EFFECT OF BRANDING GULF OYSTERS ON CONSUMERS' WILLINGNESS TO PAY

Abstract

Using a choice experiment this study found that raw oyster consumers are more likely to buy oysters harvested from their region over those harvested outside the region. Consumers are more likely to buy wild-caught oysters over cultivated oysters. Non-Gulf consumers are more likely to buy medium or large size oysters over small size.

Key words: branding, choice experiment, marketing, oyster attributes

Introduction

Raw oysters are considered a delicacy among seafood consumers and consumed worldwide. In the U.S two species of oysters *Crassoteria virginica* and *Crassoteria gigas* are harvested widely for consumption. *Crassosteria virginica* is an oyster species that is native to the East coast and the Gulf coast regions in the United States (Stanley & Sellers, 1986). *Crassoteria gigas* (Pacific oysters) are exotic species that were introduced into West coast estuaries in the early 1900's from Japan when the native species (*Ostrea lurida*) declined due to over-harvesting and water pollution (Nosho, 1989). Among these regions (East coast, Gulf coast and West coast) there exist significant oyster marketing differences based on oyster attributes and branding.

Oyster attributes such as taste, size, shape and texture are influenced by the method of production and surrounding waters from which the oysters originate. Subsequently oyster meat differs by harvest location leading to various oyster brands. An oyster brand is a trade name that is associated with a specific oyster and its attributes. These brand names give consumers some information about taste, size, price and the quality of oysters. For instance the common Eastern oyster (*Crassoteria Viginica*) is marketed under a host of different titles, such as Malpeque Bay oysters (from Prince Edward Island), Island Creek (Cape Cod, Massachusetts), Blue Point Oysters (Connecticut), Premaquid (Maine), Apalachicola Bay oysters and Moonstone oysters (from Rhode Island). Although these are all Eastern oysters, they have unique attributes due to their harvest location. These differences are often highlighted as part of the marketing strategy, resulting in product descriptions bordering on the poetic: "Malpeques are thin with elongated shell and have a firm texture. Its meats are plump and silky with a sweet flavor (www.pangeashellfish.com). Moonstones are large with unusually deep cups

(www.oystergide.com/oyster-finder). Its meats are silky and smooth with a crisp salty flavor". Oyster connoisseurs, by virtue of the brand name, know the associated oyster attributes. This general information about oysters plays an essential role in oyster marketing and helps consumers to decide on the particular raw oyster they are willing to buy.

The overall goal of the study was to estimate the effect of oyster attributes on (Gulf and non-Gulf) consumers' willingness to pay for raw oysters.

Specifically objectives were to

1. Analyze Gulf consumers' willingness to pay for branded Gulf oysters relative to the generic oysters currently on the market.
2. Analyze Non-Gulf consumers' willingness to pay for branded Gulf oysters relative to the East coast / West coast oyster brands currently on the market.
3. Estimate the effect of production method on consumers' willingness to buy raw oysters.
4. Estimate the effect of price on consumers' willingness to buy raw oysters.
5. Estimate the effect of saltiness level on consumers' willingness to buy raw oysters.
6. Estimate the effect of size of raw oysters on consumers' willingness to buy raw oysters.

Literature review

Oyster marketing

West coast and East coast oysters are marketed by means of oyster attributes such as taste, size, method of production and price, and branding which is basically established through trade names. With regards to branding, West coast and East coast oysters are either named by

the harvest locations they originate from or given an appealing name by the producer. Branding has been successful through advertisement about water quality, consistency in supply, issues of sustainability and food safety among others. These advertisements are carried out to help build certain desired image or establish a good reputation. For instance the Tomales Bay Oyster Company in California provides specific information about the quality of the waters of Tomales Bay and the Pacific Northwest at it home page for consumers (tomalesbayoysters.com). It also offer consumers free guidance on how to manage oysters to ensure consistent quality and safety.

Similarly, Copps Island Oysters is another oyster company that goes beyond the supply of information regarding taste, size and price per a specified quantity. At its home page pictures of the clean waters the oysters are harvest from, the equipment used during production, the organizations the company supports and the steps taken to maintain water quality are posted for the general public. These activities project the company's commitment towards the protection of environment as well as human health. Again some oyster producers build a good image for the chosen trade names through the extra services they make available to consumers free of charge. For example Fanny Bay Oysters is a Canadian shellfish company found along the coastline of British Columbia (www.fannybayoysters.com). At its home page, the company provides recipes for some oyster menu. By all these additional provisions oyster producers within the West coast and East coast regions seek to differentiate their products, create the image of being superior to others and help increase marketability of individual brands across the country.

Eventually these brand names are associated with specific information about it oyster taste, size, whether it was cultivated or not and price for a particular quantity and marketed across regions. With regards to quantity, East coast/West coast oyster vendors usually sell per piece at restaurants and raw bars and in counts (48, 50, 100 or 150) or dozens (5, 10 and 15) at

oyster companies, seafood markets and farms. Consumers when presented with such ample options to choose from can easily associate certain attributes with particular oyster brands sampled. Thus with the various oyster brands that the West coast and East coast regions offer, consumers have room to explore and ultimately identify their preferred oyster brands based on the attributes .In conclusion branding oysters have been very successful along the West coast and East coast regions. It effectively helped producers to differentiate their oyster products, increased marketability across regions and made it possible for consumers to identify their preferred oyster brands.

Unlike the East coast or West coast oyster market, the Gulf coast oyster market does not involve branding. Individual farmers or producers do not differentiate among oysters produced from different harvest locations within the region. The oysters harvested from the five Gulf States (Texas, Alabama, Louisiana, Mississippi and Florida) are collectively referred to as Gulf oysters with the exception of Apalachicola Bay oysters (from Apalachicola Bay) and Point aux Pins (from Grand Bay Alabama). Yet the situation in Texas might be changing (www.oysterguide.com/oyster-finder). Pepper Grove and Ladies Pass are two different oyster reefs names within the Galveston Bay. Oysters from these reefs are expected to appear on the Gulf market as Pepper Grove and Ladies Pass.

Furthermore Gulf oyster producers and retailers do not give a detail description of the oyster attributes used in marketing. For instance information about harvest location with regards to water quality and steps taken to maintain water quality, taste and texture are limited. Nevertheless some vendors are explicit about price for a particular quantity. The price of raw oysters in the Gulf oyster market is relatively lower compared to that of the West or East coast oyster brands. For instance at Clark's Oyster Bar (Gulf oyster vendor) the price of Kumamoto

from California is sold at $3.50 per oyster, Wellfleet from Massachusetts is sold at $3 and Ninigret Cup from Rhode Island is sold at $3.25. Yet at Half Shell Oyster House, half dozen of freshly shucked Gulf oysters are sold at $7 and a dozen is sold at $13 (www.halfshelloysterhouse.com). Again at Shucker's Oyster Bar, half dozen of raw Gulf oyster is sold at $8.50 and 12.50 for a dozen (http://www.shuckersontherez.com/).

According to Jacobsen (2007) the not too expensive Gulf oyster is one that consumers can afford to use in quantity. Oyster vendors within the Gulf region tend to sell Gulf oysters in quantities of half dozen and dozen at raw bars whereas for seafood markets the quantities usually specified with regards to shucked oysters include half gallon (32oz), one pint (16oz) and one gallon (80oz). With regards to whole oysters (wild or pasteurized) the quantities usually specified include 24 whole oysters, 50 – 60 oysters and 100 whole oysters.

Gulf oysters are not marketed by East coast and West coast oyster vendors although some Gulf oyster vendors have West coast and East coast oyster brands on their product list. The lack of branding as a marketing strategy within the Gulf region may be the reason why Gulf oysters do not sell beyond the Gulf coast. Therefore differentiating among oyster products from the various harvest locations within the Gulf States will lead to branding and subsequently give raw oyster consumers choice. Accordingly if a consumer purchase an oyster from a particular producer and does not appreciate the attributes of that particular oyster, this consumer have no reason to collectively label Gulf oysters as undesirable. Rather the availability of options may spur consumers to sample other brands until a prefer choice is found.

Specific problem

Although increasing oyster production is desired, future rapid growth of oyster production may bring further challenges of sales and marketing to the industry. For instance, Alfnes et al. (2006) reviewed that increased production of salmon has been accompanied by substantial decrease in prices. Young et al. (1999) posit that a period of supply-led volume growth have aquaculture producers increasingly concern about falling prices and evidence of market maturity. In effect, the concerns of the oyster industry have shifted from advanced culturing techniques to sales and marketing. The oyster industry has realized the need for a better understanding of the effects of branding on consumers' oyster consumption patterns in order to maximize economic returns.

However, with few exceptions, Gulf coast oyster producers do not brand their oyster products. The oysters produced from various harvest location within the Gulf region are collectively marketed as Gulf oysters. The problem of *Vibrio Vulnificus* risk and the BP oil spill associated with Gulf oysters has not helped Gulf oyster producers gain the marketing edge needed. On the contrary *Vibrio Vulnificus* risk and the oil spill raised issues of raw oyster safety concerns for some consumers and further exacerbated the industry's marketing strategies efforts.

Gulf oyster producers in pursuit of a solution to address the problem of *Vibrio Vulnificus* introduced post-harvest treatment technologies. However some consumers do not prefer Post-Harvest Processed oysters. Posadas and Posadas (2011) investigated consumers' preferences for Post-Harvest Processed raw oysters. Their survey results revealed that less than thirty percent of Coastal Mississippi respondents out of 511 are willing to buy Post-Harvest Processed oysters. Morgan, Martin and Huth (2009) also posit that consumers do not respond favorably to Post-

Harvest Processed oysters because taste and texture may be affected by the treatment. Therefore the problem of Gulf oyster producers is basically identifying a marketing strategy that seeks to eliminate the aforementioned marketing constrains and successfully market their products across the region and within the Gulf region.

Branding is very relevant to oyster marketing. Through labeling producers are able know the preferences of consumers, enter highly competitive market and price the optimal premium consumers are willing to pay in order to have or maintain the product. A typical example is the research conducted by Onozaka and McFadden (2011). Their research sought to investigate whether local labeling complement or compete with other sustainable labels using a conjoint choice experiment. Onozaka and McFadden (2011) employed a panel mixed logit model to analyze the choice experiment data they obtained. The result of their analysis shows that a significant proportion of U.S. consumers are willing to pay a premium for reducing their carbon footprint. A careful consideration of the choice set suggests that consumers' response was mainly based on the labeling information associated with each product.

Another example is the research findings of Brooks and Lusk (2010) where consumers considering the labeling information provided in the choice question they had, were willing to pay three times the cost of cloned milk for the organic milk. Brooks and Lusk (2010) suggest that consumers would value mandatory labels. Thus if retailers respond by revealing to consumers that there are no cloned milk at the market place by using labels like "milk from cows that have not been cloned" the value of this information was found to be $0.19 per choice.

According Gao and Schroeder (2009) consumers' willingness to pay for food attributes is indicated by the consumers' response to the labeling information provided and this subsequently determines one's anticipated change in demand. The research conducted by Gao and Schroeder (2009) sought to estimate the effects of label information on consumer willingness to pay for food attributes using choice experiment and multiple surveys. Specifically their study investigated the effect of additional attribute information on consumer choice decisions. They did that by measuring the changes in consumers' willingness to pay for attributes as more attributes are progressively provided. The results of the random parameter logit model revealed that as additional information on food attributes was provided, consumers' willingness to pay changed significantly. Hence the question is can Gulf coast oysters be branded successfully as the case of East coast or West coast oysters? Thus can Gulf oysters be branded such that it will receive positive market attention in the West coast and East coast markets?

Data

The data on the variables of interest were obtained via an online survey. The online survey was administered in March 2013 by GfK Custom Research to panelist on their knowledge panel who consume raw oysters at least once a year. The explanatory variables were the attribute variables and the dependent variable vote is a choice variable measured using choice experiment method. An example of the choice experiment question that respondents answered is as shown in Table 1.

Each respondent evaluated six choice set of three oyster alternatives. The difference in oyster alternatives lies in the production method, harvest location, size, price and taste. Price of oysters ranges from a minimum of $7 to a maximum of $18. Saltiness is categorized into sweet, mildly salty, salty and saltiness varies. Size is also grouped into small sized, medium sized, large

sized and sizes vary. With regards to production method oysters are either wild caught or cultivated. The harvest locations under consideration include Apalachicola Bay, Bay Saint Louis, Champagne Bay, Galveston Bay, Point aux Pins and Portersville Bay (Gulf oysters); Cape Cod, Chesapeake Bay and Moonstones (East coast oysters); Hood canal, Netarts Bay and Willapa Bay (West coast oysters).

Respondents indicated the **most likely** and the **least likely** oysters they are willing to buy. For instance a respondent is randomly presented with three oysters A, B and C. If this decision maker stated that he is **most likely** to buy oyster B and **least likely** to buy C, then it implies that $B \succ A \succ C$.

According to Chapman and Staelin (1982), the ranked ordered choice set can be decomposed into a series of unranked and statistically independent choice sets. Thus the ranked ordered choice set $B \succ A \succ C$ can be decomposed into

$B \succ A, C$ Choice set type one

$A \succ C$ Choice set type two

These independent choice sets were then coded as the choice variable, Vote. Alternative – Specific conditional logit (McFadden's choice) model was used to analyze the effect of the aforementioned oyster attribute variables on Vote.

Choice Experiment

Choice experiment (CE) is a method used to elicit people's preferences in the given situation that a researcher creates. Choice experiment technique is employed in this research with regards to oyster consumption preferences and subsequently the willingness to pay. The specific product attribute informing consumers' choices include size, taste, name of oyster, production method and price. Choice experiment technique is based on the theory of value and random

utility theory (Hanley et al 1998). Assuming that utility derived from consuming raw oysters depends on the set of alternatives specific oyster attributes available to the consumer, then it follows that a representative individual is assumed to have a utility function of the form

$V_{in} = V\left(X_{in}\right)$

Where:

X_{in} is a vector of relevant alternative-specific attributes on which consumers base their choice.

Therefore an individual will chose option i over option j if and only if $U_i > U_j \ \forall \ i \neq j$.

If we assume that an individuals' utility function can be partitioned into two parts, deterministic and observable part and random and unobservable then $U_{in} = v\left(X_{in}\right) + \varepsilon$ and the probability that an individual will chose option i over option j is given by

$\Pr ob\left(i / C\right) = \Pr ob\left[\left(v_{in} + \varepsilon_{in}\right) > \left(v_{jn} + \varepsilon_{jn}\right), \text{ all } \mathrm{j} \in \mathrm{C}\right]$, where C is the choice set.

$$= \Pr ob\left[\left(\varepsilon_{in} - \varepsilon_{jn}\right) < \left(v_{jn} - v_{in}\right)\right]$$

Based on the assumption that the stochastic error term is independently and identically distributed (McFadden 1974), the probability of choosing i is given by

$$\Pr ob\left(i\right) = \frac{\exp^{\beta V_i}}{\sum_{j \in c} \exp^{\beta V_j}}$$

Where β is a parameter vector and the probability can be estimated using Alternative specific conditional logistic regression. As applied to this study, the independent variables (price, size, method of production, saltiness and Name of oyster) vary across the oyster alternatives that were presented to respondents. Therefore for these alternative specific regressors, the probability of the *i*th individual choosing oyster j is given by:

$$p_{ij} = p_r\left[y_i = j\right] = \frac{\exp\left(\beta_p p_{ij} + \sum_1^n \beta_N N_{ij} + \beta_W W_{ij} + \sum_1^4 \beta_T T_{ij} + \sum_1^4 \beta_Z Z_{ij}\right)}{\sum_{j=1}^3 \exp\left(\beta_p p_{ik} + \sum_1^n \beta_N N_{ik} + \beta_W W_{ik} + \sum_1^4 \beta_T T_{ik} + \sum_1^4 \beta_Z Z_{ik}\right)}$$

where

P.....*Price*

N.....*Name of oyster*

W.....*Wild* (*method of production*)

T.....*Saltiness*

Z.....*Size*

j denotes the oyster alternatives

n denotes 2 (East coast and West coast) or 6 (individual East coast and West coast oyster barnds)

Model estimation is by maximum likelihood function. The density for the *i*th individual is

$f(y_i) = \prod_{j=1}^m P_{ij}^{y_{ij}}$, where $y_{i1}, ...y_{im}$ *are* m indicator variables

It follows that y_{ij} =1 if $y_i = j$ and y_{ij} =0 if otherwise.

For instance if an individual i $\left(y_i\right)$ chooses oyster alternative *j*=2 out of a list of alternatives 1, 2 and 3 then $y_{i2} = 1$ implying $f(y_i) = P_{i2}$ and for the other alternatives, y_{ij} =0

Hence the Likelihood function for a sample of N independent observations is the product of N densities specified as $L = \prod_{i=1}^N \prod_{j=1}^m P_{ij}^{y_{ij}}$

Maximizing the likelihood estimator implies maximizing the log likelihood function

$$\ln L = \sum_{i=1}^N \sum_{j=1}^m y_{ij} \ln F_j(x_i)$$

Results and Discussion

The results are presented in three sections. The first section present the results and discussions of the general models specified. The purpose was to estimate the effect of the attribute variables (Name of oyster, size, price, method of cultivation and taste) on consumers' willingness to pay for a particular raw oyster brand without differentiating among consumers beyond information group. With regards to the subsequent sections, raw oyster consumers sampled were further differentiated as either Gulf consumers or Non-Gulf consumers before subjecting the data to further analysis.

The second section present the results and discussions of the asclogit models specified for the data obtained from raw oyster consumers within the Gulf region. The last section focuses on the results of asclogit models specified with regards to the data on raw oyster consumers within the Non-Gulf regions. In these discussions, Gulf consumers are used to refer to raw oyster consumers who reside within the Gulf region. Similarly, Non-Gulf consumers refer to raw oyster consumers who live within the Non-Gulf region.

General models

The results of the models as shown in Table 2 indicate that price has a negative effect. This means that if price of one oyster alternative increases by one dollar then the likelihood that raw oyster consumers' will purchase that oyster alternative decrease but increases for all other oyster alternatives as expected. With regards to the high information model raw oyster consumers in general are more likely to buy medium or large size oysters over small size oysters, wild caught oysters over cultivated oysters and less likely to buy Gulf oysters over Non-gulf oyster brands. The above findings are summarized in Table 2.

Gulf consumers

Basically two models were analyzed under this section namely model 3 and model 4. The results of the analyses are summarized in Table 3. The difference in model type lies in the absence of the attribute variables such as size, taste and method of cultivation in the low information model (model 3). Aanalyzing the data on Gulf oyster consumers who had low information (mainly price and name of oyster brand) revealed that a dollar increase in the price of one oyster alternative decreases the likelihood that Gulf consumers will buy that particular alternative but increases the likelihood of purchasing all other oyster alternatives. With regards to oyster brands, Gulf consumers who had low information are more likely to buy Gulf oysters over East coast and West oyster brands.

Similar analysis was carried out on high information group consumers. The results revealed that size, saltiness and name of oyster brands had an insignificant effect on the likelihood that a Gulf consumer who had high information (price, size, taste, method of cultivation and name of oyster brand) will purchase a given raw oyster alternative. Similarly, a dollar increase in the price of one oyster alternative decreases the probability of choosing that alternative and increases the probability of choosing other alternatives. High information consumers are more likely to buy wild caught oysters over cultivated oysters. Table 3 summarizes the above findings.

Non-Gulf consumers

The data on Non-Gulf consumers were analysed and price had the same effect as the previous sections. The results of the analysis indicate that increasing the price of one raw oyster alternative decreases the likelihood that Non-Gulf consumers will purchase that oyster

alternative and increases the probability of buying other alternatives. Non-Gulf consumers are more likely to buy medium size oysters and large size oyster small size oysters. Salty oysters significantly decreased the likelihood that Non-Gulf consumers will purchase a particular oyster alternative relative to sweet oysters. Raw oyster consumers within the Non-Gulf regions are more likely to purchase wild caught oysters over cultivated oysters. With regards to oyster brands, Non-Gulf consumers are more likely to buy East coast and West coast oyster brands over Gulf oysters. The results of the models analyzed under this section are summarized in Table 4.

Conclusions

In conclusion the negative coefficient of price in all the models implies a negative own effect and a positive cross effect. That is increasing the price of one raw oyster alternative decreases the probability of purchasing that alternative and increases the probability for other alternatives. Furthermore wild caught oysters increase the probability that a raw oyster consumer will choose a given oyster alternative relative to cultivated oysters. In the case of Gulf consumers, increasing saltiness and size of raw oysters had no significant effect on the probability of choosing a given raw oyster alternative. However Non-Gulf consumers are less likely to buy salty oysters over sweet oysters. Also Non-Gulf consumers are more likely to buy medium size oysters or large size oysters over small size oysters.

With regards to harvest location, the general models suggest that raw consumers are less likely to buy Gulf oysters over East coast and West coast oyster brands. However further analysis revealed that Gulf and Non-Gulf consumers are more likely to buy oysters harvested from their region over those harvested outside the region. Therefore Gulf oyster producers can successfully brand their oyster products to establish the Gulf market and gradually enter the highly competitive West coast and East coast market.

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Example of choice experiment question

- Imagine you were at a restaurant that is known to serve high quality raw oysters on the half-shell in say November, and that the following selection of oysters is on the menu at the following prices.
- Suppose they sold only as a half –dozen and you could only order one variety of oysters at a time.
- Based on the menu shown below, which oyster are you **most likely** to buy and which oyster are you **least likely** to buy.

Table 1: A sample of choice experiment question as used in the survey

Oysters on the half-shell	*Price per half - dozen*	*Most likely to buy*	*Least likely to buy*
Point aux Pins, Grand Bay, Alabama Cultivated oysters, medium sized, mildly salty	12	✓	
Cape Cod, Massachusetts Wild oysters, small size, sweet	18		
Gulf of Mexico Wild oysters, sizes vary, saltiness varies	9		✓

[Check box] I am not willing to buy any of these oysters at these prices

Table 2: Results obtained from analyzing data on all respondents sampled (general models)

Dependent variable: Vote

Model Type:	**Model 1: Low Information**		**Model 2: High Information**	
Regressor	**Coefficient**	**Std Err**	**Coefficient**	**Std Err**
Price	-0.1116****	0.0124	-0.0790****	0.0131
Medium size	_		0.26***	0.0985
Large size	_		0.2312**	0.0924
Mildly salty	_		-0.1457	0.1098
Salty	_		-0.4579****	0.0932
Wild caught	_		0.2373***	0.0801
Gulf oysters	-0.0381	0.0796	-0.2321***	0.0922
No. of observations	2908		3409	
Log likelihood	-995.68		-1175.21	
Wald chi2	81.00		86.35	
Prob>Chi2	0.0000		0.0000	

Note: ****, ***, ** and * denote 0.01%, 1%, 5% and 10% significant levels respectively

Table 3: Results obtained from analyzing data on oyster consumers within the Gulf region

Dependent variable: Vote

Model Type:	**Model 3: Low Information**		**Model 4: High Information**	
Regressor	**Coefficient**	**Std Err**	**Coefficient**	**Std Err**
Price	-0.1188****	0.0186	-0.0587***	0.0225
Medium size	_		0.055	0.1760
Large size	_		-0.0349	0.1621
Mildly salty	_		-0.3103	0.1987
Salty	_		-0.1852	0.1651
Wild caught	_		0.2351*	0.1385
Gulf oysters	0.5358****	0.1177	0.1195	0.1535
No. of observations	1398		1203	
Log likelihood	-462.76		-418.19	
Wald chi2	64.77		25.26	
Prob>Chi2	0.0000		0.0007	

Note: ****, *** and * denote 0.01%, 1%, and 10% significant levels respectively

Table 4: Results obtained from analyzing data on oyster consumers within the Non-Gulf region

Dependent variable: Vote

Model Type:	**Model 5 : Low information**		**Model 6: High information**	
Regressor	**Coefficient**	**Std Err**	**Coefficient**	**Std Err**
Price	-0.1415****	0.0193	-0.0903****	0.0180
Medium size	-		0.3432***	0.1226
Large size	-		0.3173***	0.1150
Mildly salty	-		-0.0950	0.1335
Salty	-		-0.6236****	0.1160
Wild caught	-		0.2602***	0.1013
West coast oysters	0.4471****	0.1238	0.4844****	0.1262
East coast oysters	1.0215****	0.1835	0.4449***	0.1455
No. of observations	1510		2206	
Log likelihood	-502.64		-742.95	
Wald chi2	66.81		84.22	
Prob>Chi2	0.0000		0.0000	

Note: ****, *** and * denote 0.01%, 1%, and 10% significant levels respectively