"An Analysis of Tourists' Preferences and Perceptions for Gulf Coast Seafood: Does Labeling Matter"

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Abstract

This paper analyzes the impacts of differentiated GCR seafood products specifically looking at consumers' perceptive preferences and how these products impact consumer choice in the GCR. The study uses the conceptual "lens" model, which examines the impact of product differentiation on consumer preferences through attribute perception labeling. This type of labeling specifically identifies consumers' perceptions of safety of products, more specifically seafood products. These perceptions of product attributes are determined endogenously when looking at the choice to consume GCR seafood. To improve on the model, use of a stated preference discrete choice random utility model will be used to examine these consumers' product perceptions on the stated preference to consume seafood when traveling to the GCR using a bivariate probit estimation method. The results show that traveling consumers to the GCR value safe seafood, and have increased likelihood of consuming GCR seafood when safe seafood perception value is increased.

Introduction

Since the 1960s there has been an increased demand for seafood at the consumer level. This may be contributed to the growing perception that fresh seafood taste good and contributes to positive health benefits. During that same time there has been a steady trend of increased per capita seafood consumption along with increasing seafood prices (Edwards, 1992). The implication is that there has been a structural change in consumer preferences for seafood. This structural change can be seen in the increased willingness to prepare seafood at home versus other types of protein sources such as red meats and poultry. This is especially true for consumers of seafood landed in the Gulf Coast region (GCR). This study defines the GCR as the coastal counties of Alabama and Mississippi. The area has a rich history in seafood and plentiful fisheries. In 2008, the GCR fishery landings totaled 1,273 million pounds of seafood with a value of $697 million (National Marine Fisheries Service). This shows the importance of access to a safe fishery ecosystem, as well as the potential for an extensively developed market for seafood processing and consumption.

Markets have developed for new product forms produced for the away-from-home food industry as well as for supermarket suppliers to at home consumers. This has been a direct result of the structural change argument of Edwards (1992). He stresses that these changes occurred as a direct result of medical findings showing that seafood contains elements that are beneficial to heart health and can help improve the quality of life for individuals suffering from certain ailments such as arthritis, and certain other metabolic and neurological disorders.

While the health benefits associated with seafood consumption are usually positive, certain health risks are also associated with seafood consumption. These risks are especially associated with individuals' consumption of raw shellfish such as oysters, clams, and mussels that have been exposed to some type of environmental contamination (National Academy of Sciences, 1991). This is especially important to those who consume GCR seafood, which specializes in providing a significant portion of these shellfish to the local and regional markets.

Consumer's risk perception plays an important role in consumer's behavior and willingness to pay for particular products. If consumers perceive a product to be hazardous, the consumer will change its behavior towards the purchasing that product if the change has a strong likelihood of reducing the risk of hazard. (McIntosh et al., 1994). Consumer's attitudes and behaviors towards food consumption have been thought to be influenced more by their sociodemographic characteristics, Adu-Nyako and Thompson show that information and awareness of hazard influence these behaviors and attitudes to a greater extent (1999). Therefore, it is important for regulators to help inform the consumer of potential risk and how they may be affected.

While federal, state, and local regulatory agencies are partially responsible for helping to curb the impacts of these risks, a larger portion of responsibility lies in the hands of consumers, especially since consumers select and/or prepare the seafood being consumed. The Food & Drug Administration (FDA) is the main federal agency responsible for determining the safety of our food. The National Oceanic & Atmospheric Administration (NOAA) is the primary federal agency responsible for maintaining the safety of our fisheries. These two organizations work together to make sure that the seafood consumed within our borders is deemed safe and nonhazardous to our health. However, many consumers still perceive the seafood supply as potentially unsafe, and therefore look for specific information to help quell their uncertainty. This perception can have a negative impact on consumer demand for seafood. However, this demand for information can allow for product differentiation and be both beneficial to consumers and producers.

It is important to identify what information that will have the largest positive impact on consumer behavior. With this knowledge, important policy-based measures can be taken by producers to encourage consumers towards safer, less risky purchases. However, policy makers should take into consideration that producers will only supply information in which the marginal cost of providing the information is less than the marginal benefit (Wessells, 2002). While the information can give a producer a competitive edge through an increase in market share over producers who cannot provide products with certain levels of information, they have to decide if it is worth the investment. For seafood producers in the GCR this could mean an increase in fuel costs to harvest from fisheries not impacted by the oil spill. However, as long as the consumers are aware of the attributes of the products and how to differentiate the products based on the attributes, the value added to the products for the producers could be worth the investment into providing the information.

This paper analyzes the impacts of differentiated GCR seafood products specifically looking at consumers’ perceptive preferences and how these products impact consumer choice in the GCR. The first section deals with a brief introduction to the existing literature on seafood consumption, impacts of the Deepwater Horizon oil spill to GCR fisheries, and how public policy can help. Followed by a conceptual model, which examines the impact of product differentiation on consumer preferences through attribute perception labeling using a framework based on the “lens” model (Brunswick, 1952; Kinnucan et al., 1993; Wessells et al, 1996). This type of labeling specifically identifies consumers’ perceptions of safety of products, more specifically seafood products. These perceptions of product attributes are determined endogenously when looking at the choice to consume GCR seafood. To improve on the model, use of a stated preference discrete choice random utility model will be used to examine these consumers’ product perceptions on the stated preference to consume seafood when traveling to the GCR. Afterwards, there is a discussion of the survey and the data used for this analysis. The next section focuses on the econometric estimation and results, and the final section considers the implication to the public decision maker agencies for deciding on labeling for the consumers and support of fishery ecosystems for the producers in the GCR.

Literature Review

A quick review of the literature shows that there has been a small amount of research done on what impacts the choices made by consumers, specifically as it relates to seafood consumption. Previous studies of seafood demand have mainly been focused on factors that impact consumers' attitudes and how attitudes impact choice decision. This is important for helping policy makers, producers, and marketing agents decide courses of action to combat the potential negative impacts of a shock. For the GCR, it would help combat negative attitudes towards seafood that may have been affected by the DWH oil spill.

According to Gempesaw et al., consumers decisions to purchase seafood for at home consumption are based on perceptions of taste, ability to provide dietary variation, and nutritional capacity (1995). They show how consumers are not particularly aware of the variety of products that are available, and that generic advertising can be an effective way of increasing demand of particular types of seafood. Applying this idea to GCR seafood, local organizations responsible for the maintaining and increasing GCR seafood market share should see increased demand as a result of generic advertising to local markets. However, the generic advertising to markets where tourists are traveling from may not crossover to purchases made for away from home consumption. According to Herrman et al., factors that impact consumers' attitudes about seafood have less of an impact on seafood consumed away from home, more specifically in restaurants (1994). Therefore, consumption of seafood in restaurants by visitors to the GCR should be unaltered by the DWH oil spill.

This could be explained by how the consumer understands risk. Traditionally, the consumer perceives risk in two ways, hazard and outrage. (Sandman, 2000) Hazard is linked with how much actual damage occurs, while outrage is the magnitude of reaction to the perceived risk. Therefore, differentiation can be made between actual risk (based on hazard) and perceived risk (based on outrage). Previous studies have estimated food safety risk as a function of actual damages resulting from consumption of products (Adu-Nyako & Thompson, 1999; Schupp et al., 1998; Wessells et al., 1996). In the case of GCR seafood, where specific potentially negatively impacting shocks have occurred within GCR fisheries, the effects on the fisheries are still being investigated (Kelly, 2012; Upton, 2011).

Other authors have attempted to explain risk perception. Von Neumann & Morgenstern introduced the expected utility model, which has been foundational for most health belief theories especially as it is concerned with the behavior of economic agents (1947, 2007). They show how the decision maker response can differ when presented with a decision that could be seen as risky versus a decision with little or no risk. In this study, the consumer is presented with both the decision of whether to eat seafood when visiting the GCR on a regular visit, the less risky decision, and whether they would consume seafood visiting the GCR two years after the DWH oil spill. This allows for the random utility of two discrete choices two be measured and compared.

Many factors can affect how consumers perceive risk, and how these perceptions influence preferences. These factors could vary from socioeconomic demographic factors such as age, gender, location, and income to experience with prior illness or family members who have been ill (Weinstein, 1989; Viscusi, 1989; Adu-Nyako & Thompson, 1999; Olsen, 2003). While those factors are more closely associated with hazard risk, factors such as media coverage of potential safety issues and governmental positions and policies are more closely associated with outrage risk, but can still weigh just as heavily on consumers perceptions and preferences (Wessells & Anderson, 1995). All these factors can be influential on household seafood consumption. According to Liu et al., consumers' choice for consuming oysters is significantly linked to age, gender, residence, labeling, and preferred values (2006). They concluded that promotions that educate consumers on nutritional value, proper preparation, and special activities such as festivals are beneficial for increasing oyster consumption. Lin et al. show that consumers' preferences and perceptions to seafood, especially shellfish, are closely related to hazard risk based on past experiences and health outcomes and frequency of consumption as well as outrage risks dealing with how much exposure consumers received from negative media publicity (1991, 1993). Spinks & Bose found that seafood quality, preparation knowledge and ability, and retail availability are the primary influences impacting household consumption decisions (2002).

These finding are especially relevant to consumers in the GCR because these consumers have a potentially higher frequency of consumption. Therefore, the a priori expectation of these consumers is that they perceive seafood as safer than consumers who have a lower frequency of consumption. This is based in the understanding that the GCR consumer have developed a stock of experiences with seafood products that are more positive. Results reported later in this study matches with these expectations.

This paper extends the literature by incorporating the "lens" model into a regional framework of the GCR. It examines cues that can bring disutility or distasteful effects caused by potential hazardous perceptions of seafood landed in GCR fisheries. This is done using a stated preference discrete choice random utility model to understand the value of these cues used in the "lens" model.

Conceptual Model

The paper uses a conceptual model based partially on the "lens" model first introduced by Brunswick (1952) and then furthered by Hauser & Simmie (1981), Kinnucan et al (1993), and Wessells et al (1996). In their models, consumers' perceptions of a product are considered to be endogenous and part of a system of equations that relate preferences for specific seafood products with the frequency of consumption of said products. The endogeneity of products' perceptions in the model is based on consumers' experiences with the products.

When the bundle of attributes of a particular product (i.e.: GCR seafood) are abstracted into a subgroup of labels (i.e.: certified sustainable, certified safe to eat by NOAA, certified safe to eat by the State of Alabama, etc.) they form the perception cues that lead to decisions by the consumer. In this analysis, these perceptions of these labels are absent they could be seen as a negative externality to consumers, producers, and the surrounding GCR which is partially dependent on the seafood industry. Figure 1 shows how these cues impact consumers' choice.

The model can be illustrated in a two-stage sequence,

$$R = f[E, Z_1] \qquad (1)$$

$$CC_i = g_i[R, Z_2] \qquad (2)$$

where R is consumers' safety ratings of products, E is a vector of variables representing consumers' experience, CC_i is consumers' anticipated consumption change due to a given hypothetical event I, and Z_1 and Z_2 are vectors of social/cultural, demographic economic factors, and the perception of control of choice. However, these previous studies have estimated both equations separately making inference and interpretation of R difficult due to sequential econometric error issues. Therefore, this study applies a random utility discrete choice model (Lancaster, 1971; Hausman et al, 1995; Hite, 2000) to the lens model framework in order to examine consumers' preferences over differentiated products while including other variables for experience, frequency and differentiation then the traditional lens model.

Data

The data used in this study comes from an Internet survey with 2936 random respondents. The purpose of the survey was to understand households travel expenditures used to visit the GCR. In the survey the respondents were also asked about their seafood consumption, expenditure, and a ranking of importance of attributes used in the decision of choosing to consume seafood when visiting the GCR.

The survey also asked a question about how consumers describe their seafood purchases while visiting the coast. The options are:

1. Timed travel to seafood harvest season
2. Purchased fresh caught seafood to take home or consume during the visit
3. Ordered seafood to be mailed to the tourist's home
4. Consumed seafood at local festivals or events
5. Consumed seafood at restaurants

These options allow for seafood product differentiation of GCR consumed seafood. An assumption used in this analysis is that prices across products are equal and not included in the consumers' evoked set. Table 1 shows the distribution of the above options for seafood purchases. One can see that majority of tourists consume seafood at restaurants, followed by seafood that is currently in season, and next by seafood consumed freshly caught and/or at local festivals/events.

The next area of importance in the survey is to examine the questions meant to measure consumers' preferences for particular attributes that could be a part of the product bundle. Table 2 lists these particular choices. Simply looking at the means of the characteristics one can see that perception of safety seems to be the most important, followed by freshness of the product, perception of health benefits provided, reputation of seller, and certification of seller, which all have mean values over four. This signifies that on average the tourist consumer deemed these characteristics to be ranked important.

A factor analysis was conducted on the variables that were considered to be primers, or cues, for signaling a safe seafood product. The variables used in the analysis were:

1. Safe to eat
2. Certified sustainable
3. Certified safe to eat by NOAA
4. Certified safe to eat by the State of AL
5. Inspected by the shrimp industry
6. Reputation of the seller (restaurant, processor, etc.)

The results of the factor analysis confirmed the hypothesis that the consumer relates these variables to the underlying perception of safety. Moreover, variables one, two, and three had the lowest uniqueness values. This means that they are the most relevant variables to understand consumer safety perceptions.

Other data used in the study are demographic and socioeconomic variables. They include age, income, and the natural log of total expenditure for the stated trip. However, natural log of miles traveled is assumed to be a better cost factor for travelers when prices are assumed to be constant and that data was only available for total travel expenditures. Total travel expenditure includes living accommodations, shopping and recreational expenditure, as well as food expenditures. However, the proportion that is spent on food is assumed to be relatively low. Therefore, distance traveled was used as a proxy for willingness to pay for consumption of GCR seafood. There is also data on racial demographics, as well as ethnicity. Amount of individuals who were in a traveling party was also included. This was to control for differences between larger parties versus individuals and/or couples.

Estimation

This study uses a stated preference discrete choice random utility model to examine consumers' choice of differentiated seafood products. Some previous studies have used a nested legit regression analysis to model the impact of seafood safety perception rankings and the choice of consuming food products (Morey et al, 1998; Jakus & Shaw, 2003). Morey illustrates how nested logit models are applicable in estimating impacts of simultaneous decisions for participation and choice, while Jakus & Shaw apply the method to recreational site choice with perceived hazard constraints. This estimation method helps the researcher to avoid estimation biases and helps to provide a clear connection between perception of risk and consumers' choice.

However, this study uses the bivariate probit estimation procedure to model the direct impacts of potential product characteristics on the consumers' discrete choice on whether to consume seafood when visiting the GCR. The technique allows for estimation with two outcomes across different products, along with accommodation of the binary dependent variable (Maddala, 1983; Cameron & Trivedi, 2005).

$$y_1^* = x_1'\beta_1 + \epsilon_1$$

$$y_2^* = x_2'\beta_2 + \epsilon_2$$

Kinnucan et al (1993) and Wessells et al (1996) used probit estimation for their analysis. However, this study expands on the estimation method by allowing for two outcomes. One outcome is very the tourist consumer choice to consume seafood when visiting the GCR, and the other outcome variable is the choice to consume seafood framing the question to make the respondent consider the DWH oil spill. This type of framing should allow the probability difference to be observed between the different perception of seafood safety in the context of no perceived risk and perceived potential risk. Linear estimation techniques are also analyzed for consumer choice and for expenditure demand.

Results

The results from the ordinary least square (OLS) expenditure demand estimation is shown in Table 3. These results are consistent with results from other previous studies. Restaurant frequency, days spent traveling, and choice of consuming GCR seafood in restaurants are all positive and significant for expenditure. This is intuitively correct, and helps to show that the data and estimation are in line with theory of travel expenditure. Miles traveled is positive and significant as well. The interpretation is as these factors increase so does travel expenditure. Income was the only consumer characteristic that was significant and positive.

The linear probability model (LPM) estimation results are shown in Table 4. This model is used to initially examine travelers' choice to consume while visiting the GCR both before and after the oil spill. According to Kinnucan et al (1993), the recursive characteristic of the lens model can be estimated using LPM, but points out that probit estimation is better to use. The result in this study point to similar conclusions as to which model provides more concise estimates. However, the LPM does show that consumers' value of safe to consume seafood is positive and significant for pre-oil spill consumer choice. This signifies that the more value that is placed on safe seafood, the greater the likelihood to consume GCR seafood. In other words, travelers perceive GCR seafood to be relatively safe to consume. Post-oil spill results show that consumers' value of industry inspections increases the likelihood to consume versus the other value factors for safety. However, whether you consumed GCR seafood in the past had the highest likelihood impact.

The results from the bivariate probit model are shown in Table 5. These results are consistent with results from other previous studies. The outcome variables being examined are pre-oil spill and post-oil spill seafood consumption choice. The results are consistent with the previous estimations in this study. However, the estimated results seem to be more efficient along with being consistent. Income, value of low price, value of safe to eat, and value of certified sustainable are positive and significant across pre and post oil spill seafood consumption choices. The income variable is consistent across models. Consumers who value low prices also have higher probabilities of consuming GCR seafood, but lesser so during the post-oil spill than pre oil-spill. This interpretation is the same for those who value safe to eat seafood in relationship to GCR seafood. The interesting factors are value for certified sustainable and value for inspection by seafood industry. Both increase impact and significance levels in the post-oil spill outcome. This shows that consumers risk perception decreases with certifications of sustainable supply and industry inspected. Therefore, these labels could help provide a value added to producers by helping increase consumer likelihood to consume GCR seafood labeled with these specific certifications.

The bivariate probit results across product attributes can be seen in Tables 6-9. In Tables 6 and 7 the outcomes look at different products with differentiations based on what choice of how to consume GCR seafood pre-oil spill. Tables 8 and 9 look at different products differentiated based on what choice of how to consume GCR seafood post-oil spill. The main difference between products is that consumers value more safety when consuming seafood in restaurants, in season to be consumed at home or temporary coastal residence, and fresh caught. However, when looking for GCR seafood to mail home, consumers' choices are impacted more on higher values of consuming for health. This could be interpreted as those travelers who consume GCR seafood that they mail back to their permanent residence consume GCR seafood for its health benefits.

The results also show that consumers value low price across products and across pre and post-oil spill conditions. Consumers also value safe to eat and industry inspection over certifications provided by federal or state agencies. Therefore, policy makers could require industry inspections and that these inspections are labeled on products on which the required inspections are performed. These labels could help lower consumers' risk perceptions for GCR seafood, and actually increase the likelihood of consumption when visiting the GCR. This could be beneficial to producers by increasing consumption of GCR seafood. However, producers may find it difficult to increase prices based on the potential value-added caused by labeling because consumers value of low prices will compete with the value-added of labels for increasing likelihood of consumption choice.

Looking at the coefficient for trip expenditure, it shows that the higher the amount spent on traveling the greater the likelihood of consuming seafood at restaurants. This is an expected outcome. Those who spend more on travel, will probably have consumed more in restaurants and meals away from home in general. However, the factor is only significant when looking at GCR seafood consumed in restaurants choice attribute.

Income gave an expected result when looking at pre-oil spill versus post estimation. In the post oil spill, those with higher incomes had lower coefficients than in the pre-oil spill model. This could be interpreted as those with higher incomes have higher perceived risk of consuming contaminated seafood. This could be the result of having access to more information on issues of potential contamination or health care concerns. It could be the result of those with higher incomes taking advantage of the opportunity for inexpensive travel opportunities that were available post-oil spill.

Although the results for NOAA and State of Alabama certifications were not significant, they still tell an interesting story. Consumers do want safe seafood, however they value industry safety inspection over a federal or state regulatory body. This can be interpreted that consumers assume industry inspectors will have more experience and potentially more incentive to put out a safe product. This is a potentially important finding. Consumers may feel that they have more experience with industry level certifications and feel more trusting in the capabilities of the seafood industry to self regulate. Also, the state and industry have recently combined efforts and implemented several campaigns to promote eating GCR seafood, and these campaigns could be framing consumers perceptions about who has more experience dealing with the safety of GCR seafood.

The latter results basically show that travelers to the GCR value fresh seafood for reasons of health and perception of GCR seafood to be safe. There concerns with safety are better addressed by industry and third party certifications versus direct federal and state regulatory bodies.as large as the concerns to assure that the seafood is perceived to be fresh. These consumers feel more comfortable knowing that the regulatory body is more experienced with the products. As the consumer might be more appreciative of his/her own experiences when deciding if a certain product is healthy, that same attitude seems to transcend to the regulatory agent and who might the consumer feel is more experienced at regulating seafood in the GCR.

Implications & Conclusions

The implications of this study can help push policy as it relates to labeling seafood and the choice timing of opening fishery harvesting seasons. Results show that consumers are more concerned with safe seafood verified by industry inspectors versus seafood that is certified through governmental bodies. Therefore, policy makers should focus on aligning harvesting seasons with the movements of biological stock of the fisheries as well as the travel season of the GCR. Policymakers should also focus on encouraging more industry inspections of GCR seafood and labeling of GCR seafood that has been inspected by industry or third party agents.

Restaurants also play an important role for consumption of GCR seafood. Regulatory agents should center policy towards assuring that seafood is thought to be safe that is consumed in restaurants. Potentially, the state board of health could also give some sort of "stamp of approval" for restaurants that have fresh, safe to consume fish. The psychosocial cues of this type of regulation could help seafood restaurants have a value added to selling GCR seafood that is cued to be fresh and industry certified safe.

The expectation of the study was that negative externalities from seafood consumption as a resulting from contamination of GCR fisheries caused by the Deepwater Horizon oil spill needed to be addressed in order to bring value back to the brand of seafood landed in the GCR. It was also expected that NOAA, FDA, and the campaign for Eat Alabama Seafood should carefully consider some type of rebranding of GCR landed seafood to detour consumer risk perceptions of consuming seafood landed in the GCR. However, the results show that the main effective body for giving valued added products to establishments is the Eat Alabama Seafood campaign, which is a corroboration of stakeholders from the seafood industry and local policymakers such as Mississippi/Alabama Sea Grant Consortium. Consumers want access to fresh, safe seafood, and producers could create industry wide seafood safety certifications to provide this fresh, safe seafood with a value-added component through promoting it as originating from the GCR fisheries.

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Appendix:

Figure 1. *Lens Model of Preference Formation and Consumer Choice (Hauser & Simmie, 1981)*

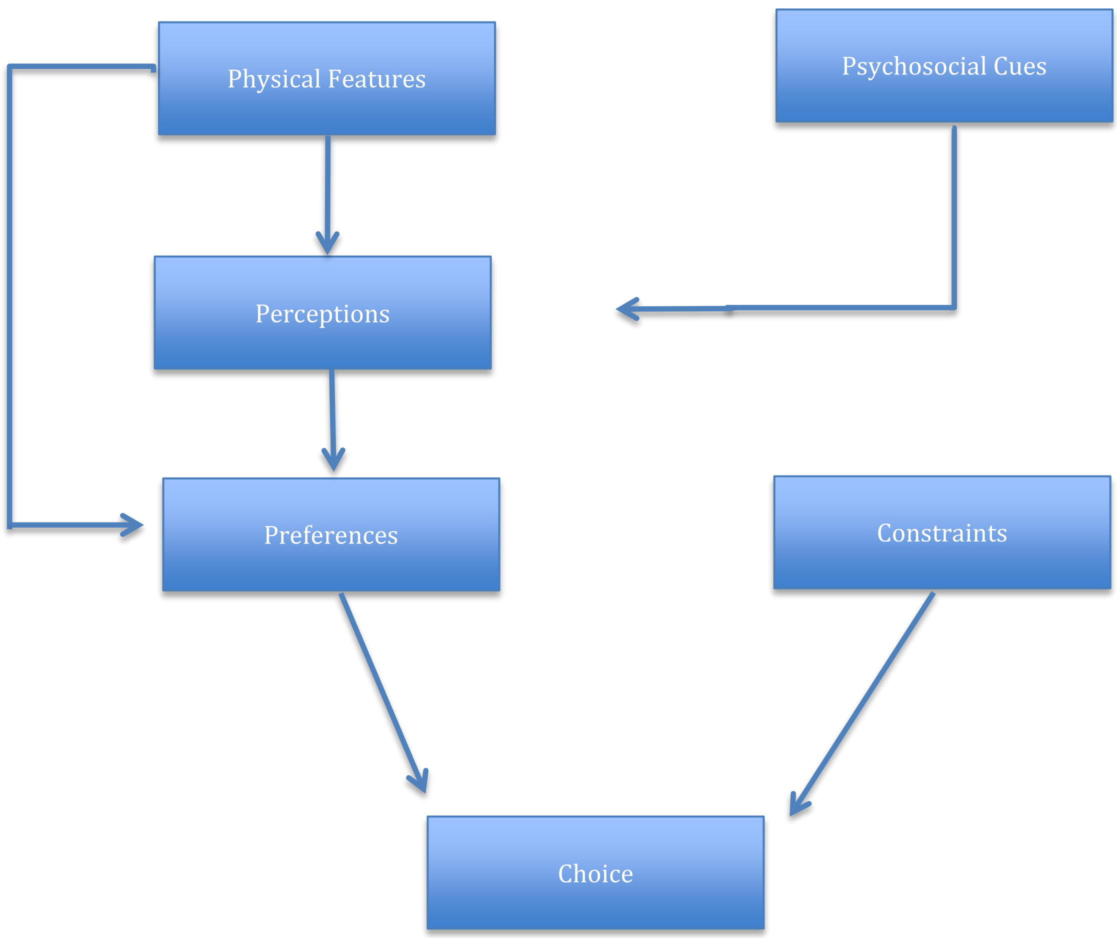

Table 1: Distribution of Product Attribute Differentiation

#		%
1		33%
2		22%
3		3%
4		22%
5		65%

Table 2: Ranking of Consumption Characteristics Demanded

Stat	Low price	Fresh	Healthy	Safe	In season	Cday	GCR	Shr Harv	CSust	CNOAA	CAL	InShr	Wild	Farm	Rep
Mean	3.70	4.31	4.19	4.38	3.83	3.82	3.65	3.70	3.89	3.99	4.03	3.96	3.67	3.35	4.02
Var	1.27	0.89	1.00	0.94	1.05	1.02	1.18	1.12	1.12	1.17	1.06	1.07	1.20	1.27	0.96
SD	1.13	0.94	1.00	0.97	1.03	1.01	1.09	1.06	1.06	1.08	1.03	1.03	1.10	1.13	0.98
Tot	354	354	359	356	352	341	364	370	351	374	347	357	341	339	346

Table 3: OLS Vacation Expenditure

VARIABLES	lnUSExp	VARIABLES	lnUSExp
Age	0.000	Black	0.046
	(0.022)		(0.242)
Income	0.118***	Asian	0.038
	(0.023)		(0.261)
lnUSMiles	0.176***	LowPrice	-0.026
	(0.024)		(0.022)
lnUSDays	0.219***	Freshness	0.029
	(0.071)		(0.020)
lnUSParty	0.028	HealthyEat	0.009
	(0.064)		(0.020)
lnUSRest	0.581***	SafeEat	0.026
	(0.064)		(0.019)
SeaSeason1	-0.285**	Sustainable	-0.003
	(0.127)		(0.021)
SeaFresh1	-0.306**	SafeNOAA	-0.009
	(0.139)		(0.021)
SeaFest1	0.242**	SafeAL	-0.007
	(0.117)		(0.021)
SeaRest1	0.120	InspShrInd	0.037*
	(0.101)		(0.022)
Male	0.038	Reput	0.053**
	(0.087)		(0.021)
White	0.069	Constant	3.412***
	(0.207)		(0.328)
Observations	800		
R-squared	0.334		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: LPM Choice to Consume
Pre-Spill (1) Post-Spill (2)

VARIABLES	(1) GCRseafood	(2) Oilseafood
Oilseafood	0.491*** (0.029)	
Age	-0.013* (0.007)	0.003 (0.007)
Income	0.018** (0.008)	0.017** (0.008)
lnUSExp	0.020* (0.010)	-0.013 (0.010)
lnUSMiles	-0.006 (0.008)	-0.008 (0.008)
LowPrice	0.016** (0.007)	0.006 (0.007)
Freshness	0.009 (0.006)	0.000 (0.007)
HealthyEat	-0.002 (0.006)	0.001 (0.007)
Season	0.006 (0.007)	0.005 (0.007)
SafeEat	0.018*** (0.006)	0.005 (0.006)
SafeNOAA	0.008 (0.007)	0.001 (0.007)
SafeAL	0.007 (0.007)	0.007 (0.007)
InspShrInd	0.003 (0.007)	0.017** (0.007)
GCRseafood		0.510*** (0.030)
Constant	0.037 (0.091)	0.218** (0.093)
Observations R-squared	852 0.304	852 0.291

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Bivariate Probit, *Consume Choice*
Pre-Spill (1) Post-Spill (2)

VARIABLES	(1) GCRseafood	(2) Oilseafood	VARIABLES	(1) GCRseafood	(2) Oilseafood
Age	-0.043*	-0.015	Season	0.031	0.030
	(0.023)	(0.023)		(0.023)	(0.022)
Income	0.095***	0.093***	SafeEat	0.073***	0.049**
	(0.024)	(0.024)		(0.020)	(0.020)
lnUSExp	0.048	-0.014	Sustainable	0.037*	0.047**
	(0.033)	(0.033)		(0.022)	(0.022)
lnUSMiles	-0.041	-0.044*	SafeNOAA	0.031	0.017
	(0.025)	(0.025)		(0.022)	(0.022)
LowPrice	0.069***	0.050**	SafeAL	0.034	0.035
	(0.023)	(0.023)		(0.022)	(0.022)
Freshness	0.033	0.017	InspShrInd	0.037	0.063***
	(0.021)	(0.020)		(0.023)	(0.023)
HealthyEat	-0.008	-0.002	Constant	-0.898***	-0.546*
	(0.021)	(0.021)		(0.294)	(0.295)
Observations	852	852	Observations	852	852

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Bivariate Probit, *In-Season & Fresh Caught For Home Seafood (1 only)*
Pre-Spill (1) Post-Spill (2)

VARIABLES	(1) GCRSeason	(2) Oilseafood	(4) GCRFresh	(5) Oilseafood
Age	-0.008	-0.014	-0.055*	-0.014
	(0.029)	(0.023)	(0.031)	(0.023)
Income	0.118***	0.091***	0.058*	0.092***
	(0.032)	(0.024)	(0.032)	(0.024)
lnUSExp	-0.044	-0.013	-0.030	-0.014
	(0.038)	(0.033)	(0.040)	(0.034)
lnUSMiles	-0.133***	-0.043*	-0.034	-0.043*
	(0.028)	(0.025)	(0.030)	(0.025)
LowPrice	0.036	0.049**	0.077**	0.048**
	(0.029)	(0.023)	(0.031)	(0.023)
Freshness	0.009	0.016	0.039	0.018
	(0.026)	(0.020)	(0.027)	(0.020)
HealthyEat	-0.007	-0.003	0.014	-0.002
	(0.026)	(0.021)	(0.027)	(0.021)
Season	0.053*	0.031	0.050*	0.030
	(0.028)	(0.022)	(0.030)	(0.022)
SafeEat	-0.009	0.047**	0.069**	0.047**
	(0.025)	(0.020)	(0.027)	(0.020)
Sustainable	0.056**	0.047**	0.013	0.047**
	(0.028)	(0.022)	(0.029)	(0.022)
SafeNOAA	0.067**	0.018	0.015	0.018
	(0.027)	(0.022)	(0.028)	(0.022)
SafeAL	0.047*	0.035	0.055*	0.036
	(0.028)	(0.022)	(0.029)	(0.022)
InspShrInd	0.087***	0.062***	0.024	0.064***
	(0.029)	(0.023)	(0.030)	(0.023)
Constant	-1.554***	-0.547*	-1.911***	-0.546*
	(0.375)	(0.295)	(0.402)	(0.297)
Observations	852	852	852	852

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Bivariate Probit, *Mail Home, Festival, & Restaurant Seafood Consume Choice (1 only)*
Pre-Spill (7, 10, 13) Post-Spill (8, 11, 14)

VARIABLES	(7) GCRMail	(8) Oilseafood	(10) GCRFest	(11) Oilseafood	(13) GCRRest	(14) Oilseafood
Age	-0.137 (0.088)	-0.016 (0.023)	-0.020 (0.028)	-0.016 (0.023)	-0.024 (0.022)	-0.015 (0.023)
Income	-0.055 (0.082)	0.093*** (0.024)	0.055* (0.030)	0.093*** (0.024)	0.045* (0.024)	0.092*** (0.024)
lnUSExp	0.271* (0.161)	-0.013 (0.033)	0.052 (0.041)	-0.011 (0.033)	0.146*** (0.034)	-0.011 (0.033)
lnUSMiles	0.029 (0.081)	-0.044* (0.025)	-0.038 (0.028)	-0.043* (0.025)	0.018 (0.024)	-0.042* (0.024)
LowPrice	0.051 (0.075)	0.050** (0.023)	0.031 (0.028)	0.050** (0.023)	0.046** (0.023)	0.050** (0.023)
Freshness	-0.075 (0.061)	0.016 (0.020)	0.069*** (0.025)	0.016 (0.020)	0.030 (0.020)	0.017 (0.021)
HealthyEat	0.151* (0.084)	-0.002 (0.021)	-0.016 (0.025)	-0.001 (0.021)	0.002 (0.020)	-0.001 (0.021)
Season	-0.032 (0.067)	0.030 (0.022)	0.005 (0.027)	0.029 (0.022)	0.029 (0.022)	0.028 (0.022)
SafeEat	-0.053 (0.061)	0.049** (0.020)	0.041* (0.024)	0.048** (0.020)	0.054*** (0.020)	0.049** (0.020)
Sustainable	-0.001 (0.065)	0.047** (0.022)	0.041 (0.027)	0.047** (0.022)	0.021 (0.022)	0.048** (0.022)
SafeNOAA	0.010 (0.067)	0.017 (0.022)	0.008 (0.026)	0.018 (0.022)	-0.011 (0.021)	0.015 (0.022)
SafeAL	-0.106 (0.071)	0.037* (0.022)	0.020 (0.026)	0.037* (0.022)	0.026 (0.022)	0.036 (0.022)
InspShrInd	0.163* (0.088)	0.064*** (0.023)	0.035 (0.027)	0.064*** (0.023)	0.023 (0.022)	0.063*** (0.023)
Constant	-4.16*** (1.238)	-0.552* (0.294)	-2.03*** (0.377)	-0.570* (0.295)	-1.81*** (0.302)	-0.566* (0.292)
Observations	852	852	852	852	852	852

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Bivariate Probit, *In-Season & Fresh Caught For Home Seafood Choice(1 & 2)*
Pre-Spill (1), (4) Post-Spill (2), (5)

VARIABLES	(1) GCRSeason	(2) OilSeason	(4) GCRFresh	(5) OilFresh
Age	-0.012 (0.029)	-0.011 (0.029)	-0.049 (0.031)	-0.047 (0.031)
Income	0.114*** (0.032)	0.097*** (0.032)	0.053* (0.032)	0.042 (0.032)
lnUSExp	-0.045 (0.038)	-0.034 (0.038)	-0.031 (0.040)	-0.028 (0.040)
lnUSMiles	-0.134*** (0.028)	-0.126*** (0.029)	-0.026 (0.030)	-0.017 (0.030)
LowPrice	0.034 (0.029)	0.032 (0.029)	0.067** (0.031)	0.056* (0.031)
Freshness	0.007 (0.026)	0.005 (0.026)	0.033 (0.027)	0.024 (0.027)
HealthyEat	-0.009 (0.026)	-0.015 (0.026)	0.009 (0.027)	0.009 (0.027)
Season	0.056** (0.028)	0.052* (0.028)	0.045 (0.029)	0.037 (0.029)
SafeEat	-0.010 (0.025)	-0.005 (0.026)	0.066** (0.027)	0.043 (0.027)
Sustainable	0.056** (0.028)	0.054* (0.028)	0.007 (0.029)	0.011 (0.029)
SafeNOAA	0.070** (0.027)	0.073*** (0.028)	0.016 (0.028)	0.021 (0.028)
SafeAL	0.040 (0.028)	0.012 (0.028)	0.045 (0.029)	0.031 (0.029)
InspShrInd	0.087*** (0.029)	0.074** (0.029)	0.019 (0.030)	0.020 (0.030)
Constant	-1.487*** (0.371)	-1.419*** (0.371)	-1.800*** (0.397)	-1.69*** (0.395)
Observations	852	852	852	852

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Bivariate Probit, *Mail-Home, Festival, & Restaurant Seafood Consume Choice (1 & 2)*
Pre-Spill (1) Post-Spill (2)

VARIABLES	(7) GCRMail	(8) OilMail	(10) GCRFest	(11) OilFest	(13) GCRRest	(14) OilRest
Age	-0.092 (0.070)	-0.117* (0.068)	-0.021 (0.028)	-0.045 (0.028)	-0.024 (0.022)	0.006 (0.022)
Income	-0.062 (0.100)	-0.062 (0.078)	0.055* (0.030)	0.056* (0.031)	0.047** (0.024)	0.057** (0.024)
lnUSExp	0.223 (0.140)	0.163 (0.124)	0.050 (0.041)	0.034 (0.041)	0.155*** (0.034)	0.080** (0.033)
lnUSMiles	0.022 (0.082)	0.044 (0.078)	-0.037 (0.029)	-0.041 (0.029)	0.020 (0.024)	0.017 (0.024)
LowPrice	0.045 (0.075)	0.127* (0.075)	0.027 (0.028)	0.024 (0.028)	0.046** (0.023)	0.042* (0.023)
Freshness	-0.077 (0.063)	-0.092* (0.055)	0.071*** (0.025)	0.048* (0.026)	0.031 (0.020)	0.018 (0.020)
HealthyEat	0.154** (0.072)	0.147** (0.071)	-0.015 (0.025)	-0.019 (0.025)	0.002 (0.020)	0.021 (0.020)
Season	-0.035 (0.060)	0.003 (0.058)	0.004 (0.027)	-0.001 (0.027)	0.030 (0.022)	0.026 (0.022)
SafeEat	-0.050 (0.060)	-0.087 (0.055)	0.038 (0.024)	0.011 (0.025)	0.055*** (0.020)	0.051*** (0.020)
Sustainable	-0.037 (0.063)	-0.083 (0.058)	0.039 (0.027)	0.044 (0.027)	0.019 (0.022)	0.043** (0.022)
SafeNOAA	-0.008 (0.081)	0.046 (0.061)	0.008 (0.026)	0.022 (0.026)	-0.010 (0.021)	-0.025 (0.021)
SafeAL	-0.121 (0.080)	-0.084 (0.061)	0.017 (0.026)	0.004 (0.027)	0.024 (0.022)	0.036* (0.022)
InspShrInd	0.168** (0.080)	0.177** (0.076)	0.034 (0.027)	0.045 (0.028)	0.022 (0.022)	0.025 (0.022)
Constant	-3.75*** (1.059)	-3.52*** (0.917)	-1.98*** (0.372)	-1.72*** (0.376)	-1.87*** (0.306)	-1.66*** (0.302)
Observations	852	852	852	852	852	852

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$