

Consumer Preferences for Ecolabeled Seafood in the United States and Norway: A Comparison

Holger Donath
Cathy R. Wessells
Robert J. Johnston
Frank Asche

The authors are research assistant, professor and department chair, and assistant professor in the Department of Environmental and Natural Resource Economics at the University of Rhode Island, respectively. Frank Asche is professor in the Department of Economics at the University of Stavanger, Norway. Funding for this project was provided by the Rhode Island Sea Grant Program under the Rhode Island Agricultural Experiment Station (contribution No. 3764) and the Norwegian Research Council, Oslo, Norway.

Introduction:

Consumers in today's marketplace do not only consider physical product attributes, prices and convenience in their purchasing decisions, but also take into account unobservable environmental attributes. In response to the demand for reliable product information and the use of confusing marketing terms by producers, ecolabeling programs have developed throughout the world. These programs evaluate products with regard to established environmental standards set by an independent third party and, if the product meets the standards, allow the producer or marketer to use a specific label in their marketing efforts. In effect, the label conveys to the consumer information about a product's environmental impact during the production process, use and discard.

Ecolabeling programs have existed since the 1980s throughout the world with different degrees of consumer acceptance (EPA 1993, OECD 1991). A notable example in the U.S. is the growing market for "organic" produce that has become a regular item in supermarkets.

In the seafood market there are several efforts underway to establish ecolabels. Most of these labels focus on "sustainable" management of fish stocks. One major effort was brought forward in 1996 in a cooperation between industry and an environmental organization. The Marine Stewardship Council (MSC) was created by the World Wildlife Fund (WWF) and Unilever, a multinational corporation (McHale, 1997, MSC 2000). Since then, several large supermarket chains in the U.S. and Europe have become partners of the MSC, pledging to promote and buy seafood only from "sustainable" and well-managed sources in the future.

As the market for seafood is global, with large volumes traded among countries, potential ecolabels will have to address the concerns of consumers in different countries. To evaluate consumers' acceptance of

ecolabels for seafood products, a virtually identical survey was designed and administered in the United States and Norway. The goal of this research is to examine whether or not consumers prefer ecolabeled seafood, what factors influence those choices, and whether those determinants differ across countries.

An accepted methodology to elicit consumer preferences for products with different attributes is contingent choice (or conjoint analysis). The environmental economics literature is replete with examples of uses of this methodology, including Haneman (1984), Mitchell and Carson (1993), Carson et al. (1994), Desvousges and Smith (1988), Johnston and Asche (1998), Freeman (1993), Cameron (1988), Cummings et al. (1986). Analyses of food markets, and in particular, seafood markets have also frequently employed these techniques, including Holland and Wessells (1997), Idrissi (1997), Wessells et al. (1999). In this research we chose to use contingent choice to determine consumers' preferences for ecolabeled seafood, and collect other data necessary to estimate the extent to which product attributes, consumer attitudes toward the environment, and consumer demographics affect consumers' choices of ecolabeled seafood. In the remainder of this paper we next present the theoretical and econometric methodology used to determine consumer choice. That is followed by a discussion of the qualitative and empirical results. The final section summarizes the findings and presents implications of these results for the seafood industry, policy makers, and those organizations worldwide attempting to generate these ecolabeling programs.

Methodology

In this paper we seek to determine if consumers consider non-use attributes represented by ecolabels in their purchasing decisions with regard to seafood. An

appropriate methodology to use is the contingent valuation method. Economists use a variety of approaches in order to determine the economic value of an environmental amenity or service based on an individual's preferences. Mitchell and Carson (1989) classified different approaches to measuring values based on whether the approach chosen uses observable choices (revealed preference) or answers to hypothetical questions. A second classification differentiates between directly observable monetary values and indirect calculation of those values. The contingent valuation method (CVM) is used to elicit individuals' responses to hypothetical questions and uses an indirect measurement of economic value. It is widely used to estimate economic values for commodities not traded in markets.

The results of the research presented here are based on surveys using a contingent choice format. Contingent choice is a subset of CV methods and can be described as a simplified version of contingent ranking; the respondent is asked to choose between specified (environmental) commodities with different attributes and/or prices. In the survey used here, respondents had to choose one of two possible alternatives (dichotomous choice). The contingent choice format is preferred over open-ended CVM because of the absence of certain biases such as strategic behavior (Arrow *et al.* 1993).

In order to ensure sufficient variation in the levels of attributes presented in the survey, researchers use the fractional factorial design (Addelman, 1963). This design allows efficient estimation of the main effects with a minimum number of distinct survey questions (Addelman and Kempthorne 1961). The levels of attributes used in surveys are determined by scientific information and the results of focus groups to achieve realism in the survey questions.

Due to the hypothetical nature of CVM, a variety of possible biases exist and need to be addressed by researchers. Most of these biases can be avoided by careful survey design, focus groups and pre-testing.

In order to model consumers' seafood purchases it is assumed that the principal shopper of the household chooses among different kinds of seafood, specifically between certified and uncertified products. The model does not include quantity, which is assumed to be fixed in the short run (i.e. the amount of seafood needed to feed the household). The utility derived from seafood product (i) is a function of physical characteristics of the product (vector X_i), environmental characteristics of the product (vector L_i with L_i equal to zero for uncertified product and equal to 1 for certified product), the consumers' demographics (vector D), the consumers' income (Y) minus the price of product i (P_i) and a vector of other goods (S).

$$U_i(X_i, L_i, D, Y-P_i, S)$$

Seafood products are assumed to be physically identical except that product A is certified while product B is not. Thus, for labeled product $L_i=L_a=1$, for unlabeled product

$L_i=L_b=0$. Furthermore, the premium for certified product A can be negative, zero or positive and the difference between the two goods is represented by:

$$P_A=P_B + P_L$$

where P_B represents the "base price" for the unlabeled product, P_L represents the premium paid for certified product A. The consumers compare the utility derived from product A (uncertified product) and product B (certified product). The difference in utility between the two products can be represented by the observable component of utility dv and a stochastic element of utility θ (random utility model):

$$\begin{aligned} dU &= U_a(X_a, L_a, D, Y-(P_b + P_L), S) - U_b(X_b, 0, D, Y-P_b, S) \\ &= v(X_a, L_a, D, Y-(P_b + P_L), S) - v(X_b, 0, D, Y-P_b, S) - [\varepsilon_b - \varepsilon_a] \\ &= dv - \theta \end{aligned}$$

The logit model represents the natural logarithm of the relative probability that an observation falls into one of two categories (here choosing certified product (1) or not choosing the certified product (0)). This dichotomous dependent variable is estimated by assuming an underlying logistic cumulative distribution function Φ using maximum likelihood techniques (Greene 1997). The observations do not reveal the net benefit of the purchase, we can only observe whether the respondents' choice is one or zero. Consequently, the model uses a utility index where logit coefficients indicate the change in that utility index due to a unit increase in the regressors. The logit estimation assumes the formula:

$$\begin{aligned} prob(y = 1) &= \frac{e^{\beta'x}}{1 + e^{\beta'x}} \\ &= \Phi(\beta'x) \end{aligned}$$

The marginal effects are calculated as:

$$\begin{aligned} \frac{d \Phi(\beta'x)}{d(\beta'x)} &= \frac{e^{\beta'x}}{(1 + e^{\beta'x})^2} \\ &= \Phi(\beta'x)(1 - \Phi(\beta'x)) \end{aligned}$$

Therefore:

$$\frac{d E(y)}{d x} = \Phi(\beta'x)(1 - \Phi(\beta'x))\beta$$

In the context given here, the marginal effects indicate the change in probability of choosing the certified product for a marginal change in regressor x_i . Because these marginal effects vary with the values of x it is useful to examine the effects at the means of the regressors. The logit model is derived in detail in Maddala (1983) and Judge et al. (1988) and McFadden (1984).

Survey Design

The survey was administered by phone in the US in the summer of 1998 and in Norway during fall 1999. In the US, 1,640 surveys were completed and 2,039 in Norway. The samples included only seafood consuming households and asked for the principal shopper to answer the questionnaire. Administering the survey by phone increased sample size but limited the information that could be conveyed to respondents. Results obtained in focus groups led to a simplification of the choices presented, and rewording of the survey text. The overall length of the survey was limited to 10 minutes. The survey consisted of a demographic section and a section surveying the respondent's current seafood consumption patterns and grocery budget. Respondents were also asked about their trust in certification agencies. Furthermore, the survey included ten questions about existing environmental concerns in general purchasing decisions. Respondents indicated their level of agreement to those ten statements on a scale ranging from "always true" (1) to "never true" (5). The average score of all ten responses was used as a measure of environmental consciousness of the respondent.

Choices Presented

Respondents were asked to choose between certified seafood with an ecolabel and uncertified seafood without an ecolabel. A certified product was described as being "caught under strict controls that prevent too much fishing". This simple statement is the result of focus groups, which indicated that respondents did not understand the meaning of "no by-catch". Furthermore, the telephone survey format requires simple and short descriptions. The survey emphasized the fact that both choices are of equal quality, texture and freshness. Each respondent had to make three choices: One between uncertified and certified cod, one between certified and uncertified salmon and one between certified and uncertified shrimp. The order of the species was randomized. Prices and premiums for each choice differed across survey versions. Fractional factorial design was used to construct the range of premiums (Addelman, 1962) resulting in 54 unique contingent choice questions, divided among 18 survey versions in each country. These premiums ranged from -20 NOK to +50 NOK in Norway and from -\$2.00 to +\$5.00 in the US. Expressed as a percentage of the price for the uncertified product, premiums ranged from -22% to +68% in Norway and from -25% to +100% in the US. Each survey listed a

specific certifying agency for each set of three questions for any one respondent, maintaining one agency for each respondent. These agencies included the World Wildlife Fund (WWF), the Marine Stewardship Council (MSC) in both countries as well as the National Marine Fishery Service (NMFS) and the Norwegian Fisheries Directorate (NFD), both national government agencies.

Qualitative Results

This section gives an overview of the survey results using descriptive statistics concerning the demographics, current seafood consumption patterns and consumers' environmental concerns in both countries. The last part gives an overview of consumers' choices of ecolabeled seafood.

Demographic Results of the United States Sample:

The sample size for the US was 1640, 65% of respondents were men and 35% women. The age distribution indicates that about a quarter (25%) of respondents are younger than 34, 50% are between 35 and 54 years old and one quarter of all respondents are 55 or older. 41% of respondents live in one or two-person households and 46% have a university degree. With regard to the household's income 45% of respondents say they have less than \$50,000 income per year. Compared to census data, the results indicate a bias towards males, older age groups, higher education and higher income.

Demographic Results of the Norway Sample:

In the sample of 2039 Norwegians, male and female respondents were equally represented by 50%. The age distribution indicates that 15% are younger than 34 years old, 35% are between 35 and 54 and over 40% are 55 or older. With regard to household size 51% of respondents live in one or two-person households and 44% have a university degree. 31% have a household income of 300,000 NOK or less, 38% between 300,000 and 500,000 NOK and 31% more than 500,000. (1\$US=8.4 NOK or 1NOK=0.12 \$)

In summary, the samples differ with regard to the demographic results in that on average, the Norwegian sample contains more female respondents and younger age groups. Household size and education levels are similar in both countries. Because of the differences in taxation a direct comparison of income groups is not accurate. Table 1 summarizes the demographic results of both samples.

Current Seafood Consumption Patterns in the United States:

65% of Americans eat seafood at least once every two weeks. US consumers most often buy fresh seafood (58%) and prefer to purchase it in supermarkets (58%). One quarter of respondents get their seafood at a seafood market. Shrimp is America's favorite seafood. Over 21%

named shrimp as their favorite species followed by salmon (14%), catfish (7%) and cod (7%). 78% of all respondents purchased shrimp at least once in the last year, compared to 55% for salmon and 30% for cod. Shrimp is consumed at home at least once every two weeks by 33%, compared to 27% for salmon and 22% for cod.

According to Census data, the weekly grocery budget of the average US consumers is \$53. In the survey, 55% of respondents had a grocery budget of less than \$100 per week and 13% spend more than \$150 on groceries. The weekly seafood budget is less than \$10 for 66% of consumers. Statistic results of current seafood consumption patterns in both countries are summarized in table 2.

Current Seafood Consumption Patterns in Norway:

Norwegians are frequent seafood consumers. Over 96% of respondents say they eat seafood at least once every two weeks. They purchase seafood most often fresh (47%) and 62% buy their seafood in supermarkets. 20% say they most often buy their seafood in seafood markets. Cod is the favorite species in Norway. 55% name cod as their favorite species for at-home consumption and 86% say they eat cod at least once a year. 70% of those consumers say they consume cod at least once every two weeks.

Salmon is the third favorite species with 14% for at-home consumption. 13% of Norwegians name salmon as their favorite species and 77% of all respondents say they consume salmon at least once a year. Of those salmon consumers, 36% say they eat salmon at least once every two weeks.

Shrimp was listed as the favorite species by 5% of respondents. 82% claim to eat shrimp at least once a year and 26% say they eat shrimp at least once every two weeks. 42% of respondents spend less than 800 NOK (ca. \$96) per week on groceries and 23% spend more than 1,200 NOK (ca. \$144) and 45% spend less than 80 NOK (ca. \$9.60) on seafood.

In summary, Norwegians consume seafood more often, are relatively more likely to buy frozen products and prefer supermarkets more than US consumers. Expenditures on groceries and seafood per week are slightly higher in Norway. Great differences exist with regard to popularity of species and frequency of consumption. Cod is a very common and popular species in Norway while shrimp is much more often consumed in the US.

Influence of Environmental Concerns on Purchasing Decisions:

The surveys contained several questions about respondents concern for the environment and their relation to the fishing industry. 15% of US consumers said they are members of an environmental organization, compared to only 6% in Norway. 32% of Americans

subscribe to an environmental or nature magazine compared to 14% in Norway. 21% of Norwegian respondents have relatives working in the seafood industry (8% in the US) and 73% have household members who engage in recreational fishing (63% in the US).

One section of the survey contained questions with regard to the influence of environmental concerns in purchasing decisions. Respondents were asked to state their agreement to 10 different statements, ranging from never true (1) to always true (5). The average of those ten statements was used to indicate the level of a respondent's environmental consciousness. Taking into account all observations in each country, Norwegians had an average of 3.65 compared to an average of 3.33 for US respondents. This result suggests that Norwegians claim to be more conscious of environmental concerns in their purchasing decisions than their American counterparts. Both surveys asked respondents about their opinion of the current condition of Cod stocks in national waters. While in both countries 11% consider stocks to be severely overfished, 70% of Americans are unsure about the condition of stocks compared to 45% in Norway. A large percentage (37%) of Norwegians consider cod stocks to be moderately overfished. Norwegians were also asked about their opinions regarding shrimp stocks and Americans were asked for their opinion about salmon stocks. 67% of Norwegians were unsure and only 3% considered shrimp to be overfished. In America 63% were unsure about the state of salmon stocks while 11% considered salmon to be overfished.

When asked about their trust in different certification agencies, 69% of Norwegians named the National Fishery Directorate as the most trusted agency while 49% of Americans trust the National Marine Fisheries Service most. The WWF is considered most trustworthy by 23% of Americans compared to 14% in Norway.

In summary, a higher percentage of Americans are members of environmental groups and subscribe to Nature magazines. At the same time Norwegians are slightly more influenced by environmental concerns in their purchasing decisions, are more likely to have relatives working in the seafood industry and to engage in recreational fishing. Concern about overfishing of cod is also stronger in Norway. The national governmental fishery organization is trusted most in both countries, with a higher percentage in Norway than in America.

Choices of Ecolabeled Seafood

The surveys asked consumers to choose between certified and uncertified cod, salmon and shrimp with various premiums for the certified product. Premium is defined here as the price for certified product minus the price for uncertified product.

Overall, Norwegian consumers are more reluctant to choose certified seafood compared to US

consumers. Table 3 gives an overview of respondents' choices in both countries.

For all species in both countries, the percentage of consumers choosing the certified product decreases as the premium increases. At a premium of zero where the price for certified and uncertified product is the same, 88% of respondents in the US choose the certified shrimp (98% for cod and 96% for salmon respectively) compared to lower percentages in Norway, i.e. 63% for shrimp, 67% for salmon and 73% for cod. It should be noted that shrimp in Norway are coldwater shrimp. This species is much smaller and can not be directly compared to the American "cocktail" shrimp, which is mostly farmed in warm water ponds and imported from Central America and Southeast Asia.

Estimation Results

In order to evaluate the factors determining consumers' choice, the logit model's dependent variable "choice" was equal to one if the respondent chose the certified product and equal to zero if the respondent preferred the uncertified product. Altogether, there were 1,640 surveys in the US data and 2,039 in the Norway data. As there are three choices in each survey, the total number of observations in both countries combined is 11,037. Because of "no answers" in the choice questions and in the eco-attitude questions, 1,184 observations were removed, leaving 9,853 observations included in the model. The log-likelihood ratio test with a value of 1,656.66 with 27 degrees of freedom indicates that the model is significant for $\alpha=0.005$. The model predicts 72% of all observations correctly. Table 4 summarizes the logit estimation results.

Interpretation of Model Results

The model includes a set of explanatory dummy variables which capture the effect of certain variables in both countries and another set of the same dummy variables multiplied with a dummy for US observations, which are called interaction variables in this paper. The interaction variables express the relative difference between the two countries for each variable. In the case that the interaction dummy is statistically significant, there exist statistically significant differences in both countries with regard to the effect of a specific variable. If the interaction variable is insignificant, the effect of the variable appears to be the same in both countries.

Furthermore, the model includes a continuous variable for premium. Premium is defined as the difference between the price for certified product minus the price for uncertified product. This premium can be negative in the case that certified product is less expensive than uncertified product, zero or positive and is expressed in the model as a percentage of the price for uncertified product in order to be able to compare the premiums from both countries.

The following section includes a detailed description of the model results for each variable.

Current Consumption Patterns

The first hypothesis tested was whether there is difference between consumers who most often purchase fresh product compared to those consumers who purchase frozen product most often. The results indicate that differences exist: FORMFRESH is marginally significant and positive. Norwegian respondents who prefer fresh product are more likely to choose certified product. The interaction variable USFORMFRESH for the US is not significant. According to these results, both Norwegian and US consumers who prefer fresh product are equally likely to purchase certified seafood.

The frequency of consumption could be a factor that influences consumers' purchasing decisions. Frequent consumers may be more aware of issues regarding overfishing or they could be more sensitive to prices. The results do not indicate any differences: Both SEAFOODOFTEN and the interaction variable USSEAFOODOFTEN are not significant. According to these results, frequency of seafood consumption does not influence consumers' choices of certified seafood in either country, even though Norwegians consume seafood much more frequently than US consumers do.

We would expect consumers with a relatively low seafood budget to react stronger to premiums for ecolabeled seafood. The model results support this hypothesis: LOWSEAFOODBUDGET is significant and negative. Norwegian consumers with low seafood budgets are less likely to choose certified product. The interaction variable USLOWSEAFOODBUDGET is negative and significant, indicating that US consumers with a smaller seafood budget are even less likely to choose certified product than Norwegian consumers.

Demographics

Consumers' education level may explain choices of certified seafood. Consumers with higher education may be better informed and may have higher incomes. The results are mixed in both countries: HIGHEducation is negative and significant. Norwegian consumers with higher education levels are less likely to choose certified product. However, the interaction variable USHIGHEducation is positive and significant. This is a case where the effects in both countries differ from each other. US consumers with higher education are more likely to choose certified product than consumers with lower education levels.

Consumers' age may influence purchasing decisions. The model indicates a weak influence: OLDER is marginally significant and positive. Older consumers in Norway are thus more likely to choose certified product than younger consumers. The interaction term USOLDER is insignificant. The effect of age is similar in both countries.

Does the gender of the principal shopper matter? The model results indicate that it does: FEMALE is significant and positive. Female consumers in Norway are more likely to choose certified than male consumers. The same is true for female consumers in the US. Since the interaction variable USFEMALE is negative and significant but smaller in magnitude, the overall effect is still positive. It can be said that female consumers in both countries are more likely to choose certified products than male consumers. However, this effect is stronger in Norway.

The household's income may influence the likelihood to choose the certified product even with a high premium. However, the results suggest no influence of a high income: HIGHINCOME and the interaction variable USHIGHINCOME are both insignificant. In both countries, consumers with higher income are not more or less likely to choose certified product than consumers with lower income. A possible explanation relates to the hypothesis that correlations exist between high income, high education and high seafood budget.

Environmental Consciousness

A part of the survey asked consumers about membership in an environmental organization. We would expect those consumers to be more likely to choose the certified product. The results indicate a different effect across countries: MEMBER is insignificant. The interaction variable for the US MEMBER is positive and significant. Consumers who are members of an environmental organization in the US are relatively more likely to choose certified products than non-members while membership does not influence decisions of Norwegian consumers.

In an attempt to measure the influence of environmental concerns in general purchasing decisions, the average of 10 responses was calculated for each consumer (see figure 1). The hypothesis is that consumers with relatively high scores would be more likely to choose certified products. The results indicate that that is the case: Norwegian consumers with a high average on the eco-attitude questions are more likely to choose certified products. HIGHECO is positive and significant. The interaction variable for USHIGHECO is insignificant. Overall, consumers in both countries are more likely to choose certified products when they consider environmental aspects in their general purchasing decisions; this effect is the same in both countries.

Agency Trust

One important question with regard to labeling is the perceived credibility of the certification agency. We would expect consumers who expressed trust in the certification agency to be more likely to choose the certified product. The results support this notion: AGENCYTRUST is significant and positive. Norwegian

respondents who named the certification agency given in the survey as the agency that they trust most are more likely to choose certified product. The interaction variable USAGENCYTRUST is significant and negative. Consumers in the US are relatively less likely to choose certified product if the certification agency in the survey is the agency that they trust most. Trust in the certification agency is a positive factor in both countries, but stronger in Norway than in the US.

Species

We would expect responses of consumers to differ for different species. The dummy variables for species in both surveys suggest that this is true. In order to evaluate the relative importance of species, two dummy variables, COD and SALMON, are included in the model. These dummies compare the relative effect of the species to the base case, which is shrimp. COD is significant and positive. Norwegian consumers are relatively more likely to choose certified cod than certified shrimp. The same is true for SALMON, indicating that Norwegian consumers are relatively more likely to choose certified salmon than certified shrimp. In the US, consumers are equally as likely to choose certified Cod as they are to choose certified shrimp as USCOD is insignificant. For salmon, the result is different. USSALMON is significant and negative. Consumers in the US are relatively less likely to choose certified salmon than certified shrimp, i.e. certification for shrimp is more important to consumers than certification of salmon.

Premium

In general, consumers are expected to be less likely to choose certified product for higher premiums. The model strongly supports this basic hypothesis: PREMIUMPERCENT is highly significant and negative. As the premium increases, consumers in both countries are less likely to choose the certified product. However, this effect is stronger in Norway than in the US. USPREMIUMPERCENT is positive and significant; i.e. compared to Norwegian consumers, US respondents are relatively more likely to choose certified product for increasing premiums. Norwegian consumers appear to be more price sensitive.

Other factors:

Several variables did not contribute to the explanatory power of the model. According to the likelihood ratio test, t-statistics and the percentage of correctly predicted choices in the model variables including product source, household size, grocery budget and connections to the fishing industry or recreational fishing activity do not significantly influence consumers choices. Interestingly, consumers who considered cod to be overfished were statistically not more likely to choose certified product. However, it should be noted that in the case of the U.S. the cod stocks are caught off the coast of New England while Norwegian stocks represent local stocks.

Respondents in the two countries are referring to different stocks. While 11% of respondents in both countries considered cod to be severely overfished, this perception of the state of national stocks does not make these respondents more likely to purchase certified products.

Summary

The main result of this model is that consumers in the two countries examined are different with regard to the influence of demographics, current seafood consumption patterns and measures of attitude towards the environment on their choices. Lessons from one country can not be easily transferred to another country. Compared to Norwegian respondents, consumers in the US

are relatively **less likely** to choose the certified product if

- they have a low seafood budget,
- they expressed trust in the certification agency,
- they are female,
- they are asked about salmon

are relatively **more likely** to choose the certified product if

- they have a high education level,
- they are members of an environmental organization,
- they are facing a relatively high premium for certified product

are equally **as likely** to choose the certified product if

- they have a relatively high income,
- they claim to be environmentally conscious in purchasing decisions,
- they are asked about Cod.

Implications:

The results of this survey have implications for consumers, seafood marketers, management of ecolabeling programs and fisheries management with regard to future developments in the seafood markets throughout the world.

For fisheries managers, a successful ecolabeling program may provide incentives to implement more sustainable management techniques and seek certification for specific fisheries. Thus, ecolabeling provides market-based incentives for improved fisheries management. One current example is the Alaskan Salmon Fishery, which is currently seeking certification by the MSC.

Seafood marketers may explore new opportunities to maintain or increase their market share by including certified product in their product lines. Distributors may seek out markets in which certified product is most likely to be accepted by consumers, depending on location, species and consumer demographics. These markets are likely to differ in each country and more consumer information about the

acceptance of ecolabels is needed to find the best match of consumer demand for certified seafood and the limited supply of certified product.

The survey results suggest that consumers accept ecolabels for seafood, especially for small premiums. However, the results of this survey are based on a scenario, which educates consumers about the issue of overfishing and explains the content of the ecolabel. In the survey, respondents are presented with a clear choice between certified and uncertified product. In order for ecolabeling to be successful and for consumers to make a tradeoff between price and certification, they have to be aware of the issue that the ecolabel addresses. Furthermore, consumers have to understand the content of the label, i.e. the link between their purchasing decision and overfishing of stocks. For managers of ecolabeling programs, consumer education is a necessary element to achieve consumer acceptance. The survey results show that 70% of respondents in the US are unsure about the current state of Cod stocks (62% for cod). These numbers indicate the need for further consumer education about ecolabeled seafood. Another important factor is the credibility of the certification agency. In both countries, most respondents trusted the national government agencies most, and respondents were more likely to choose the certified product if the certification agency named in the survey coincided with the agency that the respondent trusted most. Agency trust is important to consumers and any ecolabeling program has to provide credibility by setting objective standards for certification and enforcement of those standards over time.

References

- Addelman, S. 1962. "Symmetrical and asymmetrical fractional factorial plans," *Technometrics* 4,47-58.
- Addelman, S. and O. Kempthorne. 1961. "Orthogonal Main Effect Plans," U.S. Air Force Office of Aerospace Research, Aeronautical Research Laboratory, ARL Technical Report 79.
- Arrow, K., R. Solow, E. Leamer, P. Portney, R. Rander, and H. Schuman. 1994. "Report of the NOAA Panel on Contingent Valuation," *Federal Register* 58 (Jan.), 46022-4614.
- Cameron, T. A. 1988. "A New Paradigm for Valuing Non-market Goods Using Referendum Data: Maximum Likelihood Estimation by Censored Logistic Regression". *Journal of Environmental Economics and Management* 15, 355-379.
- Carson, R. C., J. L. Wright, A. Alberini, and N. Flores. 1994. *Bibliography of Contingent Valuation Studies and Papers*. La Jolla, CA: Natural Resource Damage Assessment Inc.
- Carson, R. C., N. E. Flores, K. M. Martin, and J. L. Wright. 1996. "Contingent Valuation and Revealed Preference Methodologies: Comparing

- the Estimates for Quasi-Public Goods,” *Land Economics* 72, 80-99.
- Cummings, R.G., D.S. Brookshire, and W.D. Schulze. 1986. *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method*. Totowa, NJ: Rowman and Allanheld.
- Desvousges, W.H. and V.K. Smith. 1988. “Focus Groups and Risk Communication: The Science of Listening to the Data,” *Risk Analysis* 8, 479-484.
- Freeman, M. A. 1993. *The Measurement of Environmental and Natural Resource Values*. Washington, DC: Resources for the Future.
- Greene, W.H. 1997. *Econometric Analysis*. 4th ed. ,Prentice Hall, New Jersey.
- Hanemann, W. M. 1984. “Some Issues in Continuous- and Discrete-Response Contingent Valuation,” *Northeastern Journal of Agricultural and Resource Economics* 14, 5-13.
- Holland, D. and C. R. Wessells. 1998. “Predicting Consumer Preferences for Fresh Salmon: The Influence of Safety Inspection and Production Method Attributes,” *Agricultural and Resource Economics Review*, 27 (April 1998):1-14.
- Idrissi, M. 1997. *Toward Sustainable Fisheries: Economic Analysis of Seafood Ecolabeling*. M.S. Major Paper, Department of Environmental and Natural Resource Economics, University of Rhode Island.
- Johnston, R. J. and F. Asche. 1998. Contingent Choice Methodology and Practice: A Review of the Literature and Theory, Foundation for Research in Economics and Business Administration, Working Paper No. 51/1998, Bergen, Norway.
- Judge, G.G., R.C. Hill, W.E. Griffiths, H. Lutkepohl, and T. Lee. 1988. *Introduction to the Theory and Practice of Econometrics*, 2nd ed. New York: Johan Wiley and Sons.
- Maddala, G.S. 1983. *Limited Dependent and Qualitative Variables in Econometrics*. Cambridge: Cambridge University Press.
- Marine Stewardship Council 2000. www.msc.org
- McFadden, D. 1973. “Conditional Logit Analysis of Qualitative Choice Behavior,” in *Frontiers in Econometrics*, P. Zarembka, ed. New York: Academic Press.
- McHale, T. 1997. “What’s in a Label?,” *Pacific Fishing*, February, 36-39.
- Mitchell, R.C. and R. T. Carson. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Washington, DC: Resources for the Future.
- Organization for Economic Cooperation and Development (OECD). 1991. *Environmental Labelling in OECD Countries*, Paris.
- U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics. 1993. *Status Report on the Use of Environmental Labels Worldwide*; Washington, DC. EPA 741-R-9-93-001.
- Wessells, C. R., Donath, H. and Johnston, R. 1999. “Assessing Consumer Preferences for Ecolabeled Seafood: The Influence Of Species, Certifier, and Household Attributes,” *American Journal of Agricultural Economics*, Vol. 81, No. 5, 1084-1089

Table 1: Demographic Results of the US and Norwegian Sample

Demographic Results	United States	Norway
Sample Size	1640	2039
Percentage Female	35%	50%
Age		
18-35	25%	15%
35-54	50%	35%
55+	25%	40%
Household Size		
1-2 persons	41%	51%
3-4 persons	44%	39%
5 +	15%	10%
Education		
High School or less	28%	30%
Bachelor or Higher	46%	44%

Table 2: Current Seafood Consumption Patterns in the US and Norway

Seafood Consumption	United States	Norway
% eating seafood at least once every two weeks	65%	96%
Favorite Species		
1st Favorite Species	Shrimp	Cod
2nd Favorite Species	Salmon	Salmon
3rd Favorite Species	Cod	Shrimp
Product Form		
% buying seafood most often fresh	58%	47%
% buying seafood most often frozen	39%	42%
Product Source		
% buying seafood most often in supermarket	58%	62%
% buying seafood most often in seafood market	24%	20%

Table 3: Respondents Choices of Certified Seafood in the US and Norway

Norway (n=2039)	certified	uncertified	No Answer
salmon	54%	31%	15%
cod	50%	37%	13%
shrimp	46%	36%	17%
US (n=1640)	certified	uncertified	No Answer
salmon	73%	22%	5%
cod	70%	23%	7%
shrimp	72%	23%	4%

Table 4: Logit Model Results for the Combined US-Norway Data

VARIABLE	DEFINITION	COEFF.	T-RATIO	MEAN
Form Fresh	1 if respondent's favorite product form is fresh	0.12	1.93*	0.50
Seafood Often	1 if respondent consumes seafood at least once a week	-0.02	-0.22	0.62
Low Seafood Budget	1 if respondent's weekly seafood budget is less than US\$10 or 80NOK	-0.20	-3.03***	0.52
Agency Trust	1 if respondent's most trusted agency = agency given in the survey	0.39	5.41***	0.24
High Education	1 if respondent has at least a bachelor's degree	-0.45	-6.81***	0.45
Older	1 if respondent's age is at least 45 years old	0.16	2.43**	0.49
Female	1 if respondent is female	0.65	10.19***	0.57
Member	1 if respondent is a member of an environmental organization	0.08	0.59	0.10
High Income	1 if respondent's income is greater than \$75,000 or 200,000 NOK	0.11	1.59	0.34
High Eco-attitude	1 if respondent's average on ten eco-attitude questions is less than 2.5	0.37	5.81***	0.51
Cod	1 if species in observation is cod	0.39	5.05***	0.34
Salmon	1 if species in observation is salmon	0.38	4.94***	0.33
Premium Percent	premium as a percentage of the price for uncertified product	-3.70	-24.47***	0.22
US Form Fresh	1 if US observation and if respondent's favorite product form is fresh	0.12	1.27	0.27
US Seafood Often	1 if US observation and if respondent consumes seafood at least once a week	-0.10	-0.80	0.16
US Low Sea Budget	1 if US observation and respondent's weekly seafood budget < US\$10 or 80NOK	-0.26	-2.49**	0.31
US Agency Trust	1 if US observation and if respondent's most trusted agency = agency in survey	-0.29	-2.56**	0.11
US High Education	1 if US observation and if respondent has at least a bachelor's degree	0.56	5.69***	0.22
US Older	1 if US observation and if respondent is at least 45 years old	-0.06	-0.59	0.23
US Female	1 if US observation and if respondent is female	-0.47	-4.89***	0.31
US Member	1 if US observation and if respondent is a member of an environmental group	0.24	1.34	0.07
US High Income	1 if US observation and if respondent's income > \$75,000 or 200,000 NOK	0.03	0.29	0.10
US High Ecoattitude	1 if US observation and if respondent's average on 10 eco-attitude questions < 2.5	0.14	1.41	0.20
US Cod	1 if US observation and if cod is the species in the observation	-0.08	-0.64	0.16
US Salmon	1 if US observation and if salmon is the species in observation	-0.51	-4.51***	0.16
US Premium Percent	Premium in Percent multiplied with US Dummy	1.82	9.15***	0.12
US Dummy	1 if US observation (intercept shifter)	0.79	4.45***	0.47
Constant	Intercept	0.40	3.12***	

Log-likelihood ratio test for the overall model: 1656.66 with 27 degrees of freedom. Significant for alpha = 0.005

t-ratios: * significant for alpha = 0.05
 ** significant for alpha = 0.025
 *** significant for alpha = 0.005

Figure 1: Environmental Purchasing Behavior: Average Responses
1: Never True 2: Rarely True 3: Sometimes True 4: Mostly True 5: Always True

