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CONSUMER DEMAND FOR ECOLABELED APPLES

By

Jeffrey Raymond Blend

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Agricultural Economics

1998

ABSTRACT

CONSUMER DEMAND FOR ECOLABELED APPLES

By

Jeffrey Raymond Blend

An ecolabel is a voluntary claim that a product meets environmental standards. It offers consumers the chance to lower the harmful impacts from their consumption by buying products which are manufactured and grown in ways that cause less environmental damage. Because ecolabeling is new, it is uncertain whether consumers would buy such products and at what price.

This paper estimates average household demand and marginal willingness to pay for ecolabeled apples. It tests several hypotheses about variables which affect consumer demand for ecolabeled foods including the comprehensiveness of the ecolabeled claim, the proof offered that it is honest and various personal factors such as income and familiarity with the claim.

A theoretical model is developed which explains how ecolabeling would affect a consumer's typical apple purchasing choice. The model asserts that the consumer faces a tradeoff between their utility from apple consumption and their disutility from the environmental damage caused by its

production.

Data from a phone survey of U.S. households is used to estimate consumer demand for regular (i.e. unlabeled) apples and ecolabeled apples in markets with and without ecolabeling. Because ecolabeled apples are new, a market scenario is created in which respondents were presented with prices and descriptions of regular and ecolabeled apples and asked which they would buy and how much they would buy in a single shopping trip. A Cragg Double Hurdle model and a Tobit model are used to estimate demand for each type of apple. The Cragg model appears to be the more appropriate model for estimating demand for a single shopping trip.

The results indicate significant consumer demand for ecolabeled apples and a willingness to pay a price premium for them. This result holds regardless of how environmental claims are worded or whether proof of their validity is stated in the label. Price is a very important determinant in consumers' decisions of whether to purchase regular and ecolabeled apples. Respondents bought ecolabeled apples primarily for environmental concern and health attributes. Respondents with more education and from larger households bought more ecolabeled apples.

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To my parents and my wife Becky

ACKNOWLEDGMENTS

Research for this paper was provided by USDA, ERS Cooperative Agreement No. 43-3AEL-6-80060 and the Michigan Agricultural Experiment Station.

I am deeply grateful to my parents for all their love, support and contribution towards my current and future success in the world. They instilled in me a good work ethic, solid morals and the ability to persist in the face of challenging obstacles.

I thank my wife Becky for her love and patience. Her support greatly contributed to the quality of this work and to my time in graduate school.

I am deeply grateful to my mentor and major advisor, Eileen O. van Ravenswaay. Her assistance, dedication and encouragement throughout my graduate experience were extraordinary. She knew when to compliment my work and when to urge me beyond the limits I had previously set. She spent a great deal of time and effort developing my professional skills and boosting my confidence in what I can accomplish. I have been blessed to have such a dedicated advisor.

I would like to thank Jeff Wooldridge for his extensive help with the

statistical aspects of this paper. I thank my other two committee members, John Hoehn and Patricia Norris for their time and genuine interest in my work.

I extend my thanks to Takashi Yamano for his generous and valuable assistance with the econometrics software used in this research. I thank Frank Lupi and Scott Swinton for their support and interest. I thank Chris Edge and David Jones for their help and great friendship as well as Lorie Srivastava, Karin Steffens and Hirokatsu Asano. I am grateful to all of the other researchers not mentioned who contributed in any way to this dissertation.

My deepest respect and thanks to the art of Yoga and its invaluable contribution to my life. I thank my Yoga instructors Ruth Fisk, Rob Eschbach and Amar Gupta. Without my practice, this experience would have been much more difficult and not nearly as valuable or insightful.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Introduction[1]

Ecolabeling is a new phenomenon in agriculture. There are standards for many other safety and quality attributes of agricultural products, but environmental standards are just beginning to emerge. There are many unanswered questions about what standards consumers want and at what price.

An ecolabel is a voluntary claim that a product meets environmental standards. It signals to consumers that a particular product has caused less environmental impact than others in the same category. The purpose of an ecolabel is to offer consumers the chance to lower the harmful impacts from consumption by changing the way products are manufactured and grown. On agricultural products, ecolabels serve to promote innovative farming techniques (e.g. Integrated Pest Management (IPM), cover crops) that result

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[1]This section is adapted from Eileen O. van Ravenswaay and Jeffrey R. Blend, "Using Ecolabeling to Encourage Adoption of Innovative Environmental Technologies in Agriculture," Flexible Incentives to Promote the Adoption of Environmental Technologies in Agriculture, Frank Casey, Andrew Schmitz, Scott Swinton and David Zilberman (Eds)., Kluwer Publishers, forthcoming, *and* Jeffrey R. Blend and Eileen van Ravenswaay, "Consumer Demand for Ecolabeled Apples: Survey Methods and Descriptive Results," 1998, Department of Agricultural Economics Staff Paper No. 98-20, Michigan State University, East Lansing, MI.

in higher environmental standards than what is already required by law.

Ecolabels are much like a seal of approval. They are awarded by a public or private nonprofit organization that establishes environmental standards for product categories and certifies that products meet those standards. Thus, an ecolabel is like a seal of approval because it is a signal of high standards as well as a signal that products meet standards.

The increasing number of ecolabels in this country and others is evidence of their growing popularity worldwide. More than 20 countries and the European Community have adopted public ecolabeling programs to encourage the development of manufacturing processes and products with less environmental impact (U.S. EPA 1993a, 1993b, 1993c, 1994). In the U.S., there are several private nonprofit ecolabeling programs (e.g., Green Seal and Scientific Certification Systems) and voluntary environmental labeling programs supported by the government (e.g., EPA Energy Star Program).

The premise behind ecolabels is that environmental damage from production and consumption of a good affects the consumers of that good. Economists typically assume that environmental damage associated with production or consumption affects some third party, not the producers or

consumers in the market. In the case of ecolabels, however, it is no longer appropriate to analyze the problem as a producer externality. The consumer now faces a tradeoff because her own consumption is the ultimate cause of the environmental damage she suffers. Without an ecolabel, the consumer has only one way she can reduce the damage, namely, to consume less. With an ecolabel, she has the option of buying from a seller who has reduced the damage for her.

Marketing research has found substantial consumer interest in green products in the U.S. The most relevant marketing study comes from the Food Marketing Institute (FMI, 1997) which identified consumer segments very interested in buying green goods and paying more for them.[2] There is little research, however, on the potential demand for ecolabeled products.

This dissertation estimates potential consumer demand for ecolabeled apples. The main research question is whether consumers would buy ecolabeled apples and how much they would pay for them if they were available at their normal place of purchase. Apple demand with and without ecolabeling is estimated to measure the effect of introducing ecolabeled

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[2]One quarter of their sample was identified as being "very interested" in purchasing green products and 8% were identified as being "very interested" in paying a 10% price premium.

apples. The results have implications for producers and retailers interested in growing and selling ecolabeled foods. In particular, they gain a better idea of whether a sufficient market exists for their products.

This dissertation examines whether demand and marginal willingness to pay depend on how the ecolabel is worded. Two important dimensions of that wording are the comprehensiveness of the ecolabel's environmental claim and the form of proof given to support the claim. The results of this inquiry will give ecolabelers an indication of whether certain ecolabels would perform more effectively than others.

The dissertation examines personal factors that affect ecolabeled apple demand. Such factors include income, household size, education, one's primary motivation for purchasing the ecolabeled apples and one's familiarity with the label claim. This information is important to marketers because it pinpoints those segments of the population most likely to buy ecolabeled food items and provides potential selling points to use in marketing the ecolabels.

Finally, this dissertation tests the validity of several aspects of survey instrument design. This is done by examining whether apple purchase location, the existence of organic apples and the fact that some surveys were given after apple season affect demand. Such information may help those

who construct similar surveys.

Data from a phone survey of U.S. households is used to estimate three different apple demands: (1) regular (i.e. unlabeled) apples in a market without ecolabeling, (2) regular apples in a market with both regular and ecolabeled apples and (3) ecolabeled apples in a market with both regular and ecolabeled apples. Cragg Double Hurdle and Tobit models are estimated to determine the factors that affect demand for each type of apple.

Theory[3]

In standard economic theory, uncompensated environmental damage is usually treated as a negative production or consumption externality. In other words, the environmental damage is assumed to be borne by a party external to the product market who is unable to seek compensation from the market's participants. Consequently, the damage is not accounted for by consumers or producers in the product market and not reflected in the equilibrium price and quantity.

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[3]This section is adapted from Eileen O. van Ravenswaay and Jeffrey R. Blend, "Using Ecolabeling to Encourage Adoption of Innovative Environmental Technologies in Agriculture," Flexible Incentives to Promote the Adoption of Environmental Technologies in Agriculture, Frank Casey, Andrew Schmitz, Scott Swinton and David Zilberman (Eds)., Kluwer Publishers, forthcoming.

The premise behind ecolabels is that some of the uncompensated disutility from the environmental damage associated with production or consumption of the product is experienced by the market's consumers. For example, suppose production or consumption of a product results in wastes that harm the environment. If the consumer knows about this environmental harm and believes that she will suffer from it without any compensation, she will experience disutility from consumption. Thus, she faces a tradeoff between the marginal utility she derives from additional consumption and the marginal disutility she derives from additional uncompensated environmental damage.

Why might consumers be aware of the environmental damage from their own consumption? There is much greater appreciation today of the interdependency of ecosystems elements. Environmental science shows us that what we once regarded as separate, independent elements of the ecosphere are in fact highly interdependent. Thus, a change in one element may have many indirect effects that are only now coming to be appreciated and, thus, are not accounted for in the current set of property rights governing goods traded in markets. Also, there has been extensive media coverage of environmental problems resulting from the production and consumption of

goods in this society. Thus, consumers are learning that money is not the only thing they sacrifice to acquire goods.

Assume a typical apple market in which the consumer's preferred varieties are available. The consumer derives utility from apple taste and nutritional value. Assume that the production of the apples causes environmental damage. Any damage of which the consumer is aware causes her disutility.[4] Thus, she faces a tradeoff between the marginal increase in utility she derives from the food attributes of an additional unit of consumption and the marginal decrease in utility from uncompensated environmental damage. Assuming all other food attributes remain unchanged and that all production results in some type of uncompensated environmental damage to the consumer, the consumer's problem can be expressed as:

(1) Maximize $U(Y,X,E(X))$

$$\text{s.t. } P_Y Y + P_X X = M$$

where U is a quasi-concave utility function, X is quantity of apples purchased, Y is the quantity of all other goods purchased (none of which

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[4]Because people are not omniscient, they will probably not be aware of all the damage caused by apple production and thus will not suffer disutility from that which they do not know. Of course, this assumes that the damage they do not know about does not affect them.

affect consumer health or safety, environmental quality or the amount purchased of X), E is environmental quality that affects the consumer, P_X is the price of apples, P_Y is the price of Y and M is income. The effect of E on utility is strictly positive ($\partial U/\partial E>0$). Since apple production uses resources and creates waste, we assume that the effect of X on E is negative ($\partial E/\partial X<0$). Because the earth has a regenerative capacity, however, this expression is rewritten as $\partial E/\partial X\leq 0$ to reflect the possibility that apples may be grown in a sustainable way that does not cause any environmental damage in the long run. Thus, the marginal utility of X may be positive or negative depending on the relative magnitude of the direct ($\partial U/\partial X>0$) and indirect ($\partial U/\partial E\cdot\partial E/\partial X\leq 0$) effects of X on utility.

This model can be used to capture the effects of environmental damage caused during either production or consumption of a good. Since we are interested in the potential effect on producer adoption of environmental technologies, we only consider the producer-related damage here.[5]

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[5]Many of the consumer externalities associated with a product involve the use of complements such as waste disposal services, energy use, and water use. This can be incorporated into the specification of the production function for environmental quality, E. The main result is that the producer will reformulate the product if the difference in marginal cost is less than or equal to the difference in marginal willingness to pay.

Suppose that some producers adopt an innovative environmental technology that does not change any of the food attributes of X (i.e., no changes in apple safety or quality) but reduces the amount of environmental damage affecting the consumer per unit of consumption. Suppose they develop an ecolabel to advertise the environmental claim to consumers. Let X′ be the quantity purchased of this ecolabeled version of X. The effect of X′ on E is non-positive ($\partial E/\partial X \leq 0$) and $E(X)<E(X')$. Because X and X′ differ only in their environmental attributes, it is assumed that they are substitute goods.

Assume for the moment that the firm's claim about the relationship between X′ and E compared to that between X and E is truthful, and that the consumer is aware of and fully understands it. Assume that the environmental technology raises the marginal costs of production. Because marginal costs are higher, X′ is sold at a higher price P_X'. The consumer's problem becomes:

(2) Maximize $U(Y,X,X',E(X,X'))$

s.t. $P_Y Y + P_X X + P_X' X' = M$

Consumers do not purchase negative amounts of goods, so $X,X',Y \geq 0$.

Since by assumption $\partial U/\partial X = \partial U/\partial X'$, the first order conditions imply

that if

(3) $P_X' - P_X > \{\partial U/\partial E(\partial E/\partial X' - \partial E/\partial X)\}\lambda$,

where λ is the Lagrangian multiplier, the consumer will not purchase any X'.[6] In other words, if the marginal cost of making a truthful environmental claim is greater than its marginal value to consumers, no ecolabeled apples will be purchased. The first order conditions also imply that if

(4) $P_X' - P_X < \{\partial U/\partial E(\partial E/\partial X' - \partial E/\partial X)\}\lambda$,

the consumer will not purchase any X. If the marginal cost of making a truthful environmental claim is less than its marginal value to consumers, only ecolabeled apples will be purchased if apples are purchased. No regular apples will be purchased. Finally, if

(5) $P_X' - P_X = \{\partial U/\partial E(\partial E/\partial X' - \partial E/\partial X)\}\lambda$,

the consumer will purchase either all of X, all of X' or some of both apples if they purchase apples. Because the marginal cost of the claim is equal its marginal value to consumers, they are indifferent between the two types of

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[6]If X and E are additively separable and corner solutions between X and X' arise, the first order conditions for a maximum are:
$\partial U/\partial X + \partial U/\partial E \cdot \partial E/\partial X - \lambda P_X \leq 0$ and if $\partial U/\partial X + \partial U/\partial E \cdot \partial E/\partial X - \lambda P_X < 0$ then $X=0$,
$\partial U/\partial X' + \partial U/\partial E \cdot \partial E/\partial X' - \lambda P_X' \leq 0$ and if $\partial U/\partial X' + \partial U/\partial E \cdot \partial E/\partial X' - \lambda P_X' < 0$ then $X'=0$,
$M - P_X X - P_X' X' = 0$.

apples.

The necessary condition for ecolabeled apples to be purchased is that the difference in marginal costs of the new method of production (reflected in the price) does not exceed the marginal value of the environmental improvement to the consumer of the last unit sold. This condition is illustrated in Figure 1 on the next page.

In Figure 1, the individual's demand for X in a single shopping trip is represented by curve D, and the demand for X′ in a single trip is represented by D′. Demand for X′ is greater than X by the marginal value of the environmental improvement to the consumer of the last unit sold. The marginal costs of supplying X and X′ are represented by MC and MC′. Marginal costs are constant and equal to price because the individual is assumed to be a price taker in the apple market. For the individual in Figure 1, the difference between the marginal costs is less than the difference in demand. Consequently, consumer surplus is greater with X′ and some ecolabeled apples are bought.

The way the curves are drawn in figure 1, some of both apples are demanded by the individual. We might expect that in a single shopping trip, however, many consumers would buy only regular or ecolabeled apples or

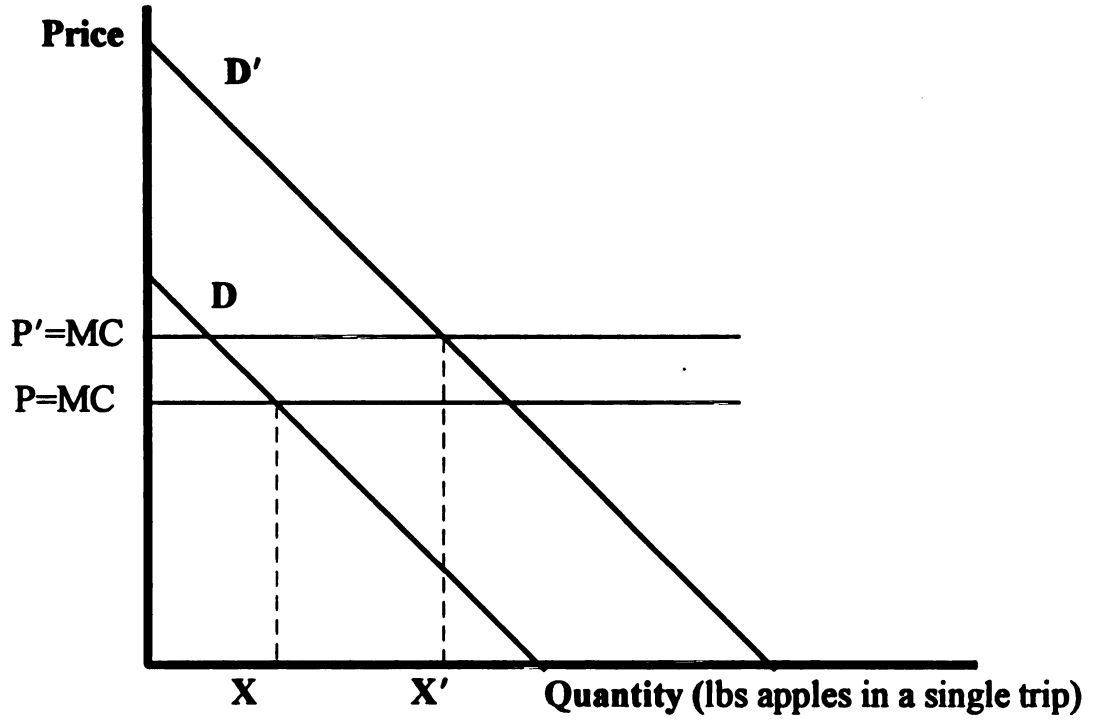

Figure 1-Consumer buys both types of apples in a single shopping trip

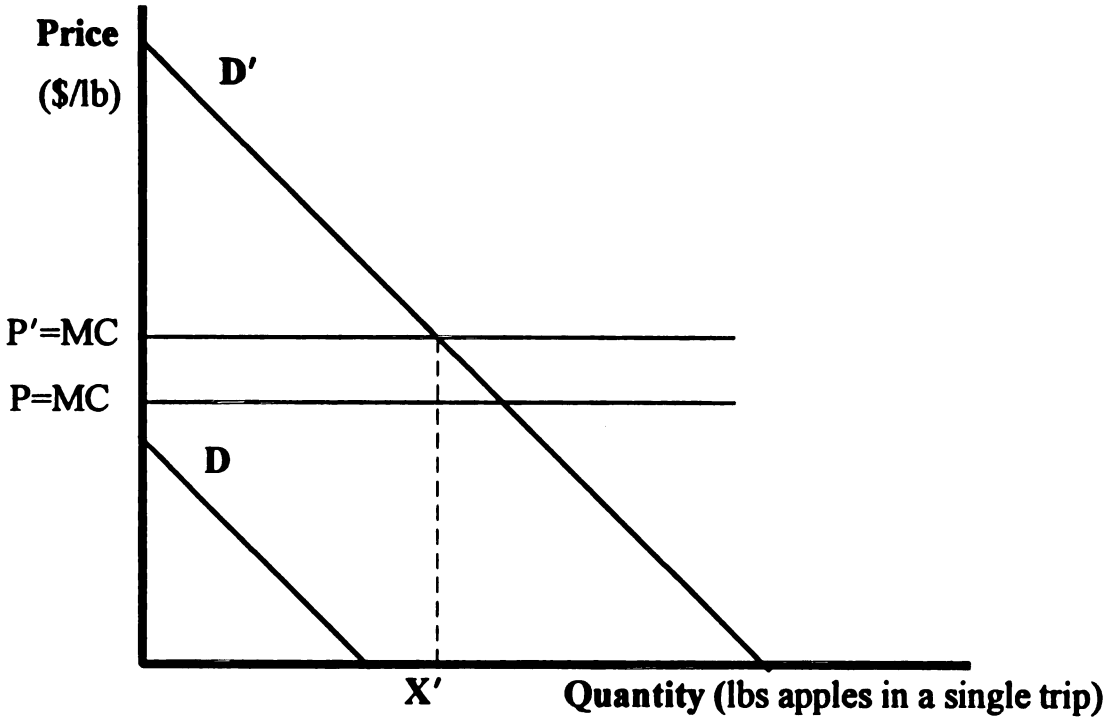

Figure 2-Consumer buys ecolabeled apples only in a single shopping trip

none at all. If an individual's demand for regular apples (D) in a single shopping trip is entirely below the price for regular apples (i.e., MC), a situation which is represented in Figure 2 on the previous page, they would not buy regular apples during that particular shopping trip. The way the curves are drawn in Figure 2, the individual would only buy ecolabeled apples. Similarly, if an individual's demand for ecolabeled apples in a single shopping trip (D′) was entirely below the price for ecolabeled apples (i.e., MC′), the individual would not buy ecolabeled apples during that particular trip. If both curves were entirely below their prices, the individual would not buy either type of apple.

Consumers are not omniscient and it is costly and difficult for them to observe whether a producer has truly improved environmental quality. Knowing this, some producers may develop a false environmental claim in hopes of receiving the higher price P_X' without incurring the additional marginal costs from the use of environmental technology. This results in an asymmetric information problem between producers and consumers, a problem which will decrease the effectiveness of ecolabel markets if not addressed.

Asymmetric information implies that the consumer does not know the

probability associated with the ecolabel claim being truthful. Assume that consumers perceive a π probability that the environmental claim is true. The closer π is to one, the more trust there is that the claim is honest. This is incorporated into the model by weighting the E production function by π. Thus, (2) becomes:

(4) Maximize $U(Y,X,X',\pi \cdot E(X,X'))$

s.t. $P_Y Y + P_X X + P_X' X' = M, \quad X,X',Y \geq 0$

where the producer's claim is represented by the E function and the trust in the claim is represented by the probability weighting function π. The greater the value of π, the more likely consumers would buy the ecolabeled apples.

Producers may attempt to increase consumer trust in the claim by developing and offering credible proof about their environmental claim. There are various forms of proof that a producer can provide to increase consumer trust. These include satisfying or complying with national standards such as those being developed for organic products, using a third-party labeler/certifier who is widely known for being accurate and truthful, making a self-declaration or giving no proof at all. Providing credible proof increases marginal costs of production and therefore increases P_X'. It also, however, increases the probability π and thus benefits to consumers.

Actions taken to reduce environmental damage may also improve food safety--primarily in terms of reduced chemical residues. Therefore, we must account for both the value of the environmental improvement and the food safety improvement to be able to say what the value of ecolabeling is. Assume that consumers perceive ecolabeled apples to be safer because of lowered levels of chemical residues per apple.[7] We denote R as the level of residue one ingests from consuming a unit of X or X′. Because chemical residues will be reduced only if the environmental claim is true, R is also weighted by π. Assume that actions taken to lower environmental damage are perceived to simultaneously lower residues. Because these two effects are simultaneous in the consumer's perception, π is the same for both. Thus, consumers will receive both improved environmental quality and less residues with the same level of probability.[8] We have:

$$(5) \quad \text{Maximize} \quad U(Y,X,X',\pi\cdot E(X,X'),\pi\cdot R(X,X'))$$

$$\text{s.t.} \quad P_Y Y + P_X X + P_X' X' = M, \qquad X,X',Y \geq 0$$

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[7]We do not include improved nutritional attributes within the safety variable because no respondents mentioned these as a reason for buying ecolabeled apples.

[8]There are health and food safety attributes other than pesticide residues, some of which might have a different π from environmental attributes. However, those attributes are not included in this model.

R has a strictly negative effect upon utility ($\partial U/\partial R<0$), $R(X)>R(X')$, and X and X′ have strictly positive effects upon residues ingested so that ($\partial R/\partial X>0$) and ($\partial R/\partial X'>0$).

The demand functions for regular and ecolabeled apples in a market where both are offered for sale are:

$$(6) \quad X = X(P_X, P_X', M, E, \pi, R)$$

$$X' = X'(P_X, P_X', M, E, \pi, R)$$

Own price is expected to negatively affect X and X′. Substitute price, M, E, π and improved health attributes in the form of lower levels of R are expected to positively affect both X and X′.

Survey Design[9]

The potential demand for ecolabeled and regular (e.g. unlabeled) apples is estimated using data from a phone survey of a random sample of U.S. households. The questionnaire elicited apple purchasing intentions with and without ecolabeling. (The questionnaire is in Appendix C.) The respondents interviewed normally do the food shopping for the household.

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[9]This section is based on Jeffrey R. Blend and Eileen van Ravenswaay, 1998, " Demand for Ecolabeled Apples: Survey Methods and Descriptive Results," Department of Agricultural Economics Staff Paper No. 98-20, Michigan State University, East Lansing, MI.

Because ecolabels are new, a simulated market was created within the questionnaire. This technique was first used by van Ravenswaay and Hoehn (1991a) to estimate consumer willingness-to-pay for reduced pesticide residues on apples. In that study, respondents were asked the amount of apples they would purchase at various prices, pesticide residue levels and pest damage levels. Because these choices were not widely available to apple shoppers at the time of their study, a simulated market was created to measure respondent purchasing intentions as if the choices did exist in a typical apple market. Other studies examining similar consumer choices with respect to food purchases have also used this technique (Eom, 1994, Buzby, Skees and Ready, 1995, van Ravenswaay and Wohl, 1995, Wohl, van Ravenswaay and Hoehn, 1995, Owens, Swinton and van Ravenswaay, 1997).

In the simulated market scenarios, respondents were presented with descriptions and prices of regular and ecolabeled apples and asked which they would buy and how much they would buy. Questions were asked in terms of household purchases during a single shopping occasion in late autumn and early winter.

To simulate markets with and without ecolabeling, two market scenarios were presented to respondents. The first involved a market in

which the respondent's preferred or regular apples were available at various prices. The second market scenario was identical except that both regular and ecolabeled versions were available. The quality and display of the apples were the same for both market scenarios.

In the first market scenario, respondents were asked to imagine themselves in their typical apple purchasing setting and were given a randomly selected price per pound for regular apples (P_X). They were told that the prices of other fruits were what would normally be expected, that all apples were the same price per pound no matter how displayed and that apples were not selling for less at other stores. Thus, P_Y was held constant. Respondents were also told that all apples were available in their favorite varieties, qualities and sizes. In this way, the effects upon apple demand of substitute fruits, packaging, competitor prices and non-environmental attributes were held constant.

Given the market scenario and price (P_X), respondents were asked whether or not they would buy the regular apples. If the answer was yes, they were asked how much they would buy at the given price. They were allowed to give their answers in terms of individual apples, pounds, pecks and

bushels although all answers were converted into pounds.[10] The respondent's answer to this second question is the quantity demanded of regular apples (X) when these are the only brand available.

In the second market scenario, the ecolabeled apple was introduced. A verbal description of its attributes was given. The price of regular apples (P_X) was the same as in the first market scenario. The price of ecolabeled apples (P_X') was equal to the price of the regular apples plus a randomly assigned price premium. Given prices for both apples and the ecolabel description, respondents were then asked which and how much they would buy at the given price(s). The respondent's answer to this second question is the quantity demanded of regular (X) and ecolabeled (X′) apples when both are available.

To test the effects of different types of ecolabels on purchasing intentions, four ecolabel descriptions were randomly varied across respondents. (A detailed description of how the ecolabel descriptions were developed is in Appendix A.) The ecolabel descriptions varied in terms of two dimensions: comprehensiveness of the environmental claim (i.e.,

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[10]One medium sized apple is equal to 1/3 pounds, one peck is equal to 10 ½ pounds and one bushel is equal to 42 pounds.

information about E(X′) relative to E(X)) and proof substantiating the environmental claim (i.e., information about π). Two variations of each of these dimensions were incorporated into the descriptions of the ecolabels. The four ecolabel names are shown in Table 1. (All tables are located at the end of the paper.)

There were fewer environmental claims made in the IPM (Integrated Pest Management) label because it specified production practices for pest control only as opposed to the wider range of practices that could reduce environmental impact. The ECO claim was more comprehensive because it specified production practices which lower a number of farm-related environmental impacts. These included efficient water and energy usage, the use of naturally occurring fertilizers for better water and soil quality, natural insect controls and reduced pesticide use. It was expected that consumers would purchase greater amounts on average of ecolabeled apples with a more comprehensive claim. The reason was that the more comprehensive claim specified a greater number of environmental attributes suggesting a greater improvement in E.

Proof was described in terms of whether the ecolabel claims were externally verified by a certifying organization. The ECO and IPM ecolabels

were either described as being certified by the USDA or not at all. Certification by the USDA rather than a private agent or a non-profit environmental group was chosen because USDA is familiar to most food consumers. Other types of certifying organizations could be specified, but this would require a larger sample size than our research funding permitted. It was expected that consumers would buy a greater amount on average of ecolabeled apples with a certified claim since this would increase their trust (π) in the honesty of the claim.

The four ecolabels were randomly varied across respondents with equal probability so that approximately equal numbers would receive each. Approximately half the sample were given the IPM ecolabel and half were given the ECO ecolabel. This was done to determine whether the number of environmental impacts specified by the ecolabel claim affects consumer purchasing choices in a market with ecolabeling. Approximately half were told that the ecolabel was certified. Certification status was not mentioned to the other half of the sample. This was done to determine whether proof offered that the claim is honest affects purchasing choices in a market with ecolabeling. The number of respondents receiving each ecolabel is shown in Table 2.

Three regular apple prices (P_X) of \$.59, \$.89 and \$1.19 per pound were randomly varied across respondents with equal probability. Additional prices could be specified, but this would require a larger sample size than our research funding permitted. The prices were chosen to reflect variation around the average U.S. apple price.[11] Three price premiums for ecolabeled apples of \$.00, \$.20, and \$.40 ($P_X'=P_X$+premium) were randomly varied across respondents with equal probability. Additional price premiums would have required an increase in sample size that our research funding did not permit. These three values are based on price premiums for organic apples in the U.S.[12] (A detailed description of how the prices were developed is in Appendix A.) Both prices were varied across respondents for the purpose of

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[11]U.S. apple prices were obtained from United States Department of Agriculture, Economics Research Service, Fruit and Tree Nuts Situation and Outlook Report, March 1997, FTS-279, p. 5 and United States Department of Agriculture, Economics Research Service, Fruit and Tree Nuts Situation and Outlook Report, Yearbook Issue, October 1996, FTS-278, p. 6.

[12]Organic apple price premiums were obtained from Hammit, James, Organic Carrots: Consumer Willingness to Pay to Reduce Food Borne Risks, 1986, Santa Monica: The RAND Corp., R-3447-EPA *and* Jolly, D., Consumer Willingness to Pay Price Premiums for Organic Apples and Peaches, March 1989, Department of Agricultural Economics, University of California, Davis *and* Jolly, D., "Differences Between Buyers and Non-buyers of Organic Produce and Willingness to Pay Organic Price Premiums", *Agribusiness*, 9:97-111.

determining their effect upon consumer demand of regular and ecolabeled apples.

Randomly varying three regular apple prices and three price premiums across the sample resulted in nine different price combinations that a respondent could receive. The four ecolabel descriptions multiplied by the nine price combinations resulted in 36 total versions of the survey market scenario randomly varied across respondents. These are summarized in Figure 3.

Two ecolabels:	X	**Two forms of proof:**	X	**Three regular apple prices:**	X	**Three ecolabel price premiums:**	=	**36 survey versions**
IPM		***Certified***		***$.59/lb***		***$.00/lb***		
ECO		***Not Certified***		***$.89/lb***		***$.20/lb***		
				$1.19/lb		***$.40/lb***		

Figure 3-The Survey Versions

Respondents were asked several questions apart from the market scenarios in order to identify factors affecting their purchases. These factors included demographics such as income and education, motivations for purchasing ecolabeled apples (i.e., perceptions of E(X′), R(X′), and π), and

whether or not the householder purchased organic apples (i.e., potential substitute for X′). For each factor, statistical tests were run to determine whether those who gave different answers made different choices.

Respondents were asked, for example, where they normally buy apples because purchasing location affects the shopping setting and thus might affect one's choice. It was expected that those who buy apples at locations other than supermarkets and grocery stores might face a different purchasing setting, different selection of apples and different substitutes and thus make different purchasing choices, *ceteris paribus*. Based upon their responses, respondents were designated as either those who buy apples at a supermarket/grocery store or those who do not. This was referred to as the 'grocery' variable. It was then determined whether or not there was a statistically significant difference in purchasing choices between the two groups.

Respondents were asked their age, gender, household size, level of education and their household's annual income.[13] This was done in order to account for the effects of demographics upon purchasing decisions. It was

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[13]The demographic data was coded in such as way as to be consistent with the figures reported in the U.S. Bureau of the Census Report from 1996.

expected that household size and income would have positive effects upon the amount purchased of both apples and that education would positively affect the amount of ecolabeled apples purchased.

Organic apples are a potential substitute for ecolabeled apples and are often sold at limited locations. To account for this, respondents were asked if and how often they bought organic apples. Those who bought them and did so 'often' or 'always' were identified as organic apple buyers.[14]

During apple season in October and November, consumers may buy more apples. This was accounted for by noting the date upon which the interview was given. Respondents interviewed in November were identified as 'in season' and those after November were 'out of season'.

The 'grocery', 'organic' and 'seasonal' variables provided a test of the validity of the survey technique used for measuring the number of apples purchased. In our case, the measurement technique was the survey questions given within the market scenarios. The validity of a measure is the extent to which it measures the theoretical model under investigation (Mitchell and Carson, 1989). In the context of this study, the validity of the survey

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[14]Because a small percentage of apple purchasers buy organic in the U.S., a more costly and complicated approach of creating 'organic' demand questions was avoided.

instrument is a function of whether all respondents are viewing the same economic conditions within their market scenario (aside from those which are intentionally varied including prices, claim comprehensiveness and proof). A valid survey would be one in which respondents were perceiving the same purchasing setting, accounting for the same substitutes, and understanding the same questions being asked of them. If the amount purchased of apples was found to be affected by whether one bought apples at a grocery store or some other location, the fact that one buys organic or whether the survey was conducted in or out of apple season, this might suggest that some respondents are perceiving different economic conditions from those in the theoretical model.

Respondent familiarity with the ecolabel claim was also taken into account because it may indicate greater knowledge of or experience with the environmental standards within that claim and thus affect one's choice. For example, those familiar with the claim may perceive a higher probability that it is truthful and thus buy more of the ecolabeled apples on average. To account for familiarity, respondents who received the IPM ecolabel were asked how much they had seen, heard, or read about IPM. Those who said that they had heard a fair amount or a great deal about IPM were designated

as familiar with the claim. Respondents receiving the ECO ecolabel were not asked about familiarity with ECO since ECO is not marketed anywhere at this time.

The theoretical model claims that consumers value both environmental improvement and health and food safety attributes in the ecolabeled apple. To test this, we accounted for the different motivations behind particular brand selections (i.e., perceptions of E, R, and π). This was done by asking respondents open ended questions about why they would or would not buy the ecolabeled apples. Respondents could give up to three reasons for buying or not buying ecolabeled. Their first responses were coded into categories such as "concern for the environment", "health and food safety concerns", "ecolabel price too high" and "lack of trust in the ecolabel."[15] Respondents whose first answer fell into the environmental concern category were identified as those whose primary reason for buying ecolabeled was environmental improvement. It was then tested whether respondents who bought them primarily for environmental improvement bought more of the ecolabeled apples on average. The same process was followed for those

[15]Many did not give second or third responses so only the first responses were used in the econometric equations. Table 21 gives statistics concerning all three responses.

whose first answer was health and food safety.

Sample Selection[16]

The phone interviews were conducted by the Institute for Public Policy and Social Research (IPPSR) at Michigan State University between November 3, 1997 and February 11, 1998. IPPSR purchased the phone numbers from Gensys Sampling Inc. who generated a proportional sample of random numbers from the lower 48 states.[17] Of 1453 eligible phone numbers that were contacted, 972 interviews were completed resulting in a participation rate of 66.9 %. (The sample selection process is described in more detail in Appendix B.)

Only those respondents who ever buy apples were asked the apple purchasing questions. Ninety-two percent of respondents (i.e., n=893) reported that they buy fresh apples for their household. We refer to these respondents as the **subsample**. There was little difference in the

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[16]This section is based on Jeffrey R. Blend and Eileen O. van Ravenswaay, " Demand for Ecolabeled Apples: Survey Methods and Descriptive Results," 1998, Department of Agricultural Economics Staff Paper No. 98-20, Michigan State University, East Lansing, MI.

[17]Alaska and Hawaii were excluded for cost reasons. If these states had been included either the sample size or the interview length would have had to be reduced to stay within our research funding limit.

demographic composition of the full sample and subsample. All the results reported in the remainder of this section and the next section of the paper are for the subsample only.

Households which earned higher incomes were over-represented in our subsample compared to the latest available census figures as were larger households and householders with more education.[18]

The household composition of the subsample was somewhat different from the national average (Table 3). The average household size in our subsample was 2.93 as compared to the national average of 2.65.[19] The percentage of households in our subsample with children under 18 was 43.2% which is greater than the national average of 34.3%. The percentage of single-person households in our sample was 15.3% compared to the national average of 24.9%.

The ages of the householders were similar to census figures (Table 4). Householders with some college or completed college degrees were over-

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[18]U.S. Bureau of the Census, Statistical Abstract of the United States: 1996 (116th edition) Washington, D.C., 1996. Pages 60, 160, 61, and 465.

[19] These figures taken from U.S. Bureau of the Census, 1996. Statistical Abstract of the United States: 1996 (116th edition) Washington, D.C., 1996, pp. 60, 160, 61, and 465.

represented while those with less than a high school education were under-represented (Table 5). The average age of subsample respondents was 46 and the average education level consisted of some college. Females made up just over three-quarters of our subsample (Table 6). When asked about household income, 18.7% of respondents either refused to report that information or did not know their income (Table 7). Of the households that did report income, both the '$10,000-$49,000' and 'Over $50,000' categories were over-represented while the "under $10,000" category was under-represented. Average household income of the subsample was about $53,000.

Table 8 gives the percentage of respondents who purchase apples at various locations. Table 9 gives the percentage of respondents who purchase organic with some frequency. Table 10 gives the percentage of respondents who have heard something about IPM.

Model Specification

The amounts of regular (Q_{REG}) and ecolabeled (Q_{LAB}) apples purchased in a market where both are available are measured by the responses to the questions about willingness to buy and quantity purchased in the second market scenario. The amount of regular apples purchased without

ecolabeling (Q_R) is measured by the responses to the same questions in the first market scenario. All amounts are expressed in terms of the pounds of apples purchased for the household in a single shopping trip in late fall and early winter.[20] (Table 11 provides definitions and summary statistics for all variables used in the econometric models.)

The explanatory variables included in all three equations are regular price (P_X), household income (M), household size (Hh), respondent age (Age), gender (Gen) and education (Educ), and the validity variables which from here on are referred to as 'grocery' (Groc), 'organic' (Org) and 'seasonal' (D). The equations for regular and ecolabeled apples in the second market scenario with ecolabeling both contain ecolabeled price (P_X'), claim comprehensiveness (L) and proof (C). The equation for ecolabeled apples contains the two 'motivation' variables which indicate whether the primary reason for purchasing ecolabeled apples was health and food safety or whether it was environmental concern. These are referred to as 'health

[20]Respondents purchased between 0 to 126 pounds of ecolabeled apples and regular apples in a market without ecolabeling. They purchased between 0 and 42 pounds of regular apples in a market with ecolabeling. The highest amounts purchased were by those who bought bushels of apples (42 pounds per bushel) in a single shopping trip. Because respondents were allowed to purchase individual apples (1/3 pound each) and pecks of apples (10.5 pounds per peck), some purchased fractions of pounds.

motivation' (Φ) and 'environmental motivation' (Ψ). It also includes a variable which indicates whether respondents who received the IPM apple are familiar with IPM. This is referred to as 'familiarity' (F). Because familiarity and the two motivation variables were asked only to select respondents, Q_{LAB} was estimated with and without them.[21]

The appropriate model for consumer decision-making differs depending on the time period involved (e.g., purchases in a single shopping trip, monthly purchases, yearly purchases). The quantity in the single trip is small and may often be zero for people who regularly eat apples. The quantity purchased in a year is large and is unlikely to be zero if the person regularly eats apples. In a single shopping trip, a two stage decision model may be more appropriate than a single stage model. In effect, the individual determines her quantity in advance of her shopping trip based on her

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[21]The number of observations for Q_{LAB} with the motivation and familiarity variables is much lower than without. The equation for Q_{LAB} is first estimated without motivation and familiarity. The values obtained from this first equation are reported in the main results in for ecolabeled apples (Tables 16 and 19). The equation for Q_{LAB} is estimated a second time with familiarity included and a third time with the health and environmental motivation variables included. These two tables report only the coefficients upon familiarity, health and environment from these last two equations. This is signified in both tables by a double line separating the coefficients for these three variables from the others.

household size, preferences and income. Once in the store, she observes price and quality and decides to buy or not.

The Tobit model (Tobin, 1959) is commonly used for modeling this two-stage purchasing choice. The Tobit jointly models the likelihood of purchasing ecolabeled apples and the quantity purchased. The Tobit imposes the restriction that the same factors have the same effects upon the decision to buy apples as they do on the quantity purchased. For a single shopping trip, this may not hold.

One would expect, for example, that a variable such as price would have a substantial effect upon the decision to buy apples in a single shopping trip but not necessarily upon the amount purchased. The reason for this is that consumers typically know how much of apples or other food items their household consumes and would likely have made the quantity decision before arriving at the store. However, with many substitutes for apples, price would likely have a significant effect upon whether they are bought at all.

The Cragg (1971) Double-Hurdle model allows us to model the same two-stage purchasing decision but relaxes the restriction imposed by the Tobit. It allows for different factors to affect the decision to purchase and the amount purchased. With the Cragg model, a Probit model is estimated for the

decision of whether or not to purchase the apples. A truncated regression is then run upon the amount of apples purchased by those who bought some. In this way, coefficients are estimated separately for each of the two decisions and different factors are allowed to influence each of these two decisions.

To determine whether the Tobit restriction held in our study, two tests were run upon the equations for regular and ecolabeled apples in a market with ecolabeling. The first test created by Fin and Schmidt (1994) determines whether the likelihood value of the Tobit is significantly different from the sum of likelihood values of the Probit and truncated regressions from the Cragg model. It was found that for both regular and ecolabeled apples in a market with ecolabeling, the difference in values was significant.[22] Thus, the results were significantly different without the restriction.

A second test consisted of running a Tobit and then running a Probit upon the decision to buy apples. The Tobit coefficients were normalized by dividing them by $\hat{\sigma}$ from the regression. The normalized Tobit values were then compared to the values of the Probit coefficients. If there are any

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[22]The test is whether 2*(Likelihood Tobit-Likelihood Probit + Likelihood Truncated) > Chi-Squared (13=number of parameters) or χ^2_{13}. $\chi^2_{13} = 22.36$. For regular apples, the test statistic equals 38.6 and for ecolabeled apples it is 103.2. Both are above the critical value.

changes in the sign of statistically significant variables or differences in magnitude of ten or more, then the two results are considered significantly different. The sign of the gender variable changed for the ecolabeled apples and upon grocery for both apples. Thus, it was suspected that the results without the restriction were different.

Based upon these tests, Cragg's Double Hurdle model was chosen as more appropriate to run. For the sake of comparison and providing recommendations to other survey researchers, the results from the Tobit were also reported.

A linear model often gives similar estimates to the Tobit of coefficients and elasticities of the explanatory variables at their mean values. Thus, it is worthwhile to compare the estimates from the Tobit to those yielded from a linear model estimated using OLS. This comparison provides a test of the sensitivity of the results to different modeling assumptions.

Because regular and ecolabeled apples are presented together in the second market scenario, their error terms may be correlated. To account for this, a Seemingly Unrelated Regressions (SUR) technique is also run to determine whether the results change significantly when correcting for existing correlation.

Separate equations were run for regular and ecolabeled apples which included four interaction terms between regular and ecolabeled prices and certification and comprehensiveness. This was done in order to determine whether the effects of own and substitute prices are different across the different ecolabels.

Results

The amounts of regular and ecolabeled apples respondents would purchase in a single shopping trip in markets with and without ecolabels form the dependent variables for the three demand equations. The first equation estimates the parameters for the demand function for regular apples (Q_R) given the first market scenario without ecolabeling. The second and third equations estimate the parameters in the demand functions for the regular (Q_{REG}) and ecolabeled apples (Q_{LAB}) given the second market scenario with both apples available.

We found significant consumer demand for ecolabeled apples. Over half of respondents (56%) would try the ecolabeled (i.e., either IPM or ECO) apples presented in our second market scenario (Table 12). On average, they bought 1.5 pounds of the ecolabeled apples and 1.3 pounds of the regular when both were available.

Many respondents were willing to pay more for the ecolabeled apples. The average marginal willingness-to-pay for a pound of ecolabeled apples was calculated at $.32/lb.[23] At a regular apple price of $.89 per pound, this translates into a 36% price premium.

The greater the price premium on ecolabeled apples, the lower the percentage of respondents who would buy some (Table 13).[24] Seventy-two percent of those who were offered regular and ecolabeled apples at the same price said they would buy the ecolabeled.[25] Fifty-two percent of those receiving a $.20 price premium bought some of the ecolabeled. At a $.40 price premium, the percentage who said they would buy was 42%.

Results of the Cragg Double Hurdle model are found in Tables 14 through 16. Column one lists the variable names (Refer to Table 11 for their

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[23]All calculated price premiums were calculated from the Tobit. Premiums were calculated at the average quantity demanded of regular apples given the second market scenario (about 1.3 pounds). A value of $.27/lb was calculated from a linear model estimated by OLS.

[24]The reported percentages of respondents buying ecolabeled apples includes both those who bought ecolabeled only and those who bought some of both types of apples.

[25]The Food Marketing Institute (whose study is mentioned in the introduction) found that there is a large group for whom environmental friendliness would be a "tie-breaker" in choosing among brands within a food product category, although only a few would pay more.

definitions). The second column in each table lists the marginal effects of the Probit upon the decision of whether or not to buy the apples. Specifically, it gives the change in the probability of the average respondent purchasing apples caused by a one unit change in the explanatory variable. Using the amount purchased of ecolabeled apples and education (Educ) as an example in Table 14, each additional year of education would raise the probability of the average respondent buying ecolabeled apples by .026, on average. The third column displays the coefficients of the truncated regression. The forth column gives the marginal effects of the truncated regression. In particular, the forth column gives the change in the quantity of apples purchased by those who bought positive amounts caused by a one unit change in the explanatory variables. Using the same example, each additional year of education results in .023 fewer pounds of ecolabeled apples purchased on average by those who purchased some.

Results of the Tobit model are found in Tables 17 through 19 for each of the three demand equations. Variable names are found in the first column (Refer to Table 11 for their definitions). The Tobit coefficients and their standard errors are listed in the second column. The McDonald and Moffitt (1980) transformed marginal effects are listed in columns three through five.

For each of the demand equations estimated by Tobit, the explanatory variables were jointly significant in predicting the model. Leaving out similar groups of explanatory variables (i.e., all demographics or the three validity variables) did not improve any of the equations, so all were included.

The coefficients from the Tobit cannot be interpreted in the same way as they are for an equation estimated using OLS. Their value does not represent the expected change in the dependent variable given a one unit change in the explanatory variable. The coefficients must undergo a transformation developed by McDonald and Moffitt (1980) in order to estimate marginal effects. This transformation decomposes the marginal effects and elasticities (calculated at the means) of the variables into three parts.

The first part which is denoted as $\partial E(Y)/\partial x$ (where Y is the dependent variable and x denotes one of the explanatory variables) gives the change in the average amount of apples purchased given a one unit change in the explanatory variable for all respondents. The second part, denoted as $\partial E(Y^*)/\partial x$ (where Y^* is all non-zero observations of the dependent variable), gives the change in the average amount of apples purchased by those who

would buy the apples given a one unit change in the explanatory variable.[26] The third part, $\partial F(z)/\partial x$ (where z is a normalized index and $F(\bullet)$ is the cumulative standard normal distribution function), gives the change in the probability of buying the apples given a one unit change in the explanatory variable.

Using Q_{REG} and P_X' in Table 18 as an example, a one dollar increase in ecolabeled apple price would result in a 2.2 increase in the average pounds of regular apples purchased by respondents in a single shopping trip ($\partial E(Y)/\partial P_X'$), a 1.7 pound increase in amount purchased for those respondents who bought regular apples ($\partial E(Y^*)/\partial P_X'$), and an increase in the probability of respondents buying regular apples of .41 ($\partial F(z)/\partial P_X'$).

The dummy variables in these tables are intercept shifters. Using organic (O) as an example in Table 18, all respondents who normally buy organic apples would buy 1.5 less pounds of regular apples on average in a single shopping trip. Organic apple shoppers who bought regular apples would buy 1.2 pounds less of them on average. All shoppers who normally buy organic apples would have a .28 lower probability on average that they

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[26]One could also think of $\partial E(Y^*)/\partial x$ as the partial derivative of Y with respect to x given that Y is greater than zero or $\partial E(Y|Y>0)/\partial x$.

would buy regular apples in a market with ecolabeling.

The McDonald and Moffitt technique also decomposes elasticities of the explanatory variables calculated at their means into three parts. These are the elasticity of the probability of buying the apple, $\eta F(z)$, and the elasticity of apple demand by those who purchase some of the apples, $\eta E(Y^*)$, which sum up to the total elasticity of demand (the percentage change in the dependent variable given a one percent change in the explanatory variable), $\eta E(Y)$.[27]

Demand elasticities calculated from the Tobit model at the means of own price, substitute price, income and other significant variables are given in Table 20 for all three equations. The way to interpret columns two through four in Table 20 is as follows. Using the example of Q_{REG} and P_X' again, a one percent increase in ecolabeled apple price would result in a 1.57 percent increase in the total amount purchased of regular apples by all respondents, $\eta E(Q_{REG})$, a .50 percent increase in the amount of regular apples purchased by those who bought regular, $\eta E(Q_{REG}^*)$, and a 1.07 percent increase in the

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[27]The presentation of the McDonald and Moffit decomposition technique is adapted from Norris, Patricia E. and Sandra S. Batie, "Virginia farmers' Soil Conservation Decisions: An Application of Tobit Analysis," *Southern Journal of Agricultural Economics*, July, 1987: 79-90.

probability of respondents buying regular apples, $\eta F(z)$.

The results from the Cragg model indicate that both prices have significant effects (of the expected signs) upon the probability of buying ecolabeled apples (Table 14). Education has a significantly positive effect upon the probability of buying. Household size, age and environmental motivation have significantly positive effects upon the amount of ecolabeled apples purchased whereas ecolabel price and purchase location (i.e., the fact that one buys apples at a grocery store or supermarket) have significantly negative effects. Being male and being familiar with the IPM claim have significantly negative effects upon the decision to buy ecolabeled and significantly positive effects upon the amount purchased. This suggests that both of these groups would buy ecolabeled apples less often, but would buy more on average when they did decide to purchase them. Buying apples in season (i.e., during November) has a significantly positive effect upon the decision to buy ecolabeled.

Regular apple price, respondent education, household size and environmental motivation have significantly positive effects upon the amount

of ecolabeled apples purchased in the Tobit model (Table 17).[28] Ecolabeled price and purchase location both have significantly negative effects upon the amount of ecolabeled apples purchased. For the Tobit model, own price elasticity for ecolabeled apples was calculated at -2.0 and cross-price elasticity at 1.6 (Table 20).

The results from the Cragg model (Table 15) indicate that both prices have a significant effect of the expected sign upon the probability of buying regular apples in a market with ecolabeling. Being male has a significantly positive effect and normally buying organic apples a significantly negative effect upon the probability of buying regular apples. Household size and age positively and significantly increased the amount purchased of regular apples by those who bought some whereas grocery had a significantly negative effect.

For the Tobit (Table 18), the following variables have a significantly negative effect upon the amount of regular apples purchased in the market with ecolabeling: regular price, buying organic and purchase location (i.e., purchasing apples at a grocery or supermarket). Ecolabeled price and gender

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[28]Unless otherwise noted, 'significant' means statistically significant at a 10% level.

(i.e., being male) both have significantly positive effects on the amount purchased. For the Tobit model, own price elasticity for regular apples was calculated at -1.7 and cross-price elasticity at 1.6 (Table 20).

Cragg's model indicates that income and education significantly increase the probability of buying regular apples in a market without ecolabeling while own price and age negatively affect that probability (Table 16). Household size, age and gender positively affect the amount purchased by those who bought regular apples whereas grocery negatively affects the amount purchased.

In the Tobit model, grocery is the only significant variable for regular apples in the market without ecolabeling (Table 19). Own price is of the expected sign but not significant.

The grocery variable is significantly negative for all three equations indicating that those who buy apples at a grocery store or supermarket bought less on average. The Cragg model indicates that grocery primarily affects the amount purchased rather than the decision to buy for all three apples. It also indicates that age and household size significantly increase the amount purchased of all three types of apples.

Using the Cragg model, certification had a significantly positive effect

on the amount purchased of regular apples by those who bought some. Respondents who bought some regular apples bought about .5 pounds more when ecolabeled apples were certified. It did not affect demand for ecolabeled apples. In the Tobit model, certification did not significantly affect regular or ecolabeled demand.

The comprehensiveness of the environmental claim did not significantly affect the amount purchased of regular or ecolabeled apples in either model.

The average marginal willingness to pay for ecolabeled apples did not greatly differ across the different ecolabels. The marginal willingness-to-pay for ecolabeled apples with USDA certification (calculated from the Tobit model) was $.29/lb and for those without certification $.35/lb. There was an even smaller difference between ecolabels with different levels of comprehensiveness. Respondents were marginally willing to pay on average $.30/lb more for IPM apples and about $.33/lb more for ECO apples.

The price of ecolabeled apples which are certified and more comprehensive had a significantly greater effect upon the amount of regular apples purchased than did the price of those which are non-certified and less comprehensive. In other words, the cross-price elasticities of the certified

and ECO apples on regular apples were greater than those of the non-certified and IPM. This was indicated by the observation that for regular apples in a market with ecolabeling, the interaction terms of ecolabeled price*certification (e.g. $P_X' * C$) and ecolabeled price*comprehensiveness (e.g. $P_X' * L$) were both positive and significant.

Health and food safety was the reason most frequently given for purchasing ecolabeled apples (Table 21). Thirty-seven percent mentioned health or food safety, including the avoidance of chemicals in food and better health for their family, as their first answer. Twenty-seven percent mentioned concern for the environment as their first answer and 19% mentioned the desire to try out the ecolabeled apples. Health and food safety did not affect the amount purchased of ecolabeled apples by those who bought some.[29] Because health and environmental motivations were only recorded for those

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[29]Health and environmental motivation for purchasing ecolabeled apples were measured by asking respondents who bought ecolabeled why they did so. Both motivational variables were also measured in a second way. They were both included in the ecolabeled apple demand equation for those who purchased ecolabeled apples *as well as* for those who did not. These variables now measured whether health or environmental motivation were significant factors in respondents' choices with respect to buying ecolabeled apples, including the decision not to buy. Measured this new way, both health and environmental motivation were positive and significant in both models. Thus, both motivations had a significantly positive effect on ecolabeled demand for all respondents including non-buyers.

who bought ecolabeled apples, we could not estimate their effect upon the decision to buy ecolabeled apples.

Respondents' top reasons for not purchasing ecolabeled apples were that they were too expensive (46%), that they did not know enough about the ecolabeled apples (22%), that they preferred their usual apples (9%) and that the regular apples were just as safe to consume (8%) (Table 22). Nine percent of responses indicated distrust of the ecolabel, IPM or the USDA.

On average, respondents bought about the same amount of apples with and without ecolabeling. In the market without ecolabeling, respondents bought 2.9 pounds of apples on average compared with 2.8 pounds of apples in the market with ecolabeling (e.g. 1.5 pounds of ecolabeled + 1.3 pounds of regular). However, the amount of regular apples purchased in the second market scenario decreased by roughly the same amount of ecolabeled bought indicating a substitution towards ecolabeled apples from regular apples.

Regular apples became more price elastic with ecolabeling as a result of the substitution effects from the ecolabeled apple. Their own price elasticity without ecolabeling was about -.14 and with ecolabeling was about -1.7. This discrepancy is not surprising. Price would likely not affect apple demand in a single trip, but rather the decision to buy only. With the

introduction of ecolabeled apples for the first time, one would expect substantial substitution effects between the two apples and thus a greater sensitivity of demand in a single shopping trip to price.

The results using a linear model estimated by OLS were qualitatively similar to those of the Tobit. Quantitatively, there were some significant differences between the two models. In Tables 23 and 24, the total marginal effects of each variable upon all respondents from the Tobit ($\partial E(Y)/\partial x$ or the change in the average amount of apples purchased given a one unit change in the explanatory variable for all respondents) are listed alongside those from OLS and SUR for regular and ecolabeled apples in the market scenario with ecolabeling. The SUR results were very similar to those from OLS indicating the correlation between the residual terms of each equation did not significantly affect the coefficient values or conclusions which could be drawn. Because the OLS and SUR results were so similar, a comparison is made only between the Tobit and OLS results.

Aside from education, the same variables were statistically significant for ecolabeled apples from the Tobit and OLS equations (Table 23). Calculated price elasticities for ecolabeled apples were similar for both equations. With Tobit, the marginal effects of both prices were slightly larger

and household size slightly smaller than OLS. There was a large difference between the two estimation techniques in the marginal effects for education and grocery.

For regular apples, own price and grocery were negative and significant using both estimation techniques (Table 24). However, the marginal effect of own price was larger and of grocery smaller for Tobit than for OLS. Ecolabeled price was significant and its marginal effect much larger for Tobit whereas certification was significant and larger using OLS. Own price elasticity for regular apples was similar using both estimation techniques as was income elasticity. Cross price elasticity was larger using the Tobit.

Conclusions

There is substantial consumer demand for ecolabeled apples. A significant percentage of the sample (56%) would try ecolabeled apples if they were available. In a market with both regular and ecolabeled apples, respondents bought more of the ecolabeled on average.

A sizable percentage of consumers would pay more for ecolabeled apples. Fifty-two percent of respondents receiving a $.20/lb price premium bought some of the ecolabeled and at a $.40/lb premium, 42% bought some. The average marginal willingness-to-pay for ecolabeled apples was calculated

at $.32/lb.

In a market with ecolabeling, both regular and ecolabel prices would affect consumer purchasing choices. In the Tobit model, regular and ecolabel prices affected the quantities purchased of both apples. In the Cragg model, both prices had significant effects upon the probability of buying regular and ecolabeled apples. Prices have a strong effect upon the choice of which apple to buy, but a less significant effect upon how many are bought. Thus, there would be substantial substitution effects between apples if both were available.

The greater the price premium on ecolabeled apples, the less consumers would buy. Thus, retailers would likely face a tradeoff between the size of the price premium they set and the pounds of ecolabeled apples sold. Those interested in promoting ecolabeled apples might offer them initially at a lower price per pound relative to regular apples with the understanding that purchases of regular will decline.

Advertising campaigns for ecolabeled apples should be targeted at educated and older consumers and larger households. In the Cragg model, older respondents who bought ecolabeled apples bought more on average. Household size had a positive effect upon the amount of both regular and

ecolabeled apples purchased, and education had a positive effect upon the probability of purchasing ecolabeled. For the Tobit model, respondents with higher levels of education and those from households with more occupants bought more ecolabeled apples on average. One marketing strategy would be to target specific forms of media and shopping locations known to attract more educated and older shoppers. Another would be to target locations frequented by larger families such as those which have children.

Consumer demand for both regular and ecolabeled apples may not be affected by claim comprehensiveness. Claim comprehensiveness had almost no effect upon the amount purchased of either apple under either estimation technique. Average marginal willingness to pay only differed by three cents between ECO and IPM apples. However, only one way of wording the IPM and ECO claims was tested. In addition, only one set of standards was tested for each claim. Further research is needed to test different wordings and different sets of standards.

Certification of the ecolabeled claim did not affect the demand for ecolabeled apples in either model. Proof in the form of government certification does not increase consumer trust in the label or the decision to buy ecolabeled. However, only two forms of proof were tested, USDA

certification and no proof. Further research is needed to determine whether other certifiers (e.g. non-profit environmental groups) and other forms of proof (e.g. national standards) would affect consumer demand for ecolabeled apples.

Consumers who buy ecolabeled apples primarily for environmental improvement bought more on average and may have a longer term commitment toward purchasing such apples. Those who just want to try them out would likely try fewer pounds initially. This suggests that ecolabelers should target their products towards stores known for their concern over environmental quality such as food co-ops and green grocers.

Health and food safety attributes resulting from ecolabeled production should be highlighted in a marketing campaign. Health and food safety was mentioned most often as the primary reason for buying ecolabeled apples. Although it did not significantly affect the amount of ecolabeled apples purchased using either estimation technique, it was close to significant in the Cragg model. This suggests that while many consumers would make the decision to buy ecolabeled apples primarily for the health and food safety attributes, they may not perceive added value from purchasing more of the ecolabeled apples. Thus, health and food safety attributes may be most

effective in a campaign aimed at convincing consumers to give ecolabeled apples an initial try.

Familiarity with the IPM claim may not lead to greater consumer demand for the ecolabeled apples. In the Tobit model, respondents familiar with the IPM claim actually bought less ecolabeled apples than those unfamiliar with the claim, although this was not statistically significant. The Cragg model showed that familiarity had a negative effect upon the probability of purchasing the ecolabeled apples and a positive effect upon the amount purchased (both effects significant). This suggests that those familiar with IPM may be less apt to buy ecolabeled because either IPM is not perceived to improve environmental quality or those familiar with IPM do not value environmental improvement in the same manner. It also suggests that familiarity may have a positive effect upon the amount purchased by those who choose to buy some. We only measured familiarity with IPM. Further research might test the effects of familiarity with other claims. Only a small percentage of consumers were identified as being familiar with IPM.

Ecolabelers may benefit from targeting organic apple buyers and those who buy apples at locations other than supermarkets and grocery stores, as both groups bought more ecolabeled apples on average. However, these

consumers only make up only a small percentage of the population.

Researchers who estimate consumer demand for food items in a single shopping trip should think carefully about the econometric model they use. This dissertation has shown that the Cragg Double Hurdle model is probably more appropriate for estimating purchasing choices in a single trip. One would expect the two stages of the purchasing choice to be made differently in a single shopping trip and thus to be affected differently by variables such as price. The Tobit may be more appropriate for longer term demand where the decision to buy and the amount purchased are more correlated with one another over numerous trips.

Evidence to support this assertion includes the two statistical tests which determined that the Cragg model results were significantly different from the Tobit model results. It also includes the fact that price is insignificant in the Tobit model while significantly increasing the probability of buying the regular apples in a market without ecolabeling using the Cragg. Thus, price has a greater effect upon the decision to buy regular apples than on the amount purchased, a distinction that the Cragg model allows the researcher to see. Finally, the Cragg gives a more detailed explanation of how some of the demographic variables affect consumer decisions.

Researchers who conduct future apple surveys should account for organic apples and for shoppers who buy apples at locations other than grocery stores and supermarkets. The results suggest that these respondents may not perceive exactly the same scenario as the others. Those who buy apples at locations other than a grocery store or supermarket bought more on average. This result is explained by the fact that a larger percentage of respondents who purchased them at non-grocery locations bought apples in larger quantities (i.e. pecks, bushels). Perhaps this is how they are typically sold at other locations explaining why some shoppers go there. The negative and significant effect of buying organic on regular apples may be explained by the different apple selection, information and values that organic shoppers possess. Giving the survey interview after apple season significantly and positively affected the decision to buy ecolabeled apples in the Cragg model, but did not significantly affect apple demand in any other case. Thus, researchers interested in constructing apple surveys may not have to account for apples being in season if they are studying regular apples.

Care should be taken in determining the ecolabel price premium and in educating consumers about ecolabeled apples. Expense and lack of knowledge were the top two reasons given by respondents for not purchasing

ecolabeled apples (Table 22). This reinforces the result that ecolabel price and respondent education significantly affect the amount purchased of ecolabeled apples.

There are many other items that could be used to test consumer demand for ecolabeled foods including meat products, other types of produce, processed foods and dairy products. For any specific product, further research might involve the use of visual ecolabels. Visual dimensions of such ecolabels could be tested as to their effects upon demand. One might also test the types of environmental information (i.e., improved water quality vs. lower levels of chemical runoff) that shoppers most strongly respond to.

Further research might examine additional aspects of ecolabels such as standard strictness and precision of standards (process vs. performance standards). It might also look more closely at the production side and the potential costs involved with meeting ecolabel standards.

TABLES

Table 1
Names of Ecolabels in the Questionnaire

DIMENSIONS OF ECOLABEL WORDING		PROOF OFFERED TO SUBSTANTIATE CLAIM?	
		No	**Yes**
AMOUNT OF ENVIRONMENTAL CLAIMS MADE?	**More**	*ECO*	*USDA Certified ECO*
	Less	*IPM*	*USDA Certified IPM*

Table 2
Number of Respondents for Each Ecolabel

TYPE OF ECOLABEL	Not Certified	Certified
ECO	248	242
IPM	243	239

Table 3
Household Composition

Household Composition	Percent of Census[a]	Percent of Sample[b]	Percent of Subsample[b]
Average household size (number of people)	2.65	2.87	2.93
Percentage of households with children under 18	34.3%	42.2%	43.2%
Percentage of single-person households	24.9%	17.0%	15.3%

[a]Source: U.S. Bureau of the Census, Statistical Abstract of the United States: 1996 (116th edition) Washington, D.C., 1996. Pages 60, 160, 61, and 465.
[b]'Sample' refers to the full sample of 972 respondents that were contacted. 'Subsample' refers to the 893 respondents in the full sample that buy apples.

Table 4
Age of the Respondents

Age of Householder[a]	Percent of Census[b]	Percent of Sample[c]	Percent of Subsample[c]
15-24 years	5.3%	6.5%	6.6%
25-34 years	19.3%	18.8%	18.1%
35-44 years	23.3%	22.1%	24.5%
45-54 years	18.0%	19.1%	19.6%
55-64 years	12.4%	11.6%	11.8%
65-74 years	11.9%	8.2%	8.3%
75 years and older	9.6%	6.5%	6.5%
Refused	-----	5.0%	4.5%

[a]Because respondents had to be at least 18 years old to complete this survey, the first age category is 18-24 years for sample and sub-sample respondents.
[b]Source: U.S. Bureau of the Census, Statistical Abstract of the United States: 1996 (116th edition) Washington, D.C., 1996. Pages 60, 160, 61, and 465.
[c]'Sample' refers to the full sample of 972 respondents that were contacted. 'Subsample' refers to the 893 respondents in the full sample that buy apples.

Table 5
Educational Attainment of Respondents

Education level	Percent of Census[a]	Percent of Sample[b]	Percent of Subsample[b]
Did not graduate high school	18.3%	6.7%	6.0%
High school diploma	33.6%	28.1%	27.3%
Some college	24.5%	30.1%	30.6%
College or graduate education	23.6%	32.7%	33.9%
Refused	----	2.4%	2.0%

[a]Source: U.S. Bureau of the Census, Statistical Abstract of the United States: 1996 (116th edition) Washington, D.C., 1996. Pages 60, 160, 61, and 465.
[b]'Sample' refers to the full sample of 972 respondents that were contacted. 'Subsample' refers to the 893 respondents in the full sample that buy apples.

Table 6
Gender of Respondents

Gender	Percent of Sample[a]	Percent of Subsample[a]
Female	75.0%	76.8%
Male	25.0%	23.3%

[a]'Sample' refers to the full sample of 972 respondents that were contacted. 'Subsample' refers to the 893 respondents in the full sample that buy apples.

Table 7
Household Income

Total household income in 1996	Percent of Census Households[a]	Percent of Sample[b]	Percent of Subsample[b]	Percent of subsample who reported income[c]
Less than $10,000	12.3%	3.0%	2.1%	2.6%
$10,000-$49,000	55.7%	43.8%	44.7%	55.0%
$50,000 or more	31.9%	33.4%	34.5%	42.4%
No answer	-----	19.8%	18.7%	-----
Mean household income	$34,076	-----	-----	$53,003

[a]Source: U.S. Bureau of the Census, Statistical Abstract of the United States: 1996 (116th edition) Washington, D.C., 1996. Pages 60, 160, 61, and 465.
[b]'Sample' refers to the full sample of 972 respondents that were contacted. 'Subsample' refers to the 893 respondents in the full sample that buy apples.
[c]This column was included to compare those respondents in the subsample who reported income with Census figures.

Table 8

Q: Where do you usually purchase fresh apples? (Open ended)

Location	Percent Respondents
Supermarket or grocery store	89.7 %
Farm, roadside stand or orchard	5.3 %
Farmer's Market	3.4 %
Green grocer or fruit specialty store	0.7 %
Bulk/Discount Store	0.2 %
Don't Know	0.1 %
Refused	0.7%

Table 9

Q: When you buy apples, how often do you buy organic apples?

Response	Percent Respondents
Often or always	2.9 %
Rarely or occasionally	15.3 %
Do not buy them	73.9 %
Do not know	7.5 %
Refused	0.3%

Table 10

Q: How much have you seen, heard, or read about Integrated Pest Management or IPM?

(Note: This question given only to those receiving a scenario with IPM apples; N=404)

Response	Percent Respondents
A great deal	2.7 %
A fair amount	4.2 %
A little	26.5 %
Nothing	66.3 %
Don't Know	0.2 %
Refused	0.0 %

Table 11
Variable names, definitions, means and standard deviations[a]

Name	Definition	Mean	Std. Dev.
Q_R	Pounds of **regular** apples purchased for the household in a single shopping trip when ecolabeled apples are *not* available	8.6988	18.4988
Q_{REG}	Pounds of **regular** apples purchased for the household in a single shopping trip when *both* types of apples are available	3.8949	9.1442
Q_{LAB}	Pounds of **ecolabeled** apples purchased for the household in a single shopping trip when *both* types of apples are available	4.4943	14.8275
P_X	Price of regular apples per pound *(in dollars)*	.8823	.2453
P_X'	Price of ecolabeled apples per pound *(in dollars)*	1.0794	.2940
C	Form of proof offered for the environmental claim: 1=USDA certification, 0=No Proof	.5050	.5003
L	Comprehensiveness of ecolabel claim: 1=More--ECO ecolabel, 0=Less--IPM ecolabel	.5006	.5003
M	Household Income *(in thousands of dollars)*	53.0028	36.09
Hh	Household Size (*Number of occupants in household*)	2.9287	1.6094
Age	Age of householder *(in years)*	46.1596	16.1943
Gen	Respondent's gender: 1=Male, 0=Female	.2318	.4222

[a]These numbers are reported for the 893 respondents in the full sample that buy apples.

Table 11 (Cont'd)

Name	Definition	Mean	Std. Dev.
Educ	Number of years of education householder has completed	14.0331	2.7065
Groc	Householder's typical apple purchasing location: 1=Grocery store or supermarket, 0=Other locations	.8959	.3056
Org	Frequency that householder normally buys organic apples: 1=Often or always, 0=Never, rarely or occasionally	.0291	.1682
D	Whether survey was given during apple season (in November): 1=Given in season during November, 0=Given out of season from December through February	.3359	.4726
F	Whether householder is familiar with IPM: 1=Yes, 0=No	.0659	.2546
Φ	Respondent's first reason for buying ecolabeled apples is: 1=Health or food safety, 0=A different reason	.3689	.4830
Ψ	Respondent's first reason for buying ecolabeled apples is: 1=Concern for the environment, 0=A different reason	.2722	.4455

Table 12
Percent respondents purchasing regular and ecolabeled apples when both are available

Regular only	Ecolabeled only[a]	Some of both apples	No apples	Don't know	Refused
33.2%	41.7%	13.9%	6.3%	4.4%	0.7%

[a]Ecolabeled apples refer to both IPM and ECO apples.

Table 13
Percent respondents purchasing regular and ecolabeled apples when the price premium on ecolabeled apples is $___/lb.

Price Premium on ecolabeled apples[a] ($/lb.)	Regular Apples	Eco-labeled Apples[a]	Some of both apples	No apples	Don't Know	Refused
$.00	16.3%	57.2%	15.4%	7.2%	2.6%	1.3%
$.20	39.8%	38.1%	14.3%	5.4%	1.4%	0.0%
$.40	44.0%	29.0%	13.3%	9.9%	3.1%	0.7%

[a]Ecolabeled apples refer to both IPM and ECO apples.

Table 14
Cragg Double Hurdle for *ecolabeled apples* in a market with ecolabeling

Variable name	Dependent Variable (estimation technique)		Marginal effects of the Truncated regression upon amount purchased
	Whether or not regular apples were purchased[a] (Probit)	Amount of regular apples purchased by those who bought some (Truncated)	
P_X	.7513*** (.1353)	6.6724 (5.3694)	.8784 (.7069)
P_X'	-.8894*** (.1140)	-8.1623* (4.8833)	-1.0746* (.6429)
M	.0002 (.0006)	.0030 (.0199)	.0004 (.0026)
Hh	.0142 (.0123)	.9403** (.4613)	.1238** (.0607)
Age	-.0014 (.0012)	.1085** (.0534)	.0143** (.0070)
Gen	-.1112*** (.0444)	3.7615** (1.8524)	.4952** (.2439)
Educ	.0255*** (.0072)	-.1738 (.2708)	-.0229 (.0357)
L	.0506 (.0363)	.6130 (1.3378)	.0807 (.1761)

[a]The values listed in this column are the marginal values of the Probit and thus give a change in the probability of buying the apples given a one unit change in the explanatory variable.

Table 14 (cont'd)

Variable name	Dependent Variable (estimation technique)		Marginal effects of the Truncated regression upon amount purchased
	Whether or not regular apples were purchased[a] (Probit)	Amount of regular apples purchased by those who bought some (Truncated)	
C	-.0133 (.0364)	-1.0754 (1.3484)	-.1416 (.1775)
Groc	-.0536 (.0599)	-6.3647** (2.5201)	-.8379** (.3318)
Org	.1653 (.0914)	.9537 (3.5129)	.1255 (.4625)
D	.0624* (.0380)	-2.1041 (1.5457)	-.2770 (.2035)
F[a]	-.1973* (.1023)	1.4127* (.8188)	.7132* (.4134)
Φ[a]	-----[b]	2.7356 (1.6835)	.3841 (.2364)
Ψ[a]	-----[b]	3.8977** (1.8950)	.5473** (.2610)
$\hat{\sigma}$	-----	2.7452	-----

*= Significant at the 10% level,**= Significant at the 5% level,***= Significant at the 1% level

[a]The values listed in this column are the marginal values of the Probit and thus give a change in the probability of buying the apples given a one unit change in the explanatory variable.

[b]Because Φ and Ψ were measured only for those who bought ecolabeled, they cannot be measured for their effect upon the decision to buy.

Table 15
Cragg Double Hurdle for regular apples in a market with ecolabeling

Variable name	Dependent Variable (estimation technique)		Marginal effects of the Truncated regression upon amount purchased
	Whether or not regular apples were purchased[a] (Probit)	Amount of regular apples purchased by those who bought some (Truncated)	
P_X	-.8452*** (.1377)	-3.5062 (2.5510)	-1.0056 (.7317)
P_X'	.7552*** (.1136)	1.0373 (2.1911)	.2975 (.6285)
M	.0003 (.0006)	-.0032 (.0115)	-.0009 (.0033)
Hh	-.0080 (.0123)	.7275*** (.2444)	.2086*** (.0701)
Age	.0000 (.0012)	.0714*** (.0248)	.0205*** (.0070)
Gen	.0918** (.0436)	.6809 (.7896)	.1953 (.2265)
Educ	-.0042 (.0072)	-.0598 (.1254)	-.0171 (.0360)
L	-.0098 (.0365)	-.5383 (.6612)	-.1544 (.1897)

[a]The values listed in this column are the marginal values of the Probit and thus give a change in the probability of buying the apples given a one unit change in the explanatory variable.

Table 15 (cont'd)

Variable name	Dependent Variable (estimation technique)		Marginal effects of the Truncated regression upon amount purchased
	Whether or not regular apples were purchased[a] (Probit)	Amount of regular apples purchased by those who bought some (Truncated)	
C	.0305 (.0366)	1.7641** (.7234)	.5060** (.2075)
Groc	-.0446 (.0365)	-2.4535** (1.1198)	-.7037** (.3212)
Org	-.3142*** (.0791)	.5051 (2.7083)	.1449 (.7768)
D	-.0528 (.0384)	.4246 (.7072)	.1218 (.2028)
$\hat{\sigma}$	----	3.4594	----

*= Significant at the 10% level,**= Significant at the 5% level,***= Significant at the 1% level

[a]The values listed in this column are the marginal values of the Probit and thus give a change in the probability of buying the apples given a one unit change in the explanatory variable.

Table 16

Cragg Double Hurdle for *regular apples* in a market without ecolabeling

Variable name	Dependent Variable (estimation technique)		Marginal effects of the Truncated regression upon amount purchased
	Whether or not regular apples were purchased[a] (Probit)	Amount of regular apples purchased by those who bought some (Truncated)	
P_X	-.1505*** (.0452)	-1.5345 (.9899)	-.5216 (.7739)
M	.0006* (.0003)	-.0031 (.0071)	.0011 (.0024)
Hh	.0063 (.0075)	.6421*** (.1650)	.2183*** (.0561)
Age	-.0015** (.0008)	.0592*** (.0171)	.0201*** (.0058)
Gen	-.0145 (.0261)	.9842* (.5422)	.3346* (.1843)
Educ	.0141*** (.0043)	-.0362 (.0928)	.0123 (.0315)
Groc	.0278 (.0380)	-3.3003*** (.7402)	-1.1218*** (.2516)
Org	.0180 (.0644)	-1.5593 (1.4755)	-.5300 (.5016)
D	.0158 (.0230)	.2806 (.1806)	.0954 (.1634)
$\hat{\sigma}$	-----	3.4594	-----

*= Significant at the 10% level,**= Significant at the 5% level,***= Significant at the 1% level

Table 16 (Cont'd)

[a]The values listed in this column are the marginal values of the Probit and thus give a change in the probability of buying the apples given a one unit change in the explanatory variable

Table 17
Tobit coefficients and calculated marginal effects for *ecolabeled apples*

Variable name	Tobit coeff.	(∂E(Y)/∂x)	(∂E(Y*)/∂x)	(∂F(z)/∂x)
P_X	9.0430*** (2.0001)	3.9981*** (.8833)	3.0100	.5252
P_X'	-9.4586*** (1.6709)	-4.1818** (.7360)	-3.1483	-.5494
M	.0017 (.0081)	.0007 (.0036)	.0006	.0001
Hh	.3451* (.1778)	.1526* (.0787)	.1149	.0200
Age	-.0124 (.0182)	-.0055 (.0081)	-.0041	-.0007
Gen	-.9111 (.6475)	-.4028 (.2861)	-.3033	-.0529
Educ	.1915* (.1079)	.0847* (.0476)	.0637	.0111
L	-.0495 (.5335)	-.0219 (.2359)	-.0165	-.0029
C	.2760 (.5346)	.1220 (.2364)	.0919	.0160
Groc	-3.9809*** (.8782)	-1.7600*** (.3913)	-1.3251	-.2312
Org	1.4056 (1.5141)	.6214 (.6693)	.4679	.0816
D	-.0518 (.5613)	-.0229 (.2482)	-.0173	-.0030

Table 17 (cont'd)

Variable name	Tobit coeff.	(∂E(Y)/∂x)	(∂E(Y*)/∂x)	(∂F(z)/∂x)
F[a]	-2.7705 (2.4059)	-1.0818	-.8421	-.1095
Φ[a]	.6038 (.6890)	.2958	.2074	.0265
Ψ[a]	1.5394** (.7352)	.8042	.5640	.0722
σ̂	6.7963	-----	-----	-----

*= Significant at the 10% level,**= Significant at the 5% level,***= Significant at the 1% level

[a]The familiarity, health and environmental concern variables are separated from the other variables by a double line to indicate that they were estimated in separate equations. The results above the double line were estimated in a regression without these three variables included. Two separate equations were run with familiarity (F) and the two motivational variables (Φ and Ψ). We only report the coefficients of these three variables from those last two equations.

Likelihood Value[a]: -1755.8419
Chi-Squared[a]: 64.94, **P-value[a]:** .0000
[a] These values for the equation without F, Φ and Ψ.

Table 18
Tobit coefficients and calculated marginal effects for *regular apples* in a market with both types of apples

Variable name	Tobit coefficient	(∂E(Y)/∂x)	(∂E(Y*)/∂x)	(∂F(z)/∂x)
P_X	-7.0380*** (1.5198)	-2.9439*** (.6317)	-2.2581	-.5531
P_X'	5.2287*** (1.2693)	2.1871*** (.5265)	1.6776	.4109
M	.0030 (.0064)	.0013 (.0027)	.0010	.0002
Hh	.0753 (.1352)	.0315 (.0566)	.0241	.0059
Age	.0068 (.0136)	.0028 (.0057)	.0021	.0005
Gen	.9108* (.4789)	.3810* (.2002)	.2922	.0716
Educ	-.0967 (.0785)	-.0405 (.0329)	-.0310	-.0076
L	-.6010 (.4023)	-.2514 (.1685)	-.1928	-.0472
C	.1789 (.4031)	.0748 (.1686)	.0574	.0141
Groc	-2.0192*** (.6687)	-.8446*** (.2814)	-.6478	-.1587
Org	-3.5886** (1.4063)	-1.5010** (.5861)	-1.1514	-.2820
D	.1280 (.4274)	.0536 (.1788)	.0411	.0101

Table 18 (Cont'd)

Variable name	Tobit coefficient	(∂E(Y)/∂x)	(∂E(Y*)/∂x)	(∂F(z)/∂x)
$\hat{\sigma}$	4.9699	-----	-----	-----

*= Significant at the 10% level,**= Significant at the 5% level,***= Significant at the 1% level

Likelihood Value: -1392.7057
Chi-Squared: 42.37, **P-value:** .0000

Table 19
Tobit coefficients and calculated marginal effects for *regular apples* in a market without ecolabeled apples.

Variable name	Tobit coefficient	(∂E(Y)/∂x)	(∂E(Y*)/∂x)	(∂F(z)/∂x)
P_X	-.9419 (1.0037)	-.6100 (.6500)	-.4277	-.0531
M	.0045 (.0076)	.0029 (.0049)	.0020	.0003
Hh	.1334 (.1658)	.0864 (.1074)	.0606	.0075
Age	-.0233 (.0166)	-.0151 (.0108)	-.0106	-.0013
Gen	-.2520 (.5771)	-.1632 (.3738)	-.1144	-.0142
Educ	.0230 (.0960)	.0149 (.0622)	.0104	.0013
Groc	-5.0969*** (.8179)	-3.3013*** (.5346)	-2.3145	-.2871
Org	-.8844 (1.4169)	-.5728 (.9179)	-.4016	-.0498
D	.3799 (.5091)	.2461 (.3298)	.1725	.0214
$\hat{\sigma}$	6.5911	-----	-----	-----

*= Significant at the 10% level,**= Significant at the 5% level,***= Significant at the 1% level

Likelihood Value: -2354.083
Chi-Squared: 42.76, **P-value:** .0000

Table 20
Calculated Tobit elasticities of prices, income and significant variables for all three types of apples

Variable Name	ηE(Y)	ηE(Y*)	ηF(z)
Regular Apples in first market scenario			
P_X	-.1324	-.0601	-.0723
M	.0383	.0174	.0209
Groc	-.7332	-.3329	-.4003
Regular apples in the second market scenario			
P_X	-1.7260	-.5538	-1.1722
P_X'	1.5690	.5034	1.0656
M	.0443	.0142	.0301
Gen	.0610	.0196	.0414
Groc	-.5033	-.1615	-.3418
Org	-.0302	-.0097	-.0205
Ecolabeled apples			
P_X	1.5767	.5248	1.0519
P_X'	-2.0207	-.6726	-1.3481
M	.0174	.0058	.0116
Hh	.2010	.0669	.1341
Educ	.5294	.1762	.3532
Groc	-.7078	-.2356	-.4722
Ψ	.0559	.0261	.0299

Table 21

Q: Why did you choose to buy the ecolabeled[a] apples? (Open ended)
(Note: This question asked only to those who bought ecolabeled apples)

Stated Reason	First Reason Percent Respondents (N=496)	Second Reason Percent Respondents (N=255)	Third Reason Percent Respondents (N=103)
Ecolabeled apples are better for the environment	27.4 %	23.5%	23.3%
To avoid chemicals in my food	20.9 %	18.4%	21.4%
To try them/Buy them out of curiosity	18.9%	6.3%	2.9%
Ecolabeled apples are safer/healthier for me and my family	16.2 %	32.5%	23.3%
The ecolabeled apple quality is better	10.2 %	10.2%	9.7%
Feels like I'm doing something good	5.5 %	3.1%	4.8%
I care about future generations	1.6 %	2.4%	4.9%
Don't know	1.4 %	3.1%	6.8%
Refused	.6%	.4%	2.9%

[a]Ecolabeled apples refer to both IPM and ECO apples

Table 22

Q: Why did you choose not to buy the ecolabeled apples[a]? (Open-ended)

(Note: This question asked only to those respondents who did not buy ecolabeled apples)

Stated Reason	First Reason Percent Respondents (N=352)	Second Reason Percent Respondents (N=87)	Third Reason Percent Respondents (N=36)
They are too expensive	46.3 %	14.9%	22.2%
Do not know enough about ecolabels to buy them	21.6 %	42.5%	44.4%
Prefer own brand of apples	8.5 %	6.9%	2.8%
Regular apples are just as safe and healthy for my family	8.2 %	14.9%	2.8%
Do not trust/believe the ecolabel	4.5 %	6.9%	0.0%
They are an advertising gimmick	2.3 %	4.6%	8.3%
Do not trust the government/USDA	2.0 %	0.0%	0.0%
Do not like to try new things	1.1 %	1.1%	2.8%
Don't know	4.3 %	5.7%	13.9%
Refused	1.1%	2.3%	2.8%

[a]Ecolabeled apples refer to both IPM and ECO apples.

Table 23
Comparison of results between Tobit, OLS and SUR for ecolabeled apples in a market with ecolabeling

Variable Name	Tobit model-Marginal effects	OLS (Linear functional form)	SUR (Linear functional form)
Ecolabeled apples in the second market scenario			
P_X	3.9981*** (.8833)	3.3109** (1.3171) [1.0200][a]	3.3532** (1.3352)
P_X'	-4.1818** (.7360)	-2.9552*** (1.0946) [.5581]	-3.0055*** (1.1073)
M	.0007 (.0036)	-.0003 (.0055) [.0025]	.0007 (.0056)
Hh	.1526* (.0787)	.2191* (.1188) [.1346]	.2183* (.1205)
Age	-.0055 (.0081)	-.0007 (.0120) [.0083]	-.0016 (.0122)
Gen	-.4028 (.2861)	-.1209 (.4252) [.2784]	-.1184 (.4313)
Educ	.0847* (.0476)	.0189 (.0698) [.0460]	.0010 (.0702)

[a]The bracketed expression is White's robust standard error given to correct for heteroscedasticity.

Table 24 (cont'd)

Variable Name	Tobit model-Marginal effects	OLS (Linear functional form)	SUR (Linear functional form)
Ecolabeled apples in the second market scenario			
L	-.0219 (.2359)	-.2645 (.3538) [.3985]	-.2910 (.3588)
C	.1220 (.2364)	.3181 (.3545) [.3572]	.3341 (.3597)
Groc	-1.7600*** (.3913)	-3.0334*** (.6007) [1.7205]	-3.0194*** (.6050)
Org	.6214 (.6693)	.2587 (1.0457) [.3793]	.2430 (1.0528)
D	-.0229 (.2482)	-.3894 (.3749) [.2909]	-.4089 (.3795)
Cross price elas	-2.0207	-2.0846	-2.0914
Own price elas	1.5767	1.9061	1.9048
income elas	.0174	-.0104	.0238
MSE	----	14.897	5.0001

*= Significant at the 10% level,**= Significant at the 5% level,***= Significant at the 1%level

Table 24
Comparison of results between Tobit, OLS and SUR for regular apples in a market with ecolabeling

Variable Name	Tobit model-Marginal effects	OLS (Linear functional form)	SUR (Linear functional form)
Regular apples in the second market scenario			
P_X	-2.9439*** (.6317)	-1.9829** (.8079) [.5929][a]	-2.0070** (.8164)
P_X'	2.1871*** (.5265)	.8512 (.6703) [.8512]	.8736 (.6745)
M	.0013 (.0027)	.0036 (.0034) [.0036]	----[b]
Hh	.0315 (.0566)	.0827 (.0731) [.0827]	.1082 (.0725)
Age	.0028 (.0057)	.0052 (.0074) [.0052]	.0072 (.0074)
Gen	.3810* (.2002)	.3263 (.2609) [.3263]	.3475 (.2636)

[a]The bracketed expression is White's robust standard error given to correct for heteroscedasticity.
[b]In order for SUR to run as SUR, the explanatory variables have to be different between the two equations. Thus, income and education were left out of the regular equation so that the equations would be different.

Table 24 (cont...)

Variable Name	Tobit model-Marginal effects	OLS (Linear functional form)	SUR (Linear functional form)
Regular apples in the second market scenario			
Educ	-.0405 (.0329)	-.0573 (.0426) [.0629]	-----
L	-.2514 (.1685)	-.4476** (.2175) [-.2338]	-.4495** (.2196)
C	.0748 (.1686)	-.0020 (.2181) [.2161]	-.0073 (.2198)
Groc	-.8446*** (.2814)	-1.7885*** (.3663) [.9545]	-1.8082*** (.3700)
Org	-1.5010** (.5861)	-.9469 (.6415) [.3853]	-.9457 (.6378)
D	.0536 (.1788)	.2925 (.2300) [.2646]	.3139 (.2322)
Own price elas.	-1.7260	-1.3406	-1.3379
Cross price elas.	1.5690	.7043	.7122
Income elas.	.0443	.1468	-----
MSE	-----	3.0452	3.0571

*= Significant at the 10% level,**= Significant at the 5% level,***= Significant at the 1% level

APPENDICES

APPENDIX A

DEVELOPMENT OF ECOLABEL DESCRIPTIONS AND PRICES[30]

The ecolabels presented in the questionnaire were developed over several months. Descriptions of ecolabels were pretested in personal interviews with consumers and refined based on the pretest results. Many rounds of pretests were conducted before the final wording was selected.

The initial set of ecolabels was created by examining existing agricultural ecolabeling programs in the U.S. These programs included the Massachusetts-IPM Partners with Nature Program, the Wegmans IPM label for canned corn and standards developed by California Clean Growers. Initially, we looked at three dimensions of the ecolabels: (1) whether process standards (i.e., production practices) or performance standards (i.e., environmental outcomes) were used to define the environmental claim, (2) how comprehensive the claim was (i.e., how many types of process or performance standards were specified), and (3) whether certification was

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[30]This section taken from Jeffrey R. Blend, and Eileen O. van Ravenswaay, 1998, " Demand for Ecolabeled Apples: Survey Methods and Descriptive Results," Department of Agricultural Economics Staff Paper No. 98-20 , Michigan State University, East Lansing, MI.

performed and, if so, by whom. Initial label descriptions consisted of different combinations of standards, comprehensiveness, and certifiers. Examples of some of the initial ecolabel descriptions follow:

Example 1: Process standards which are non-comprehensive and producer certified

Grown using Integrated Pest Management

Grown with 33% less of Pesticide X

Certified by the Smith Farms

Example 2: Performance standards which are non-comprehensive and certified by the federal government

Production resulted in 75% less nitrates in groundwater

Superb rating on the Soil Health Index

Certified by the USDA

Example 3: Process standards which are comprehensive and certified by a well-known consumer group

Used the safest fertilizers and pesticides on the market at the lowest possible levels

Met 80% of the total points possible to qualify as IPM certified

Produced in a manner which encourages healthy soil

Produced with 60% less of chemicals X, Y, and Z

Produced with 40% less irrigation water

Grown using 30% less total energy (in Kilowatts)

Certified by the Society for a Better America Consumer Group

Example 4: Performance standards which are comprehensive and not certified

Improved 50% on the Soil Nutrient Yardstick over previous year

Doubled the number of Sandhill Crane and endangered Gray Wolves observed on the farm

Water runoff from farm contained a 40% lower concentration of toxic residue than average levels in the county

No detectable residues found upon this product

Introduced four new species of rare wild flowers to farm

Production resulted in 20% less on-farm solid waste than the year before

Energy-efficient transport of this product resulted in 50% less air emissions

Example 5: No process or performance standards and no certification

This product grown with a commitment to preserving our environment

Initial pretest interviews revealed that these descriptions were too

complicated and confusing. Participants did not like being read a 'laundry list' of environmental attributes and thought the standards were very vague. We also learned from agricultural scientists that the development of performance standards was hampered by the current inability to measure environmental performance.[31] Consequently, we decided to omit the distinction between the process and performance standards. The pretests did indicate, however, that certification status and comprehensiveness of the claim were important in the purchasing decision. As a result, they were included as dimensions in the further rounds of ecolabel pretesting.

IPM ecolabel was chosen because several U.S. agricultural ecolabels are based upon IPM standards including Partners with Nature in Massachusetts and the Wegmans label on canned vegetables in New York state. These existing labels provided a framework within which to create the

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[31]Discussions of these difficulties found in S. Riha, L. Levitan, and J. Hutson, "Environmental Impact Assessment: The Quest for a Holistic Picture," *Proceedings of the Third National IPM Symposium, USDA, ERS, Washington, D.C.*, 1997 *and* Wayne S. Roberts and Scott M. Swinton, "Economic Methods for Comparing Alternative Crop Production Systems: A Review of the Literature," *American Journal of Alternative Agriculture*, 1996, 11(1):10-17.

IPM description.[32]

The ECO ecolabel was created to see if consumers distinguish other farm-related environmental impacts. Unlike the IPM ecolabel, the ECO ecolabel was not based upon an existing ecolabel.

Food labels at local food stores provided examples of simple and clear language that respondents would recognize.[33] Labels were examined on fresh and frozen produce and juices, processed foods, health foods, and organic foods.

The final versions of the ecolabel began with a definition of IPM or ECO, depending upon which version the respondent received. This was followed by the environmental claim itself. The IPM claim was:

On the label it is stated that IPM means that the apples were

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[32]The IPM definition and practices mentioned in the claim were obtained from two web-sites and from the Wegman's IPM label for canned corn. Valuable assistance was also provided by Mark Whalen, Entomology Dept. at MSU, Lois Levitan, Cornell University, Kurt Petzoldt with New York IPM, Cornell Extension Station and Laura Tourte, UC Davis-extension. Bill Coli at Umass at Amhurst and Bryan Hubbel at Univ. of Georgia at Athens provided assistance with the specific wording of the IPM claim.

[33]Stores visited consisted of several supermarkets, a farmer's markets and an organic-oriented food co-op, the names of which are Meijers, Kroger, Save-A-Lot, and East Lansing Food Co-Op or ELFCO, and the Haslett Farmer's Market.

grown using Integrated Pest Management. Signs and brochures in the store explain that IPM uses a number of different methods to prevent pest damage to fresh apples. These methods lower the need for environmentally harmful practices on the farm. For example, insects that damage apples are controlled by their natural enemies. Fields are monitored for pests to reduce unnecessary chemical usage. Apple varieties are planted which resist disease. When pesticides are needed, the least harmful are used.

The ECO claim was:

Signs and brochures in the store explain that "ECO-apples" are grown using techniques based on environmental principles. These techniques result in more efficient use of water and energy. They include the use of naturally occurring fertilizers to protect water and soil quality. When possible, natural insect control methods are used to prevent pest damage on fresh apples. Man-made pesticides are used only as a last resort.

To help respondents visualize the ecolabel, a physical description was provided. The size, shape, color and lettering upon the label were described.

Respondents were told that the letters on the label were IPM [or ECO] in capital letters. We included three capital letters on all versions of the ecolabel to ensure that the letter size would not affect demand.

The regular apple prices used in the market scenarios were chosen based upon U.S. apple data. Retail apple prices from the months in which the survey was given, November through February, were averaged over the last five years of available data (1992-1996) resulting in a figure of $.88 per pound.[34] A central price of $.89 per pound was identified because most apples in the U.S. are sold at a price which ends in '9' on a per pound basis.[35] Two additional prices were then chosen on either side of this figure at $.30 increments to represent variation about the average U.S. apple price.

Prices for the ecolabeled apple were selected by looking at the market for organic apples. In van Ravenswaay and Blend (1997), it was suggested that ecolabeled apples would best capture a significant portion of the apple market by providing a cheaper environmental alternative to organic. Thus, the ecolabeled apple prices used in our market scenario were kept at or below

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[34]All prices given are in December, 1997 dollars.

[35]It was decided from earlier work (van Ravenswaay and Hoehn, 1991) that the prices given would be on a per pound basis since this was the most common way respondents understood them.

the lowest organic prices.

In order to determine the lowest prices for organic apples, a price range was identified. This was done by looking at prices in the Lansing area and referring to studies by Jolly (1989 and 1991) and Hammit (1986) who calculated price premiums for organic apples in California.[36] The lowest prices for organic apples were about $1.39-$1.49 per pound.[37] This was set as an approximate upper bound price for the ecolabeled apples.

Because the highest price for regular apples was $1.19/lb, the price premium on ecolabeled apples could be no greater than 30 or 40 cents per pound if it were to stay roughly within its bound. Thus, the highest premium was set at $.40/lb. The lowest premium was set at zero cents (i.e., same price for regular and ecolabeled apples) so that an estimate could be made of the difference in demand between ecolabeled and regular brands, *ceteris paribus*. A third premium was set halfway between these two at $.20/lb.

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[36]Stores visited included East Lansing Food Co-op, Kroger grocery store, and the Haslett Farmer's Market.

[37]It was found that organic prices ranged from $1.50/lb up to $2.50 per pound from the sources consulted. The lower prices were from price data reported in Hammitt and Jolly. The highest price was seen at the local food co-op.

APPENDIX B

SAMPLE SELECTION[38]

The Institute of Public Policy and Social Research (IPPSR) at Michigan State University conducted the survey interviews. IPPSR purchased the phone numbers from Gensys Sampling Inc. who randomly generated 3945 numbers from a straight 48 state proportional sample.

IPPSR assigned a five digit case ID number to each phone number. Each ID number was then randomly assigned to one of the 36 survey versions. In this way, approximately equal numbers of respondents received each survey version.

IPPSR dialed the phone numbers until they obtained the desired sample size. The calls were placed between November 3, 1997 and February 11, 1998 and the survey interviews lasted an average of 7 minutes. Of the 3203 numbers dialed, 1453 reached households with persons who were eligible for

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[38]This section is based on Jeffrey R. Blend, and Eileen O. van Ravenswaay, 1998, " Demand for Ecolabeled Apples: Survey Methods and Descriptive Results," Department of Agricultural Economics Staff Paper No. 98-20 , Michigan State University, East Lansing, MI.

participation in the survey.[39] Of these eligible cases, 972 interviews were completed resulting in a participation rate of 66.9 % (972/1453). Of the eligible households, there were 393 refusals. One thousand seven hundred and fifty numbers or 54.6% of those dialed were ineligible for participation. One thousand three hundred and twelve of the ineligible numbers consisted of business lines, FAX or computer numbers and verified non-working numbers. Three hundred and twenty-nine could not be contacted because either no one answered or the line was constantly busy after 20 attempts. One hundred thirty seven of the ineligible numbers reached respondents who were unable to participate due to physical handicaps, respondents with language barriers, those who were too young (teenager lines) and those who were absent during the study period.

[39]Eligibility required the number to be that of a residential household and that the person who purchases food for the household be 18 years or older.

APPENDIX C

SURVEY INSTRUMENT[40]

Hello, my name is _____ and I am calling from the Institute of Public Policy and Social Research at Michigan State University. Is this (phone number)?

We are calling on behalf of the Agricultural Economics Department at Michigan State University. We are conducting a national survey of food consumers. May I speak to the person who usually does the food shopping for your household? Thank you.

The survey takes about 7 minutes. Before we begin, let me tell you that any information you give me will be kept strictly confidential. Let me also tell you that this interview is completely voluntary. Should we come to any question that you don't want to answer, just let me know and we'll go on to the next question.

I'd like to start by asking you some general questions about the fresh apples you may buy for your household. By fresh apples, I am referring only to raw apples. When answering the following questions, do not include canned or processed apples, apple juice, apple sauce, or cider. Fresh apples are in season in late summer and early fall.

Q1. Do you buy fresh apples for your household? [IF THEY ASK WHAT IS MEANT BY HOUSEHOLD: Your household includes yourself, your dependents, and persons with whom you share income and household living expenses.]

1. Yes---[GO TO Q3]
5. No---[GO TO Q2]
8. Don't know
9. Refused---[GO TO Q3]

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[40]This section is based on Jeffrey R. Blend and Eileen O. van Ravenswaay, 1998, "Demand for Ecolabeled Apples: Survey Methods and Descriptive Results," Department of Agricultural Economics Staff Paper No. 98-20, Michigan State University, East Lansing, MI.

Q2. Could you tell me why you do not buy fresh apples for your household? (ALLOW 2 CHOICES)

1. My household does not like/eat apples
2. Apples are too expensive
3. Apples are not available
4. Apples are unsafe or unhealthy
5. Other (Specify_____)
90. Do buy apples, but only in season or only occasionally--[GO TO Q3]
98. Don't Know
99. Refused

GO TO Q17

Q3. Where do you usually purchase apples?

1. Supermarket, grocery, or convenience store
2. Farmer's market
3. Farm, roadside stand, orchard, or cider mill
4. Green grocer or fruit specialty store
5. Organic food store or cooperative
6. Other (Specify_____)
8. Don't know
9. Refused

Q4. Have you ever bought organic apples?

1. Yes---[GO TO Q4a]
5. No---[GOTO Q5]
8. Don't Know---[GOTO Q5]
9. Refused---[GOTO Q5]

Q4a. When you buy apples, how often do you buy organic apples? Would you say rarely, occasionally, often, or always?

1. Rarely
2. Occasionally
3. Often
4. Always
8. Do not know
9. Refused

Q5. How much have you seen, heard, or read about Integrated Pest Management or IPM?

1. Nothing
2. A little
3. A fair amount
4. A great deal
8. Don't know
9. Refused

Q6 Imagine you are at the place where you normally buy fresh apples, and you are planning to buy some. Suppose that all apple varieties and sizes are the same price per pound whether displayed individually or packaged in bags, boxes, or bushels. All your favorite varieties are on display and are of the size and quality you prefer. There are no special sales on any other fresh fruits. If the price of apples was _____ per pound and no other place was selling them for less, would you buy any apples?

1. Yes---[GOTO Q7]
5. No----[GOTO Q6a]
8. Don't know---[GO TO Q10]
9. Refused----[GO TO Q10]

Q6a. Why would you not buy any apples?

1. Too expensive---[GO TO Q8]
2. Other (Specify___)---[GO TO Q8]
9. Respondent contradicts what was read in scenario, Specify (___)--- [GO TO Q6b]
98. Do not know---[GO TO Q8]
99. Refused---[GO TO Q8]

Q6b. If _____ [INSERT RESPONDENT'S CONTRADICTION FROM Q6a] was not a factor, and if the price of apples was [INSERT PRICE FROM Q6] ___ per pound, would you buy any apples?

1. Yes---[GO TO Q7]
5. No---[GO TO Q8]
8. Don't know
9. Refused

Q7. How much would you buy?

RECORD NUMBER and UNITS

Q8. If you were in exactly the same setting, and the price of apples was _____ per pound, would you buy any apples?

1. Yes---[GO TO Q9]
5. No----[GO TO Q10]
8. Don't know---[GO TO Q10]
9. Refused---[GO TO Q10]

Q9. How much would you buy?

RECORD NUMBER and UNITS

Q10. [*There are four versions to Q10. Respondents are assigned randomly to receive one of these version. Versions 1 and 3 present the respondent with an IPM ecolabel and versions 2 and 4 present the respondent with an "ECO" ecolabel. Versions 1 and 2 include the statement that the ecolabel is certified by the USDA, whereas versions 3 and 4 do not.*]

[VERSIONS 1 AND 3 OF Q10, WITH IPM ECOLABEL]
Imagine you are in the same setting and you notice something new at your store. Your store sells the same apples it always has and apples grown a new way. The apples grown the new way have small, round half-inch wide labels that have a white background and green lettering.

The letters on the label are IPM in capital letters. [The label states that IPM apples are certified by the USDA to have been grown and handled according to government standards.] On the label it is stated that IPM means that the apples were grown using Integrated Pest Management. Signs and brochures in the store explain that IPM uses a number of different methods to prevent pest damage to fresh apples.

These methods lower the need for environmentally harmful practices on the farm. For example, insects that damage apples are controlled by their natural enemies. Fields are monitored for pests to reduce unnecessary chemical usage. Apple varieties are planted which resist disease. When pesticides are needed, the least harmful are used.

You are planning to buy fresh apples of the size and quality you prefer. The price of the regular apples is the same as before, (INSERT PRICE FROM Q6) _____ per pound and the price of the [Certified] IPM apples is _____ per pound. Would you buy the regular apples, the

IPM apples, some of both, or none at all?

1. Regular only---[GO TO Q10a]
2. IPM only—[GO TO Q10b]
3. Some of both---[GO TO Q10a]
4. None at all---[GO TO Q15]
8. Don't know---[GO TO Q16]
9. Refused---[GO TO Q16]

[*The bracketed sentence involving USDA certification of IPM and the bracketed word "certified" are included only in version 1 of the apple scenario. They are not included in version 3*]

Q10
[VERSIONS 2 AND 4 WITH THE "ECO" ECOLABEL]

Imagine you are in the same setting and you notice something new at your store.

Your store sells the same apples it always has and apples grown a new way. The apples grown the new way have small, round half-inch wide labels that have a white background and green lettering.

The letters on the label are E C O or "Eco" in capital letters. [The label states that ECO-apples are certified by the USDA to have been grown and handled according to government standards.] Signs and brochures in the store explain that "ECO-apples" are grown using techniques based on environmental principles. These techniques result in more efficient use of water and energy. They include the use of naturally occurring fertilizers to protect water and soil quality. When possible, natural insect control methods are used to prevent pest damage on fresh apples. Man-made pesticides are used only as a last resort.

You are planning to buy fresh apples of the size and quality you would prefer. The price of the regular apples is the same as before, (INSERT PRICE FROM Q6) _____ per pound and the price of the [Certified] ECO-apples is _____ per pound. Would you buy the regular apples, the ECO-apples, some of both, or none at all?

1. Regular only---[GO TO Q10a]
2. IPM only---[GO TO Q10b]

3. Some of both---[GO TO Q10a]
4. None at all---[GO TO Q13]
8. Don't know---[GO TO Q17]
9. Refused---[GO TO Q17]

[*The bracketed sentence involving government certification of ECO apples and the bracketed word "certified" will be included only in version 2 of the apple scenario. It will not be included in version 4*]

Q10a. How much of the regular apples would you buy?

RECORD NUMBER AND UNITS (if blank record zero)

Q10b. How much of the IPM apples would you buy?

RECORD NUMBER AND UNITS (if blank record zero)

Q11 Why would you buy the [IPM/ECO] apples? (Open-ended) (Allow up to 3 choices)

1. IPM apples are better for the environment
2. I care about future generations/future of our planet
3. IPM apples are safer and healthier for my family and myself
4. To avoid chemicals in my food
5. Feels good/feels like I'm doing something good
6. Other (Specify_____)
8. Don't know
9. Refused

Q12 Why would you not buy the [IPM/Eco] apples? (Open-ended) (Allow up to 3 choices)

1. They are too expensive/Not worth it---[GO TO Q13]
2. The regular apples are just as safe/healthy for my family---[GO TO Q13]
3. I do not trust/believe the IPM label—[GO TO Q13]
4. I do not know enough about IPM to buy them---[GO TO Q13]
5. IPM is an advertising gimmick---[GO TO Q13]
6. Other (Specify_____)---[GO TO Q13]
90. Respondent contradicts what was read in scenario, Specify (___)---[GO TO Q12a]
98. Do not know---[GO TO Q13]

99. Refused---[GO TO Q13]

Q12a Imagine that this (INSERT RESPONDENT'S CONTRADICTION FROM Q12) is not a factor. The price of the regular apples is the same as before, (INSERT PRICES FROM Q10) _____ per pound, and the price of the [Certified] ECO-apples is _____ per pound. Would you buy the regular apples, the ECO-apples, some of both, or none at all?

1. Regular only---[GO TO Q10a]
2. IPM only—[GO TO Q10b]
3. Some of both---[GO TO Q10a]
4. None at all---[GO TO Q13]
8. Don't know---[GO TO Q17]
9. Refused---[GO TO Q17]

Q13 Suppose that the price of the regular apples is the same as before, [INSERT THE PRICE GIVEN FROM Q6] _____ per pound and no other place is selling them for less. The price of the [IPM/Eco] apples is now _____ per pound. Would you buy the regular apples, the IPM/Eco apples, some of both, or none at all?

1. Regular only---[GO TO Q13a]
2. IPM only—[GO TO Q13b]
3. Some of both---[GO TO Q13a]
4. None at all---[GO TO Q17]
8. Don't know---[GO TO Q17]
9. Refused---[GO TO Q17]

Q13a. How much of the regular apples would you buy?

RECORD NUMBER AND UNITS (if blank record zero)

Q13b. How much of the IPM apples would you buy?

RECORD NUMBER AND UNITS (if blank record zero)

DEMOGRAPHIC QUESTIONS

[*If they answered yes to Q1, then use the following statement only. If they answered no to Q1, then use the following statement and add on the alternate statement*]

These last few questions for statistical purposes only and cannot be linked to you in any way.

[*If they answered no to Q1, then use the following statement*]
Although you do not buy apples for your household, this information is still valuable to the survey.

Q17. Are you male or female? [ASK ONLY IF IN DOUBT] (Circle one)

1. Female
2. Male

Q18a. Including yourself, how many people in your household are in the following age categories? (Write in the numbers)

Under 5 years?

<0-10> Under 5 years
<98> Don't Know
<99> Refused

Q18b. 5 to 17 years?

<0-10> 5 to 17 years
<98> Don't Know
<99> Refused

Q18c. 18 to 64 years?

<0-10> 18 to 64 years
<98> Don't Know
<99> Refused

Q18d. 65 years or older?

<0-10> 65 or older
<98> Don't Know
<99> Refused

Q19. In what year were you born?

19 <00-79> YEAR BORN
18 <90-99> YEAR BORN

<998> Don't know
<999> Refused

Q20. Please indicate the highest level of education you have completed. (Circle one).

0. Did not go to school
1-11. Grade school
12. High school graduate or GED holder
13-15. Some college (One to three years)
16. College Graduate (Four years)
17. Some graduate school or professional (law, medical) school
18. Graduate degree
20. Technical School or Junior College Graduate
98. Do not know
99. Refused

To find out if people with different financial situations make different food choices, we'd like to know the general range of incomes of all households we interview. Your answers will be kept strictly confidential.

Q21. Now, thinking about your household's total annual income from all sources (including your job), did you household receive $30,000 or more in 1996? (Circle one)

1. Yes ($30,000 OR MORE) [GO TO INC4]
5 No (Less than $30,000) [GO TO INC2]
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

>INC2< Was it $20,000 or more?

0. NOT APPLICABLE
1. Yes ($20,000 - 29,999)
5 No (LESS THAN $20,000)
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

>INC3< Was it $10,000 or more?

0. NOT APPLICABLE
1. Yes ($10,000 - 19,999)
5 No (LESS THAN $10,000)
98. DON'T KNOW-NO OPINION

99. REFUSED-NO ANSWER

>INC4< Was it $60,000 or more?

0. NOT APPLICABLE
1. Yes (more than $60,000)[goto INC7]
5 No (more than $30,000 and less than $60,000)[goto INC5]
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

>INC5< Was it $40,000 or more?

0. NOT APPLICABLE
1. Yes ($40,000 or more)[goto INC6]
5 No ($30,000 - $39,999)
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

>INC6< Was it $50,000 or more?

0. NOT APPLICABLE
1. Yes ($50,000 - 59,999)
5 No ($40,000 LESS THAN $49,999)
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

>INC7< Was it $80,000 or more?

0. NOT APPLICABLE
1. Yes ($80,000 or more)[goto INC9]
5 No (More than $60,000 LESS THAN $79,999) [goto INC8]
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

>INC8< Was it $70,000 or more?

0. NOT APPLICABLE
1. Yes ($70,000 - 79,999)
5 No ($60,000-$69,9999)
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

>INC9< Was it $100,000 or more?

0. NOT APPLICABLE
1. Yes ($100,000 or more)[goto INC11]
5 No ($80,000-$99,999)[gotoINC10]
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

INC10 Was it $90,000 or more?

0. NOT APPLICABLE
1. Yes ($90,000 - 99,999)
5 No ($80,000-$89,9999)
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

INC11< Was it $110,000 or more?

0. NOT APPLICABLE
1. Yes ($110,000 - or more)
5 No ($100,000-$109,9999)
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

>NC12< Was it $150,000 or more?

0. NOT APPLICABLE
1. Yes ($150,000 to $200,000)
5 No ($110,000-$149,9999)
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

>NC13< Was it $200,000 or more?

0. NOT APPLICABLE
1. Yes ($200,000 or more)
5 No ($150,000-$199,9999)
98. DON'T KNOW-NO OPINION
99. REFUSED-NO ANSWER

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