \exp(-\text{logit}_{ij,1}) + \exp(-\text{logit}_{ij,1} - \text{logit}_{ij,2}) + \exp(-\text{logit}_{ij,1} - \text{logit}_{ij,2} - \text{logit}_{ij,3}))$$
$$\pi_{ij,2} = 1/(\exp(\text{logit}_{ij,1}) + 1 + \exp(-\text{logit}_{ij,2}) + \exp(-\text{logit}_{ij,2} - \text{logit}_{ij,3}))$$
$$\pi_{ij,3} = 1/(\exp(\text{logit}_{ij,1} + \text{logit}_{ij,2}) + \exp(\text{logit}_{ij,2}) + 1 + \exp(-\text{logit}_{ij,3}))$$
$$\pi_{ij,4} = 1/(\exp(\text{logit}_{ij,1} + \text{logit}_{ij,2} + \text{logit}_{ij,3}) + \exp(\text{logit}_{ij,2} + \text{logit}_{ij,3}) + \exp(\text{logit}_{ij,3}) + 1)$$

Estimation

ACL random effects models can be fit from a classical (frequentist) perspective with, for example, SAS procedure NLMIXED (see So and Kuhfeld, 1995). However, SAS proved impractical to use to fit such models to our survey data (fitting a simple model with common product and subject covariate effects across logits took 25 days on a Pentium III PC with 256MB RAM). An alternative approach is to put the model into a Bayesian framework (see Huber and Train, 2001, for a discussion of similarities between classical and Bayesian estimation in a choice modeling context). For such a Bayesian approach, we need to specify prior distributions for α_r, $\boldsymbol{\beta}_r$, $\boldsymbol{\theta}_r$, and u_{ir}. With small samples this choice can be critical, but with larger samples (such as in this application) the choice is less crucial, since information in the data heavily outweighs information in the prior. Thus, we give α_r, $\boldsymbol{\beta}_r$, and $\boldsymbol{\theta}_r$ flat (uninformative) priors, while specifying a multivariate normal exchangeable prior for the subject-level errors,
$\boldsymbol{u}_i = (u_{i,1}, u_{i,2}, u_{i,3})^T \sim \mathrm{N}(\mathbf{0}, \boldsymbol{\Gamma}^{-1})$, where $\mathbf{0}$ is a column vector of zeros and $\boldsymbol{\Gamma}^{-1}$ is a 3×3 covariance matrix. We then specify a hyper-prior distribution for the inverse covariance matrix, $\boldsymbol{\Gamma} \sim \text{Wishart}(\boldsymbol{R}, 3)$, where $\boldsymbol{R}$ can be considered a prior estimate of $\boldsymbol{\Gamma}^{-1}$ based on 3 observations, and, to represent vague prior knowledge, degrees of freedom for the Wishart distribution is set as small as possible at 3 (the rank of $\boldsymbol{\Gamma}$). We give $\boldsymbol{R}$ values of ten along the diagonal and zero elsewhere; sensitivity analysis, discussed below, confirms that these values have little effect on results.
We used WinBUGS (Spiegelhalter et al., 2002) software to generate posterior samples for α_r, $\boldsymbol{\beta}_r$, $\boldsymbol{\theta}_r$, and u_{ir}. WinBUGS facilitates Bayesian analysis of complex statistical models using Gibbs sampling, a Markov chain Monte Carlo (MCMC) technique. To aid computation, Age was standardized using its sample mean and standard deviation.

Model Assessment

We first fit a model with common product and subject covariate effects across logits (model 1). Four chains of 22,500 iterations each for this model produced trace plots with a good degree of

mixing, and various MCMC convergence diagnostics indicated convergence. In particular, after discarding 10,000 burn-in samples and thinning to retain every tenth sample to reduce autocorrelation (leaving a total of 5,000 posterior samples), the 0.975 quantiles of the corrected scale reduction factor (Brooks and Gelman, 1998, p.438) for the α_r, $\boldsymbol{\beta}_r$, and $\boldsymbol{\theta}_r$ parameters were each less than 1.2.

We fit more complex models in a similar way: allowing subject covariate effects to vary by logit (model 2), allowing product covariate effects to vary by logit (model 3), and allowing both product and subject covariate effects to vary by logit (model 4). We also investigated whether the inclusion of product-subject interactions could improve the fit of the model. In particular, we incorporated all possible interactions between the 14 product level covariates and three of the subject level covariates (Rarely, Sometimes, and Often) into model 1. Then we iteratively removed interactions with little explanatory ability (large posterior standard deviations relative to means) until the number of interactions was reduced to 24 (model 5). It is straightforward to add interaction terms to equation (1) using $\boldsymbol{\eta}$ (say) to represent the interaction effects.

Table 1 compares the models with respect to minus twice log-likelihood values, Akaike's Information Criterion (Akaike, 1973), Bayesian (or Schwarz's) Information Criterion (Schwarz, 1978), and Deviance Information Criterion (Spiegelhalter et al., 2002). Model 0 is model 1 without random effects. Model 3 has the lowest AIC value and the second lowest BIC and DIC values, and appears to offer the most reasonable compromise between parsimony and fitting the sample data well.

[TABLE 1 ABOUT HERE]

Finally, we carried out a small sensitivity analysis for $\boldsymbol{R}$, the prior estimate of the covariance matrix. Increasing (decreasing) the elements of $\boldsymbol{R}$ by a factor of 10 lead to changes in model parameter posterior means averaging 0.04 (0.02) in absolute value.

EMPIRICAL RESULTS

Subjects who chose the SRP at all three price points were the most responsive to the socially responsible benefits. As they did not demonstrate any resistance to the premium price, they may have employed the heuristic of always selecting the SRP over the conventional version. Those who chose the SRP twice (at the two lower price differences) demonstrated a lesser commitment to those benefits in the face of having to pay a high premium. Those who chose the SRP once (at the lowest price difference) demonstrated some interest in the socially responsible benefits associated with that product, but the lowest level of commitment to them. Those who never chose the SRP within each purchasing situation are the least responsive to the particular socially responsible benefits associated with it. They may have some interest in one or more of those benefits, but not enough to pay the lowest level of price premium represented in this study. These subject preferences thus reflect willingness to pay for socially responsible benefits, ranging from high to low as the number of times the SRP was chosen decreases from three to zero.

Results from fitting the ACL random effects model provide insight into how subjects are distributed along the willingness to pay continuum across purchasing situations, for different perceived socially responsible benefits, and across varying demographics. Summary statistics for the posterior samples of the parameters for model 3 (product covariate effects vary by logit, but

subject covariate effects are common across logits) are presented in Tables 2, 3, and 4.

[TABLES 2, 3, AND 4 ABOUT HERE]

The means of the posterior samples provide point estimates for the model parameters, while the standard deviations provide measures of precision. The 95 percent "highest posterior density" (HPD) intervals provide an alternative indication of the covariates' effects along with estimation precision. Those 95 percent HPD intervals that exclude zero are roughly equivalent to classical statistical significance at the $p < 0.05$ level. Odds ratio estimates in the column headed "exp(Mean)" indicate the multiplicative impact on the odds of selecting the SRP rather than the conventional version, where the odds are defined as the probability of selecting the SRP three times divided by the probability of selecting it twice (or probability of selecting twice divided by probability of selecting once, or probability of selecting once divided by probability of selecting zero times).
The choice of reference levels for the indicator variables dictate that the intercept parameters represent the car purchasing situation for female sophomores, juniors or seniors who never consider sustainability issues when buying products, and who do not consider there to be any major potential benefits from selecting the SRP in this situation. The results for the other eight purchasing situations in Table 2 therefore represent effects relative to those for the car. The results in Table 3 represent effects that can be related specifically to the benefits that are thought to arise from selecting the SRP. Finally, the results in Table 4 represent subject effects for age (standardized), gender (male relative to female), year (freshman relative to sophomores, juniors and seniors), and how often sustainability issues are considered when buying products: rarely, sometimes, or often (relative to never).

Purchasing Situation Effects

An alternative to modeling multinomial responses with adjacent-categories logits uses baseline-category logits instead. These logits have a common divisor (for the baseline-category) and in this application can be defined

$$\log\left(\frac{\pi_{ijr}}{\pi_{ij4}}\right), \quad r = 1, 2, 3$$

to compare subjects selecting SRPs three times, twice, or once to those that never select them. However, in ordinal settings such as our application, baseline-category logit models are less powerful than the ACL model which exploits the fact that the responses have a natural monotone ordering. Nevertheless, even when fitting an ACL model, it can be illuminating to express the resulting adjacent-categories logits as baseline-categories logits since these often have a more intuitive interpretation.
For example, since

$$\log\left(\frac{\pi_{ijr}}{\pi_{ij4}}\right) = \sum_{s=r}^{3} \log\left(\frac{\pi_{ijs}}{\pi_{ij,s+1}}\right), \quad r = 1, 2, 3$$

then the estimated odds that the socially responsible car was selected three times instead of never are exp(−1.836−2.177+0.677) = 0.036 (for female sophomores, juniors or seniors who never consider sustainability issues when buying products, and who do not consider there to be any

major potential benefits from selecting the SRP in this situation). Similarly, the odds of selecting the socially responsible car twice instead of never are exp(−2.177+0.677) = 0.223, while the odds of selecting the socially responsible car once instead of never are exp(0.677) = 1.968. These quantities can be compared with similar measures for the other purchasing situations. For example, the odds of selecting the socially responsible washer three times instead of never are exp(−1.836−2.177+0.677+0.998+0.281−0.187) = 0.106, twice rather than never are exp(−2.177+0.677+0.281−0.187) = 0.245, and once rather than never are exp(0.677−0.187) = 1.632. Posterior samples for such quantities for all the situations are summarized in Figure 5. Situations are ordered from left to right by their estimated odds ratios within each part of the figure, where the upper section compares selecting the SRP three times to never selecting it, the middle section compares twice to never, and the lower section compares once to never.

[FIGURE 5 ABOUT HERE]

For which purchasing situation is the SRP most preferred? The answer is complex. Figure 5 depicts the estimated odds ratios for selecting the SRP three, two or one times in each situation for comparisons against the baseline case where the SRP was never chosen. Being chosen once versus never reflects the increased odds in a comparison between some interest in the socially responsible benefits represented in this study but little commitment to them, versus no sensitivity to those benefits. None of the other situations had greater increased odds than the car in that comparison (the estimated odds ratio for the washer was almost as high, however). Being chosen twice versus never reflects the increased odds in a comparison between a strong commitment to the socially responsible benefits in the face of having to pay a higher premium, versus no sensitivity to those benefits. The results are very similar to the previous comparison, although the estimated odds ratio is slightly higher for the washer than for the car. Being chosen three times versus never reflects the increased odds in a comparison between maximum sensitivity to the socially responsible benefits, versus no sensitivity to those benefits. Again, the washer is the only situation where the increased odds were higher than the car in that comparison.
Further information on the relative ordering of the seven other purchasing situations is also available in Figure 5. For example, while choosing the SRP for the athletic shoes was consistently rare across the purchasing situations, the laundry detergent had little appeal for those selecting the SRP two or three times versus never, but more appeal (relative to other purchasing situations) for those selecting the SRP once rather than never. Such a pattern indicates that producers of socially responsible athletic shoes need to price their shoes very competitively to have any hope of competing with conventional producers, whereas socially responsible laundry detergent can probably gain appreciable market share even at a higher price than conventional detergent, as long as the premium is not too high—this study suggests that this premium threshold might be in the $16\frac{2}{3}$ to $33\frac{1}{3}$ percent range.

Socially Responsible Benefit Effects

As for perceived socially responsible benefits, the estimated odds that a SRP was selected three times instead of never are increased by exp(0.191+0.055+0.378) = 1.866 times when the product is considered to be organic. The increased odds for selecting an organic SRP twice instead of never are exp(0.055+0.378) = 1.542 times, while that for selecting an organic SRP once instead of never are exp(0.378) = 1.459 times. Posterior samples for such quantities for all the major benefit

effects are summarized in Figure 6.

[FIGURE 6 ABOUT HERE]

Figure 6 depicts increased odds for socially responsible benefits using the same choice comparisons as Figure 5. The relative benefit comparisons from bottom to top of the figure (choosing the SRP one time versus never choosing it, twice versus never, and three times versus never) reflect increasing commitment to the SRP in the face of higher price premiums. For some benefits, such as organic agriculture, the increased odds reflect a fairly consistent relative advantage over other benefits in all three comparisons. Increased odds for other benefits have a more complex pattern. For example worker's rights seems to have an effect in the once versus never comparison, but not the other two. That is, there seems to be some sensitivity to worker's rights but relatively little commitment to them as the price differential increases. Note that each benefit appears to affect choice, some more than others, and differentially for people at different points of the "conventional-socially responsible spectrum."

Generally, the odds ratios in Figure 6 increase from once versus never, through twice versus never and three times versus never. This could be interpreted as subjects selecting SRPs more often being more likely to associate their purchasing behavior with external benefits. However, interactions within the different types of benefit also can result in counter-intuitive patterns, such as occurs for animal rights. Perhaps there are complex trade-offs causing this apparent behavior—people that make product choices that take into account animal welfare are willing to pay a premium (two times choosers) as long as it's not too excessive (three times choosers); on the other hand people that make socially responsible product choices only when the price difference is quite small (one time choosers) aren't responding to animal welfare issues at all.

In interpreting Figures 5 and 6 it may be useful to recall the number of choices represented in Figure 1. For example, choosing a SRP three times was relatively rare. It is also important to emphasize that the benefits associated with each choice situation reflect the benefits which each subject indicated were present (for example, if a subject thought that organic apples included a benefit for workers rights, that is how it was modeled).

Subject Demographic Effects

Finally, subject effects are modeled as common across logits. For example, the estimated odds that a SRP was selected three times instead of twice (or twice instead of once, or once instead of zero times) are increased by exp(1.607) = 4.986 times for subjects that claim to consider sustainability issues often, nearly always, or always over those that never consider such issues (or who "don't know"). Posterior samples for such quantities for all the subject covariates are summarized in Figure 7.

[FIGURE 7 ABOUT HERE]

As we might expect, the increased odds for subjects choosing an SRP do not seem to be affected by age or whether the subject was in their first year in college or not. However, there was a difference between males and females, with males estimated to be 21.5 percent more likely than females to select the SRP three times rather than twice (or twice rather than once, or once rather than never). Also, the increased odds ratios for the Rarely, Sometimes and Often categories clearly provide validation for the self-reported scale items measuring how often subjects consider

sustainability issues. More generally these results illustrate how such odds ratios can be used to cross validate self-reported preferences or attitude scales in other contexts.

Self-reported Revealed Preferences

One well-known limitation to surveys of this nature is that "stated preferences" in an experimental situation can vary considerably from "revealed preferences" in real purchasing situations. To provide some insight into this issue, we collected information on whether subjects claimed to have purchased SRPs or conventional products most often for each of the purchasing situations in the last year. This information essentially amounts to self-reported revealed preferences, and as such will be subject to similar limitations as stated preference data, although hopefully to a lesser degree. Nevertheless, the major focus of this study is relative effects across different purchasing situations and demographics, rather than absolute predictions of market share for SRPs versus conventional products. Analysis of self-reported revealed preferences can provide useful information about how relative effects here compare with those in the stated preference analysis. We fit a random effects logistic regression model to these data, where the response variable is coded 1 if the subject claimed to have purchased the SRP most often in the last year and 0 if the conventional version was selected most often. Responses of "don't know" (which also includes circumstances in which the subject had not purchased the type of product in question) were excluded from this analysis; this left 2263 observations compared to $395 \times 9 = 3555$ observations for the stated preference analysis. The same covariates as for the stated preference analysis were used to enable easy comparison, although since the response is dichotomous here rather than polytomous there is just one logit (which compares selecting the SRP to selecting the conventional version). Summary statistics for the posterior samples of the parameters for this model are presented in Table 5.

[TABLE 5 ABOUT HERE]

A number of interesting comparisons can be made between these results and the previous stated preference results. To some extent, differences in the two sets of results reflect restricted opportunities to purchase in reality relative to the stated preference experiment. However, since the revealed preference analysis was conducted only for products actually purchased, relative effects can be compared. For the purchasing situations, estimated odds ratios from the revealed preference logistic model are similar to those for the "choose twice versus never" logit from the stated preference ACL model for all situations except the wine, the washer, and the car. If the self-reported revealed preferences and stated preferences can be considered to be equally reliable, this suggests that the survey subjects mostly experienced the intermediate price premium for SRPs over conventional products in the last year.

For the wine situation however, the revealed preference odds ratio ($\exp(-3.945+1.099) = 0.058$) is proportionately much higher than the stated preference odds ratio for choose twice versus never ($\exp(-2.177+0.677-1.235-1.395) = 0.016$). Organic wine was apparently relatively more popular in the revealed preference experiment than in the stated preference experiment. The opposite occurs for the car and the washer. For example, for the car the revealed preference odds ratio ($\exp(-3.945) = 0.019$) is proportionately much lower than the stated preference odds ratio for choose twice versus never ($\exp(-2.177+0.677) = 0.223$).

With regard to benefit effects, for reduced pollution, workers' rights, and human health, the

estimated odds ratios from the revealed preference logistic model are again similar to those for the choose twice versus never logit from the stated preference ACL model. However, natural resources was more influential in the revealed preference experiment (odds ratio of exp(0.309) = 1.362) than in the stated preference experiment (odds ratio for choose twice versus never of exp(−0.148+0.081) = 0.935). On the other hand, organic agriculture and animal welfare were both far less influential in the revealed preference experiment than in the stated preference experiment.

Finally, demographic effects tended to be larger in the revealed preference experiment than in the stated preference experiment. For example, males were 57.9 percent more likely than females to claim to have selected the SRP over the conventional product most often in the last year, compared with an increase of 21.5 percent when selecting the SRP three times rather than twice (or twice rather than once or once rather than never) in the stated preference experiment.

DISCUSSION

The current study illustrates a novel experimental choice task and introduces to the marketing literature the unique method for analyzing its results. The experimental choice task is one in which subjects make repeated choices among alternatives in multiple product categories, and more than two choice alternatives in each product category are fully ordered. Specifically, in the current study subjects were repeatedly presented with a choice between socially responsible and less socially responsible but lower priced versions of a product under different relative price conditions. In each product category, the number of times each subject chose the SRP reflected commitment to it in the face of an increasing price premium. The multinomial adjacent-categories logit (ACL) random effects model (Hartzel, Agresti, and Caffo, 2001) is uniquely appropriate to this situation.

We do not claim general superiority for the current study's choice model over other experimental choice designs. Conjoint analysis has been employed frequently and successfully to study relative influence among product attributes, including pro-social ones (e.g. Sriram and Forman, 1993). Covariance structure models have been used to test relationships among predictors of environmentalist and other pro-social attitudes, and attitudes toward SRPs and the companies that make them (Brown and Dacin, 1997; Follows and Jobber, 2000). However, the ACL model allows us to compare the proportional odds across ordered categories of choices. Comparisons across such ordered categories can produce insights that are not otherwise available. In the current application we can assess subjects' relative levels of commitment across various types of social responsibility and across multiple product categories.

The ACL model also can be used in conjunction with other methods to triangulate results. In the current study, increased odds ratios for choosing SRPs clearly provide validation for the self-reported scale items measuring how often subjects consider sustainability issues. Such odds ratios can be used to cross validate self-reported preferences or attitude scales in other contexts.

Although we view the contribution of the current study to be primarily methodological, it is useful to place the current study within the context of previous findings regarding consumer sensitivity to social responsibility and preferences for SRPs. There is growing evidence that some buyers do consider environmental impact, causes, or other non-economic criteria, when making product choices (e.g. Drumwright, 1994; Sen and Bhattacharya, 2001). Similarly, the current

study shows that some consumers report a preference for products made in such a way as supports their personal beliefs about such issues as environmental protection, worker's rights, or "ethical" treatment of animals.

This non-economic dimension of choice behavior then becomes the basis for marketing strategies predicated on environmental sensitivity, business sustainability, or the support of particular causes. Research suggests that the effectiveness of these strategies depends both on characteristics of consumer segments and on the way they process information relevant to product choices. For example, Shrum, McCarty, and Lowrey (1995) studied advertising to "green" consumers, who tended to be opinion leaders, careful shoppers, and knowledgeable information seekers. They reported that only consumers who were active information seekers were willing to switch from their current brand to an environmentally safer but less effective brand. Osterhus (1997) examined factors that lead people to respond favorably to SRP claims. He reported that the success of pro-social influence strategies depends on whether consumers trust the source of the claims and whether they think consumers are responsible for the effects of consumption (such as environmental damage). Sen and Bhattacharya (2001) similarly reported that a number of variables mediate or moderate the effect of pro-social positioning on purchase intent.

Evidence that pro-social product claims do not translate directly into behavior, suggests the importance of methods for examining the complexities of consumer trade-offs. The current study demonstrates one such method for examining relative commitment to SRPs across products and non-economic criteria.

Limitations

It was not our purpose to assess sensitivity to SRPs for particular causes or particular product categories, but rather to illustrate a potentially useful method of assessment. The current study used a convenience sample of undergraduate students; therefore descriptive results cannot be generalized to any population.

As previously reported, some subjects gave responses indicating either difficulty with the choice task, or low motivation to consider the alternatives. Subjects giving results that seemed suspiciously random (willingness to purchase an SRP only at a much higher price but not at a moderately higher price, for example) were given an opportunity to reconsider their responses in full. Analyses with and without these changes affected only the amount of noise in the data, however.

It seems likely that choices in the current situation sometimes reflect choice heuristics rather than precise trade-offs between price and socially responsible dimensions. Subjects who never chose the SRP at any premium price may have simply employed the simplifying heuristic of not considering any non-performance dimension. Subjects who chose the SRP all 3 times may have employed the heuristic of always choosing the most socially responsible product. Despite the use of such heuristics, the current study did permit assessment of increasing levels of commitment to a particular SRP or benefit.

It was obvious in the current study that one product version in each category represented someone's idea of greater sustainability or social responsibility. Such choices are subject to a social desirability bias that over-represents the true level of concern with social responsibility. It is therefore more appropriate to look at the results for benefits or products relative to each other

rather than in absolute terms. The analysis of self-reported revealed preferences provided some insight into this issue.

Finally, the current study assumed that the lowest acceptable price premium for an SRP is zero. It is conceivable that some subjects might actually prefer products that waste resources or employ animal testing, perhaps as a reaction against political correctness. The authors find this viewpoint unlikely in the current sample; however, it may be an interesting question to pursue in future research using different subject populations.

APPENDIX: PRODUCT CHOICE SURVEY

Instructions

Consider the following situations and select the option you would most likely choose if you were buying the product in question. In each situation, the prices and purchase incentives for the products vary; make sure you consider this information carefully when making your choices. You are asked to make **three** choices for each situation, each one under different price/incentive combination sets. You can make different choices for the three different sets, e.g. product A for set 1, product B for sets 2 and 3. **Assume that each pair of products (A and B) is identical in all respects other than the particular features mentioned (i.e. comparable size, quality, and other features not mentioned).** Select (click) the appropriate button for each choice you make.

An **example** is shown below. This person prefers product B for sets 1 and 2, and product A for set 3.

Situation 9: You'd like to buy a new car, preferably a 4-door compact sedan.

Product A: "hybrid" gas/electric 4-door compact sedan (gets 52/45 miles per gallon city/highway)

Product B: conventional 4-door compact sedan (gets 25/30 miles per gallon city/highway)

	Product A: $20,700	Product B: $13,800
set 1: $2,300 off your income taxes for product A	◯	⊙
set 2: no incentive for either product	◯	⊙
set 3: $4,600 off your income taxes for product A	⊙	◯

Please make your choices for the following **nine** situations. Be careful not to make any irrational choices, otherwise you will not get the extra credit for BA 101. For example, in the situation above, selecting product A for set 1 but product B for set 3 would be irrational. After making your choices, please also complete the additional information in the survey. Thank you for your assistance. Submit your survey by clicking on the button at the end.

Situation 1: You are doing the weekly grocery shopping and wish to buy a 5 pound bag of apples.

Product A: unwaxed apples produced organically (minimal use of chemical pesticides and herbicides, and farming practices aim to maintain ecological harmony)

Product B: conventionally grown apples

	Product A: $5.40	Product B: $3.60
set 1: no incentive for either product	◯	◯
set 2: in-store coupon for $0.60 off product A	◯	◯
set 3: in-store coupon for $1.20 off product A	◯	◯

Situation 2: You have to wake up before your next class, so you need to get a cup of coffee.

Product A: conventional coffee

Product B: coffee that is organic, "shade grown" (coffee grows under a tree canopy and does not require clear-cutting the forest), and "fair trade" (importers pay a higher-than-market price to farmers to ensure a living wage)

	Product A: $1.80	Product B: $2.70
set 1: in-store coupon for $0.60 off product B	◯	◯
set 2: no incentive for either product	◯	◯
set 3: in-store coupon for $0.30 off product B	◯	◯

Situation 3: You are doing the weekly grocery shopping and wish to buy a dozen eggs.

Product A: conventional (factory-farmed) eggs

Product B: organic "free-range" eggs (hens are fed an organic diet with no antibiotics and are not housed in small battery cages)

	Product A: $2.40	Product B: $3.60
set 1: no incentive for either product	◯	◯
set 2: in-store coupon for $0.40 off product B	◯	◯
set 3: in-store coupon for $0.80 off product B	◯	◯

Situation 4: You need to get some laundry detergent powder for use in an automatic washer; you figure enough for 40 loads will get you through the next quarter.

Product A: conventional name-brand laundry detergent

Product B: "environmentally friendly" laundry detergent (biodegradeable, not tested on animals, and free of fragrances and dyes that can cause allergic reactions)

	Product A: $6.00	Product B: $9.00
set 1: no incentive for either product	◯	◯
set 2: in-store coupon for $2.00 off product B	◯	◯
set 3: in-store coupon for $1.00 off product B	◯	◯

Situation 5: You're going to a dinner party and want to take a bottle of wine along.

Product A: organic wine (grapes grown organically with workers not exposed to pesticide sprays, and wine contains no animal-derived products)

Product B: non-organic wine

	Product A: $12.60	Product B: $8.40
set 1: product A on sale for $2.80 off	◯	◯
set 2: no incentive for either product	◯	◯
set 3: product A on sale for $1.40 off	◯	◯

Situation 6: Your old sports shoes are falling apart, so you need to buy some new ones.

Product A: name-brand athletic footwear made from leather

Product B: man-made athletic footwear that is "labor friendly" (produced by a company with a strong commitment to protecting workers' rights)

	Product A: $48	Product B: $72
set 1: product B on sale for $16 off	◯	◯
set 2: product B on sale for $8 off	◯	◯
set 3: no incentive for either product	◯	◯

Situation 7: You've received $15,000 of inheritance money that you are required to invest in a mutual fund as a condition of the inheritance.

Product A: "socially responsible" large growth fund that invests only in companies with strong environmental impact policies and practices, and respect for human rights around the world

Product B: conventional large growth fund

	Product A	Product B
set 1: front-load fees of 2.67% ($400) for product A, 2% ($300) for product B	◯	◯
set 2: front-load fees of 2.33% ($350) for product A, 2% ($300) for product B	◯	◯
set 3: front-load fees of 3% ($450) for product A, 2% ($300) for product B	◯	◯

Situation 8: You've had enough of going to the Laundromat, and want to buy an automatic washing machine.

Product A: conventional top-loader

Product B: energy-efficient front-loader (uses about half the electricity and a third less water than the top-loader)

	Product A: $540	Product B: $810
set 1: $90 off your income taxes for product B	◯	◯
set 2: $180 off your income taxes for product B	◯	◯
set 3: no incentive for either product	◯	◯

Situation 9: You'd like to buy a new car, preferably a 4-door compact sedan.

Product A: "hybrid" gas/electric 4-door compact sedan (gets 52/45 miles per gallon city/highway)

Product B: conventional 4-door compact sedan (gets 25/30 miles per gallon city/highway)

	Product A: $20,700	Product B: $13,800
set 1: $2,300 off your income taxes for product A	◯	◯
set 2: no incentive for either product	◯	◯
set 3: $4,600 off your income taxes for product A	◯	◯

Additional Information (all responses will be kept confidential and you will not be added to any mailing lists).

Carefully enter your 4 digit BA 101 class ID and your e-mail address to make sure you get the extra credit.

Class ID (4 digits): ☐

E-Mail Address: ☐

Check off the following choices that you have made **most often** in the last year. Only select choices you have actually made that are very similar to the situations described. If you don't know which choice you've made most often, or you haven't purchased the type of product in question, select "don't know."

	product A	product B	don't know
A: organic apples or B: conventional apples	◯	◯	◯
A: conventional coffee or B: organic, shade grown, fair trade coffee	◯	◯	◯
A: conventional eggs B: organic, free-range eggs	◯	◯	◯
A: conventional laundry detergent or B: environmentally friendly laundry detergent	◯	◯	◯
A: organic wine or B: non-organic wine	◯	◯	◯
A: name-brand, leather athletic shoes or B: labor friendly, man-made athletic shoes	◯	◯	◯
A: socially responsible mutual fund or B: conventional mutual fund	◯	◯	◯
A: top loader washing machine or B: front loader washing machine	◯	◯	◯
A: hybrid gas/electric car or B: conventional car	◯	◯	◯

Consider the **major** potential benefits of your purchasing one type of product over another for each of the nine situations. In particular, think about the following benefits:

Natural resources: reduces use of natural resources such as fossil fuels and trees

Reduced pollution: lowers amount of pollution dispersed into the air, land or water

Organic agriculture: promotes and enhances biodiversity, biological cycles and soil biological activity, and restores, maintains and enhances ecological harmony

Workers' rights: protects human rights of laborers around the world with respect to wages, working conditions, and health/safety

Human health: reduces potential adverse effects on human health, either for the actual *consumer* or for other affected by *use* of the product (don't include workers' health in this category)

Animal welfare: improves the well-being of animals and lessens their exploitation

Select **up to three** of the benefits above from purchasing each of the following products rather than the conventional alternatives (i.e. you could check 1, 2, or 3 boxes for each product). Make sure a "check" appears in the boxes you wish to select; if the box just turns gray, you need to click again to make the check appear.

	natural resources	reduced pollution	organic agriculture	workers' rights	human health	animal welfare
Unwaxed apples produced organically (minimal use of chemical pesticides/herbicides, farming practices aim to maintain ecological harmony)	☐	☐	☐	☐	☐	☐
Coffee that is organic, shade grown (no clear-cut forest), and fair trade (importers pay higher-than-market price to farmers to ensure living wage)	☐	☐	☐	☐	☐	☐
Organic free-range eggs (hens fed organic diet with no antibiotics and not housed in small battery cages)	☐	☐	☐	☐	☐	☐
Environmentally friendly laundry detergent (biodegradeable, not tested on animals, free of fragrances/dyes that can cause allergic reactions)	☐	☐	☐	☐	☐	☐
Organic wine (grapes grown organically, workers not exposed to pesticide sprays, wine contains no animal-derived products)	☐	☐	☐	☐	☐	☐
Man-made athletic shoes that are labor friendly (produced by company with strong commitment to protecting workers' rights)	☐	☐	☐	☐	☐	☐
Socially responsible mutual fund that invests only in companies with strong environmental impact policies/practices, respect for human rights around the world	☐	☐	☐	☐	☐	☐
Energy-efficient front loader washing machine (uses about half the electricity and a third less water)	☐	☐	☐	☐	☐	☐
Hybrid gas/electric 4-door compact sedan car (gets 52/45 miles per gallon city/highway)	☐	☐	☐	☐	☐	☐

What is your age? ☐

Gender: ◯ Male ◯ Female

Year at UO: ◯ Freshman ◯ Sophomore ◯ Junior ◯ Senior ◯ Other (please specify)

If you selected other please specify: ☐

Student status: ◯ Domestic ◯ International

How would you describe the degree to which you consider sustainability issues when making purchasing decisions? (Select One)

never	◯
rarely	◯
sometimes	◯
often	◯
nearly always	◯
always	◯
don’t know	◯

When you’ve completed the survey, please submit it by clicking below.

Submit Survey

Table 1

MODEL COMPARISON: MINUS TWICE LOG-LIKELIHOOD VALUES (-2LL), AKAIKE'S INFORMATION CRITERION (AIC), BAYESIAN INFORMATION CRITERION (BIC), AND DEVIANCE INFORMATION CRITERION (DIC)

Model	Covariate effects		Model parameters						Fit measures			
	Product	Subject	α	$\boldsymbol{\beta}$	$\boldsymbol{\theta}$	$\boldsymbol{\eta}$	$\boldsymbol{\Gamma}$	Total	-2LL	AIC	BIC	DIC
0	Common	Common	3	14	6	0	0	23	8289	8335	8477	8334
1	Common	Common	3	14	6	0	6	29	5034	5092	5271	6433
2	Common	Vary by logit	3	14	18	0	6	41	5032	5114	5367	6426
3	Vary by logit	Common	3	42	6	0	6	57	4822	4936	5288	6290
4	Vary by logit	Vary by logit	3	42	18	0	6	69	4818	4956	5382	6282
5	Common	Common	3	14	6	24	6	53	4942	5048	5375	6392

Table 2
POSTERIOR SUMMARIES FOR PURCHASING SITUATION EFFECTS

Term	Mean	S.D.	95% HPD interval		exp(Mean)
Logit 1: select SRP three times rather than twice					
Intercept	−1.836	0.407	−2.565	−1.026	0.159
Apples	−0.391	0.389	−1.161	0.352	0.676
Coffee	0.527	0.376	−0.242	1.236	1.694
Eggs	0.522	0.416	−0.338	1.306	1.685
Detergent	−0.248	0.387	−1.000	0.500	0.780
Wine	1.263	0.403	0.475	2.039	3.537
Shoes	0.593	0.434	−0.202	1.501	1.810
Fund	1.438	0.348	0.774	2.123	4.211
Washer	0.998	0.264	0.503	1.508	2.714
Logit 2: select SRP twice rather than once					
Intercept	−2.177	0.346	−2.862	−1.518	0.113
Apples	−0.815	0.322	−1.416	−0.171	0.443
Coffee	−0.423	0.337	−1.050	0.259	0.655
Eggs	−1.466	0.371	−2.193	−0.740	0.231
Detergent	−1.644	0.315	−2.251	−1.033	0.193
Wine	−1.235	0.360	−1.958	−0.559	0.291
Shoes	−0.845	0.389	−1.657	−0.120	0.429
Fund	−0.114	0.327	−0.740	0.527	0.892
Washer	0.281	0.253	−0.197	0.788	1.325
Logit 3: select SRP once rather than never					
Intercept	0.677	0.348	0.030	1.372	1.969
Apples	−1.235	0.299	−1.821	−0.646	0.291
Coffee	−1.877	0.310	−2.502	−1.282	0.153
Eggs	−0.979	0.316	−1.581	−0.356	0.376
Detergent	−1.023	0.276	−1.570	−0.503	0.360
Wine	−1.395	0.315	−2.017	−0.796	0.248
Shoes	−2.630	0.320	−3.249	−2.011	0.072
Fund	−2.288	0.291	−2.846	−1.693	0.101
Washer	−0.187	0.278	−0.710	0.381	0.829

Table 3
POSTERIOR SUMMARIES FOR SOCIALLY RESPONSIBLE BENEFIT EFFECTS

Term	Mean	S.D.	95% HPD interval		exp(Mean)
Logit 1: select SRP three times rather than twice					
Natural resources	0.258	0.200	−0.140	0.643	1.294
Reduce pollution	0.003	0.190	−0.362	0.382	1.003
Organic agriculture	0.191	0.258	−0.301	0.703	1.211
Workers' rights	0.004	0.250	−0.462	0.500	1.004
Human health	0.285	0.184	−0.090	0.635	1.330
Animal welfare	−0.304	0.238	−0.747	0.190	0.738
Logit 2: select SRP twice rather than once					
Natural resources	−0.148	0.175	−0.480	0.205	0.863
Reduce pollution	0.217	0.178	−0.107	0.590	1.242
Organic agriculture	0.055	0.223	−0.370	0.504	1.056
Workers' rights	−0.292	0.231	−0.738	0.180	0.747
Human health	−0.097	0.165	−0.415	0.232	0.908
Animal welfare	0.735	0.216	0.318	1.164	2.085
Logit 3: select SRP once rather than never					
Natural resources	0.081	0.148	−0.206	0.366	1.084
Reduce pollution	−0.099	0.147	−0.394	0.179	0.906
Organic agriculture	0.378	0.184	0.018	0.729	1.459
Workers' rights	0.252	0.189	−0.130	0.612	1.287
Human health	0.187	0.136	−0.079	0.452	1.205
Animal welfare	−0.246	0.175	−0.590	0.097	0.782

Table 4
POSTERIOR SUMMARIES FOR SUBJECT DEMOGRAPHIC EFFECTS
(COMMON ACROSS LOGITS)

Term	Mean	S.D.	95% HPD interval		exp(Mean)
Age	−0.034	0.052	−0.136	0.068	0.966
Gender	0.195	0.095	0.006	0.370	1.215
Year	0.103	0.107	−0.109	0.303	1.109
Rarely	0.306	0.212	−0.097	0.719	1.358
Sometimes	0.983	0.200	0.593	1.357	2.673
Often	1.607	0.213	1.173	2.009	4.986

Table 5
POSTERIOR SUMMARIES FOR SELF-REPORTED REVEALED PREFERENCES

Term	Mean	S.D.	95% HPD interval		exp(Mean)
Intercept	−3.945	0.582	−5.054	−2.822	0.019
Apples	−0.074	0.348	−0.754	0.600	0.929
Coffee	−0.018	0.384	−0.767	0.747	0.982
Eggs	0.351	0.385	−0.394	1.116	1.421
Detergent	−0.496	0.327	−1.141	0.139	0.609
Wine	1.099	0.389	0.335	1.871	3.001
Shoes	−0.619	0.386	−1.406	0.129	0.538
Fund	0.158	0.377	−0.607	0.898	1.171
Washer	1.198	0.312	0.589	1.802	3.313
Natural resources	0.309	0.175	−0.033	0.645	1.363
Reduce pollution	0.113	0.179	−0.235	0.458	1.120
Organic agriculture	0.099	0.206	−0.312	0.499	1.104
Workers' rights	0.011	0.219	−0.412	0.450	1.011
Human health	0.097	0.159	−0.212	0.402	1.102
Animal welfare	−0.049	0.199	−0.436	0.332	0.953
Age	−0.028	0.105	−0.230	0.180	0.972
Gender	0.457	0.215	0.038	0.887	1.579
Year	0.271	0.236	−0.197	0.740	1.311
Rarely	0.210	0.497	−0.737	1.211	1.234
Sometimes	1.166	0.450	0.319	2.076	3.209
Often	2.733	0.481	1.819	3.718	15.379

Figure 1

PERCENTAGE OF SUBJECTS CHOOSING THE SRP THREE TIMES, TWICE, ONCE, OR NEVER

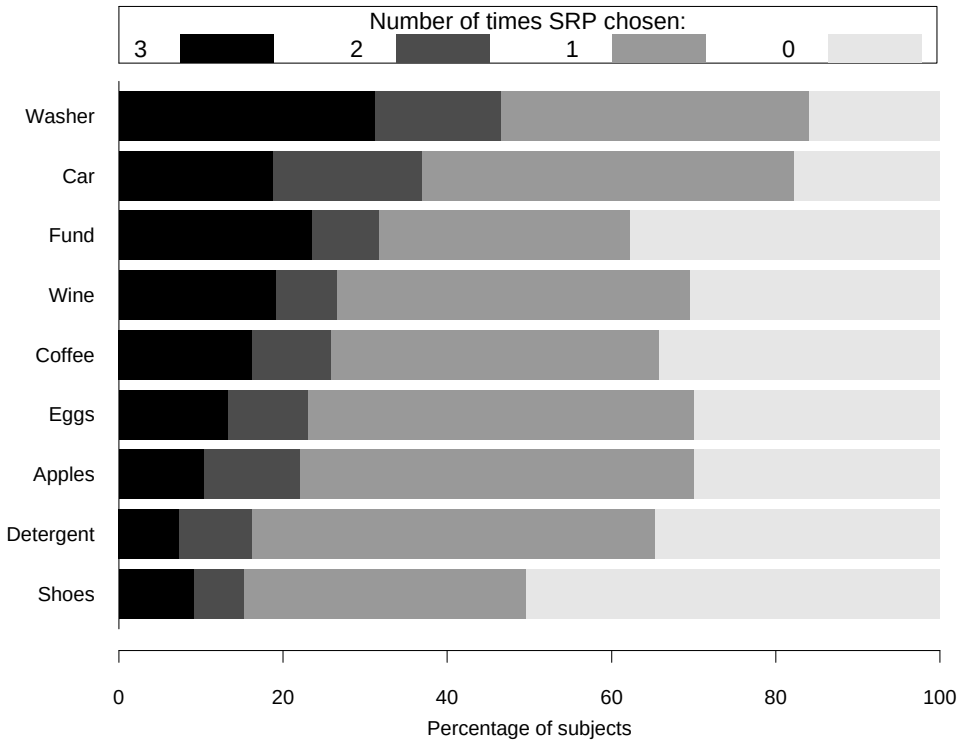


Figure 2

PERCENTAGE OF SUBJECTS CLAIMING “SUSTAINABLE,” “CONVENTIONAL,” OR “DON’T KNOW” FOR THE PRODUCT CHOICES THEY HAD MADE MOST OFTEN IN THE LAST YEAR

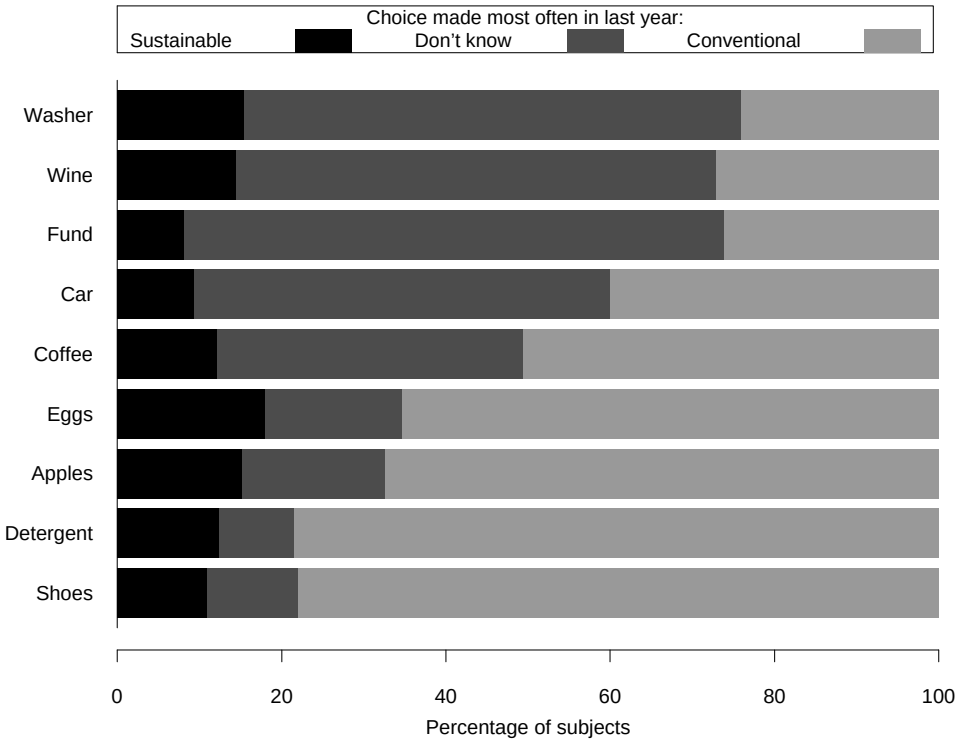


Figure 3

NUMBER OF TIMES EACH MAJOR POTENTIAL BENEFIT WAS SELECTED FOR EACH SITUATION

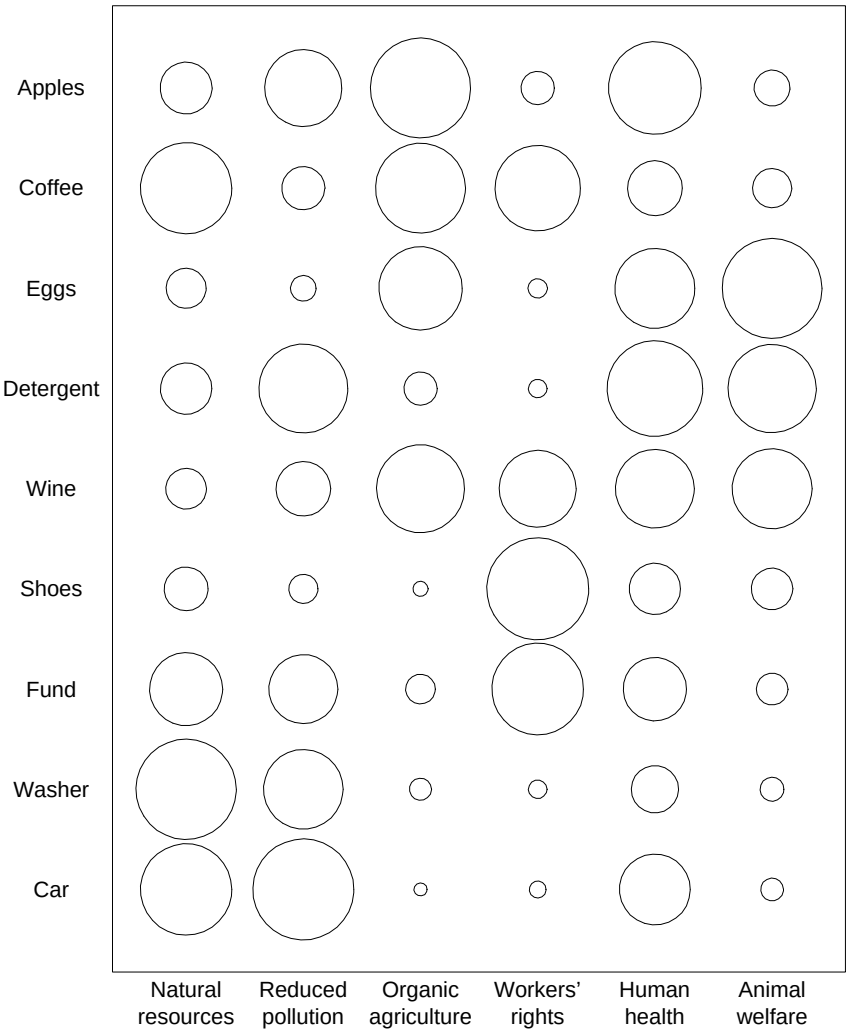
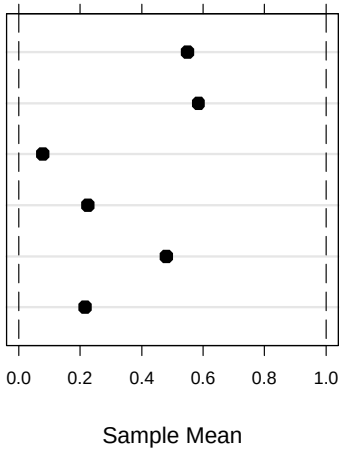


Figure 4

SAMPLE MEANS, NAMES AND DESCRIPTIONS OF SUBJECT-LEVEL COVARIATES (THE “RARELY”, “SOMETIMES”, AND “OFTEN” INDICATOR VARIABLES ARE RELATIVE TO THE “NEVER” REFERENCE CATEGORY)



Gender (1: male, 0: female)

Year (1: freshman, 0: sophomore, junior, or senior)

never consider sustainability issues when buying products

Rarely (1: rarely consider sustainability issues)

Sometimes (1: sometimes consider sustainability issues)

Often (1: often or always consider sustainability issues)

Figure 5

ESTIMATED ODDS RATIOS (THICK LINES) FOR DIFFERENT SITUATIONS (BARS ARE 95% HPD INTERVALS, DASHED LINE IS A NO EFFECT REFERENCE LINE FOR AN ODDS RATIO OF ONE)

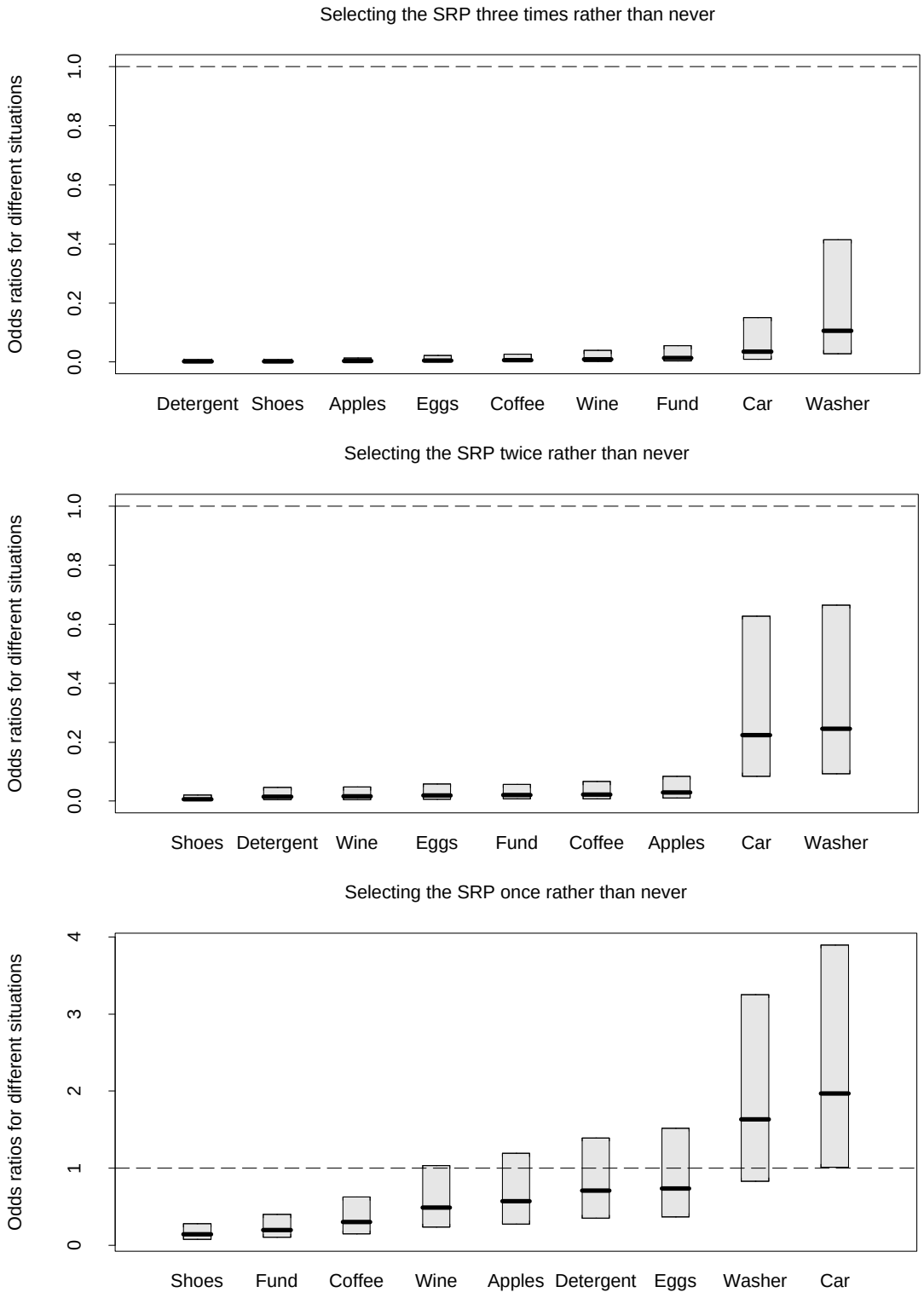


Figure 6

ESTIMATED ODDS RATIOS (THICK LINES) FOR BENEFIT EFFECTS
(BARS ARE 95% HPD INTERVALS, DASHED LINE REPRESENTS NO EFFECT)

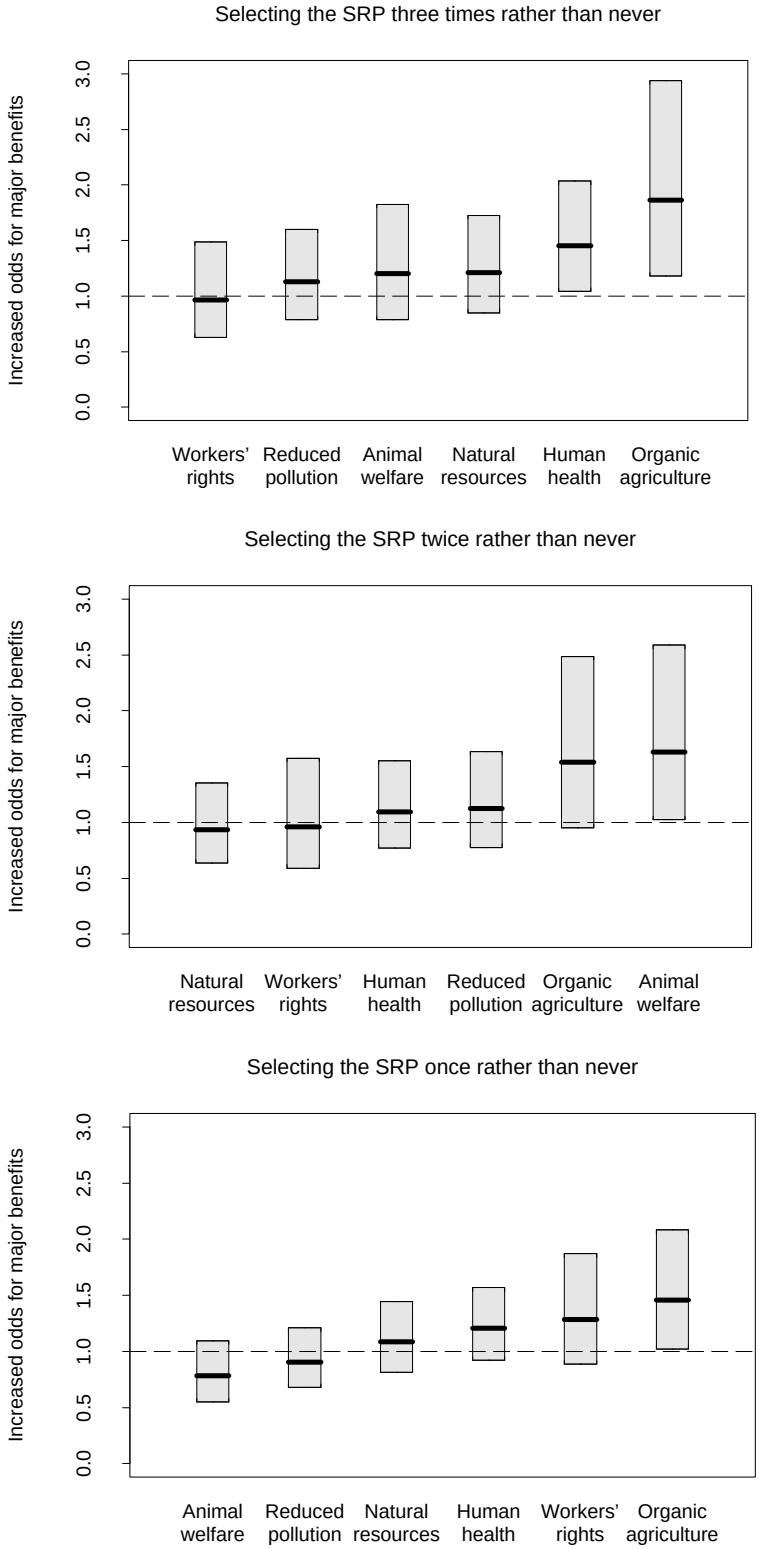


Figure 7

ESTIMATED ODDS RATIOS (THICK LINES) FOR SUBJECT EFFECTS
(BARS ARE 95% HPD INTERVALS, DASHED LINE REPRESENTS NO EFFECT)

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