The Effectiveness of State Logos for Farm-raised Catfish*

by

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Abstract

Product differentiation can consist of identifying the corporate firm that produces the product (such as Kraft) or the producer cooperative that produces the product (such as Ocean Spray). The Catfish Institute (funded by producers, feed mills and processors) was created to promote the generic sales of farm-raised catfish. Also, a number of Mississippi catfish processors are differentiating their product by promoting it as Mississippi Farm-Raised Catfish.

Louisiana farm-raised catfish are highly comparable in breeding, feeding and processing to catfish marketed as Mississippi Farm-Raised Catfish. Use of a state logo is based on the premise that loyalties tend to encourage food consumers to patronize local producers. Louisiana State University Agricultural Center researchers surveyed a sample of 5,000 households in three major Louisiana cities (New Orleans, Lafayette and Shreveport) in early 1992 to estimate their willingness to purchase a product classified as "Louisiana Farm-Raised Catfish," given the instate availability of catfish with the Mississippi Farm-Raised Catfish logo. The larger the percentage of Louisiana households willing to buy Louisiana Farm-Raised Catfish at higher or equal prices to Mississippi Farm-Raised Catfish, the more effective the proposed Louisiana logo and the stronger the premise that state loyalties exist and are effective.

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The survey data, which indicate that the proposed "Louisiana Farm-Raised Catfish" would be popular with many Louisiana consumers, were analyzed with respect to location (city) and socio-economic characteristics of the households using Logit analysis. As firms and states develop new nontraditional agricultural products, these results indicate that a state logo has the potential to be effectively used in promoting these new products.

Key Words

Farm-raised catfish, Product differentiation, State logos

Introduction

The farm-raised catfish industry has grown significantly from its founding in the 1960's. Mississippi alone has over 90,000 acres currently under water for catfish. Other major producers of farm-raised catfish are Arkansas, Alabama and Louisiana. Throughout the 1970s and early 1980s, the capacity to produce farm-raised catfish increased, placing downward pressures on prices and creating a need to expand the demand for farm-raised catfish.

The Mississippi industry (growers, feed suppliers and processors) took a leadership role in designing the Catfish Institute. The Catfish Institute was created to promote the consumption of farm-raised catfish among households throughout the United States. Several processor groups also developed private brands to promote the consumption of farm-raised catfish. Another major Mississippi farm-raised catfish processor group chose to differentiate their product by promoting it as Mississippi Farm-Raised Catfish. While a study to evaluate the success of the Mississippi logo in promoting farm-raised catfish has not been completed, other research has shown that the use of state logos for promoting sales of agricultural products can be successful (examples include Trotter and Brewer 1977 and Brooker, et al. 1987). Logos, both private and state, have been shown to be successful in a number of studies (see References).

The use of a state logo in marketing Mississippi farm-raised catfish raises the possibility of Louisiana farm-raised catfish growers or processors using a comparable state logo to promote their product instate. This paper examines the impact of a potential Louisiana Farm-Raised Catfish logo on household preferences for catfish in three major metropolitan areas of Louisiana given the availability of Mississippi Farm-Raised Catfish. The first section of the paper examines the procedures used in the mail survey of households during the spring of 1992. The second section reviews the statistical procedures associated with the nested logit analysis. The next section reports the results of the analysis and the final section presents the conclusions and implications.

Procedures

In February of 1992, 5,000 households in Lafayette, New Orleans and Shreveport were mailed a four-page survey form requesting information on the households' consumption patterns for aquaculture products and their socioeconomic characteristics. (Shreveport is in north Louisiana while the other two cities are in south Louisiana). Nonresponding households were mailed a follow-up survey form approximately three weeks later. A total of 1,216 responses were received for a 24% response rate. Since a number of the responding households failed to answer some of the questions, a total of 1,062 observations were used in the analysis. The question most frequently unanswered pertained to income.

Households were asked whether they would purchase a product termed Louisiana Farm-Raised Catfish (comparable in quality to Mississippi Farm-Raised Catfish) at higher, equal or lower prices than Mississippi Farm-Raised Catfish or whether they would not purchase the Louisiana product. Definitions of variables used in the analysis are given in Table 1 and their descriptive statistics are presented in Table 2. Approximately six percent were willing to pay a higher price for the Louisiana product than the Mississippi product, 57 percent were willing to pay equal prices and 36 percent were willing only to pay a lower price or would not purchase the Louisiana product.

Table 1

Definition of Variables Used in the Logit Analysis, Louisiana, 1992

Variable	Definition
CAT1	1 if the household would pay a higher price for Louisiana farm-raised catfish than Mississippi farm-raised catfish, 0 otherwise.
CAT2	1 if the household would pay the same price for Louisiana farm-raised catfish as Mississippi farm-raised catfish, 0 otherwise.
CAT3	1 if the household would pay a lower price for Louisiana farm-raised catfish than for Mississippi farm-raised catfish or would not purchase Louisiana farm-raised catfish, 0 otherwise.
PI	Household per capita income in thousands of dollars.
PISQ	Household per capita income squared in thousands of dollars.
IND	Number of individuals in the household.
INDSQ	Number of individuals in the household squared.
LHS	1 if household head has less than high school education, 0 otherwise.
HS	1 if household head has a high school education, 0 otherwise.
SCOL	1 if household head has some college education, 0 otherwise.
COL	1 if household head has a college education, 0 otherwise.
GRAD	1 if household head has graduate education, 0 otherwise.
CATH	1 if the household is Catholic, 0 otherwise.
NONCATH	1 if the household is nonCatholic, 0 otherwise.
MIXED	1 if the household is both Catholic and NonCatholic, 0 otherwise.
CAUC	1 if the household is Caucasian, 0 otherwise.
BLACK	1 if the household is African-American, 0 otherwise.
AA	1 if the household is Asian-American, 0 otherwise.
OTHER	1 if the household is of other ethnic grouping, 0 otherwise.
LAF	1 if the household is in Lafayette, 0 otherwise.
SHR	1 if the household is in Shreveport, 0 otherwise.
NO	1 if the household is in New Orleans, 0 otherwise.

Table 2

Descriptive Statistics of Variables Used in the Analysis of Household Preferences
For Louisiana Farm-raised Catfish and Mississippi Farm-raised Catfish, Louisiana, 1992

Variable	Mean	Std. Dev.	Min.	Max.
CAT1	0.0631	0.2432	0.0000	1.0000
CAT2	0.5781	0.4941	0.0000	1.0000
CAT3	0.3587	0.4798	0.0000	1.0000
PI(1,000s)	16.8356	13.9098	1.0714	85.0000
PISQ(1,000s)	476.7446	1,007.3436	1.1479	7,225.0000
IND #	2.8870	1.4576	1.0000	11.0000
INDSQ #	10.4576	10.6900	1.0000	121.0000
LHS	0.0462	0.2101	0.0000	1.0000
HS	0.2525	0.4346	0.0000	1.0000
SCOL	0.3135	0.4641	0.0000	1.0000
COL	0.2220	0.4157	0.0000	1.0000
GRAD	0.1655	0.3718	0.0000	1.0000
CATH	0.4662	0.4991	0.0000	1.0000
NONCATH	0.4581	0.4911	0.0000	1.0000
MIXED	0.0721	0.2588	0.0000	1.0000
CAUC	0.7741	0.4202	0.0000	1.0000
BLACK	0.1885	0.3881	0.0000	1.0000
AA	0.0148	0.1208	0.0000	1.0000
OTH	0.0222	0.1444	0.0000	1.0000
LAF	0.4067	0.4914	0.0000	1.0000
SHR	0.3097	0.4626	0.0000	1.0000
NO	0.2834	0.4508	0.0000	1.0000

Nested Logit Analysis

The nested logit is based upon the underlying properties of the logit model, a zero-one decision making process, and, due to the structure of the questions asked, the probabilities of all choices sum to 1 (Intriligator). The model is constrained by asking households to choose between four alternatives and each choice is analyzed. The properties of the nested logit are based upon decision trees (Moore, Pessemier and Lehmann).

The logit model, which uses the cumulative logistic probability function, can be designated as:

$$P_i = \frac{1}{1 + e_1^{-z}}$$

where e denotes the base of the natural logarithm, Z_i is a vector of characteristics of an independent variable X_i and P_i is the probability that the household will make a certain choice. The model was used in this form to determine the probabilities of purchasing catfish under selected scenarios.

The logit form of regression analysis is used to estimate the coefficients:

$$\ln \frac{P_1}{1 - P_i} = Z_i = \alpha + \beta X_i$$

Results

Tables 3 - 5 contain the statistical results concerning a household's likelihood to purchase a product promoted and labeled as Louisiana Farm-Raised Catfish at higher, equal or lower prices than a substitute product bearing the Mississippi Farm-Raised Catfish logo. In addition to location (city), household characteristics of income, education, religious preference, ethnic grouping and number of individuals in the household were included in the logit analysis. A quadratic term was used with both income and individuals in the household to incorporate the household's marginal propensity to consume with increases in income or household size.

Three household characteristics - income, education and ethic grouping of the household head - significantly influenced the household's decision to purchase Louisiana Farm-Raised Catfish at prices equal to or lower than (including would not purchase the Louisiana product) for Mississippi Farm-Raised Catfish. Religious preference significantly influenced the household's decision to purchase Louisiana Farm-Raised Catfish at higher prices than for Mississippi Farm-Raised Catfish. Geographic location of the household and the number of individuals residing in the household did not significantly influence the household's likelihood to purchase Louisiana Farm-Raised Catfish at either of the price levels to Mississippi Farm-Raised Catfish.

Income had a positive impact on the households willingness to purchase Louisiana Farm-Raised Catfish at equal prices to Mississippi Farm-Raised Catfish and a negative impact at lower prices. The significant income squared term was negative and positive for equal and lower prices, respectively, indicating that the household's willingness to purchase Louisiana Farm-Raised Catfish increased with income at lower prices and decreased with income at equal prices.

The coefficients in Tables 4 and 5 indicate that households with heads having a high school or less education are less willing to purchase Louisiana Farm-Raised Catfish at prices equal to those for Mississippi Farm-Raised Catfish and more willing to purchase at lower prices.

Caucasian households were significantly more willing to purchase Louisiana Farm-Raised Catfish at prices equal to Mississippi Farm-Raised Catfish and less willing to purchase at a lower price. NonCatholic households were significantly less willing to purchase Louisiana Farm-Raised Catfish at prices exceeding those for Mississippi Farm-Raised Catfish.

Household characteristics with the greatest potential for purchasing Louisiana Farm-Raised Catfish at prices exceeding those of Mississippi Farm-Raised Catfish include higher income, smaller size, lower educated, Catholic religious preference, African-American and located in

Table 3

Logit Estimated Coefficients for a Household's Willingness to Pay a Higher Price For Louisiana Farm-raised Catfish than for Mississippi Farm-raised Catfish, Louisiana, 1992

Variable Name	Estimated Coefficient	Standard Error	T-Ratio
CONSTANT	-3.32320	1.12650	-2.9499*
PI	0.03474	0.02499	1.3900
PISQ	-0.00012	0.00028	-0.4411
IND	-0.06280	0.31439	-0.1997
INDSQ	0.00570	0.04144	0.1376
LHS	0.86105	0.58875	1.4625
HS	-0.23895	0.44293	-0.5395
SCOL	-0.08524	0.39980	-0.2132
COL DEG	0.00330	0.40125	0.0082
CATH	-0.39456	0.37059	-1.0647
NONCATH	-1.10260	0.40340	-2.7333*
CAUC	0.49047	0.75966	0.6456
BLACK	0.73145	0.80353	0.9103
LAF	0.45501	0.33791	1.3465
SHR	0.01886	0.38647	0.0488

Number of Observations = 1,062 - 66 at 1 and 996 at 0.
* = Significant at the 10% level.
Likelihood Ratio Test = 26.6864 with 13 df.
Maddala R-Square = 0.02482

Table 4

Logit Estimated Coefficients for a Household's Willingness to Pay the Same Price For Louisiana Farm-raised Catfish as for Mississippi Farm-raised Catfish, Louisiana, 1992

Variable Name	Estimated Coefficient	Standard Error	T-Ratio
CONSTANT	-1.56220	0.54235	-2.8805*
PI	0.02893	0.01367	2.1162*
PISQ	-0.00034	0.00017	-2.0402*
IND	0.09524	0.15891	0.5993
INDSQ	0.00020	0.02076	0.0096
LHS	-0.97994	0.38794	-2.5260*
HS	-0.34635	0.22372	-1.5481
SCOL	-0.11634	0.20895	-0.5567
COL DEG	0.88650	0.21909	0.4046
CATH	0.33174	0.21830	1.5197
NONCATH	0.33271	0.21535	1.5449
CAUC	1.37430	0.33723	4.0752*
BLACK	0.17280	0.36097	0.4787
LAF	-0.02650	0.17475	-0.1516
SHR	-0.21429	0.18984	-1.1288

Number of Observations = 1,062 - 614 at 1 and 448 at 0.
* = Significant at the 10% level.
Likelihood Ratio Test = 117.800 with 13 df.
Maddala R-Square = 0.1050

Table 5

Logit Estimated Coefficients for a Household's Willingness to Pay a Lower Price For Louisiana Farm-raised Catfish than for Mississippi Farm-raised Catfish Or Wouldn't Purchase Louisiana Farm raised-Catfish, Louisiana, 1992

Variable Name	Estimated Coefficient	Standard Error	T-Ratio
CONSTANT	1.36290	0.54668	2.4930*
PI	-0.03930	0.01441	-2.7258*
PISQ	0.00035	0.00018	1.9086*
IND	-0.07877	0.16353	-0.4817
INDSQ	-0.00174	0.02143	-0.0813
LHS	0.64203	0.37888	1.6946*
HS	0.42676	0.23364	1.8266*
SCOL	0.15418	0.22022	0.7001
COL DEG	-0.10733	0.23414	-0.4584
CATH	-0.20985	0.22268	-0.9424
NONCATH	-0.04903	0.21786	-0.2251
CAUC	-1.45230	0.32825	-4.4244*
BLACK	-0.30992	0.34969	-0.8862
LAF	-0.10418	0.18074	-0.5764
SHR	-0.24950	0.19468	-1.2816

Number of Observations = 1,062 - 381 at 1 and 681 at 0.
* = Significant at the 10% level.
Likelihood Ratio Test = 124.936 with 13 df.
Maddala R-Square = 0.1110

Shreveport. The probabilities of consumption of Louisiana Farm-Raised Catfish for households with selected socioeconomic characteristics and at varying income levels are given in Tables 6 - 8 for the three price levels. The choice of characteristics under each of the four models was made to be consistent with previous research. The likelihood of a Louisiana household purchasing Louisiana Farm-Raised Catfish differs greatly by household income and characteristic (i.e. model).

Conclusions and Implications

Mississippi leads the United States in the production of farm-raised catfish, with Louisiana being the fourth largest producer. Several Mississippi catfish processing firms have differentiated their product using the Mississippi Farm-Raised Catfish logo. This study evaluated consumer acceptance of a proposed Louisiana Farm-Raised Catfish relative to the price of Mississippi Farm-Raised Catfish.

Results indicate that 74 percent of the responding Louisiana households would purchase Louisiana Farm-Raised Catfish at prices equal to or higher than for Mississippi Farm-Raised Catfish. Income, ethnic grouping, education and/or religious preference had a significant impact on the household's willingness to purchase Louisiana Farm-Raised Catfish at premium, same or discounted prices to the price of Mississippi Farm-Raised Catfish.

These results further indicate that a state logo has the potential to be successfully used to differentiate farm-raised catfish and encourage its sale even when an adjoining state is using its own state logo to promote a substitute product. This represents additional evidence of the value of state logos in the promotion and marketing of agricultural products.

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Table 6

Probabilities Associated With a Household Purchasing Louisiana Farm-raised Catfish At a Higher Price than for Mississippi Farm-raised Catfish, Louisiana, 1992

Per Capita Income ($1,000)	Probabilities			
	Model 1	Model 2	Model 3	Model 4
5	0.0202	0.0560	0.0251	0.0198
10	0.0257	0.0654	0.0304	0.0233
15	0.0277	0.0758	0.0344	0.0271
20	0.0321	0.0872	0.0398	0.0314
25	0.0369	0.0995	0.0458	0.0362
30	0.0423	0.1128	0.0523	0.0415
35	0.0482	0.1271	0.0595	0.0472

Model 1 - Three-member household, High School Education, NonCatholic, African-American, Residing in Shreveport.
Model 2 - Three-member household, Some College, Catholic, Caucasian, Residing in Lafayette.
Model 3 - Three-member household, A College Education, NonCatholic, African-American, Residing in New Orleans.
Model 4 - Three-member household, Graduate Education, NonCatholic, Caucasian, Residing in New Orleans.

Table 7

Probabilities Associated With a Household Purchasing Louisiana Farm-raised Catfish At the Same Price as Mississippi Farm-raised Catfish, Louisiana, 1992

Per Capita Income ($1,000)	Probabilities			
	Model 1	Model 2	Model 3	Model 4
5	0.2730	0.6604	0.3672	0.6384
10	0.2972	0.6865	0.3951	0.6653
15	0.3188	0.7079	0.4195	0.6874
20	0.3372	0.7249	0.4405	0.7052
25	0.3522	0.7379	0.4565	0.7188
30	0.3635	0.7473	0.4687	0.7286
35	0.3708	0.7532	0.4766	0.7348

Note: See Table 6 above for description of the models.

Table 8

Probabilities Associated With a Household Purchasing Louisiana Farm-raised Catfish Only at a Lower Price than Mississippi Farm-raised Catfish Or Only Purchasing Mississippi Farm-raised Catfish, Louisiana, 1992

Per Capita Income ($1,000)	Probabilities			
	Model 1	Model 2	Model 3	Model 4
5	0.6803	0.3374	0.6156	0.3626
10	0.6423	0.3005	0.5747	0.3243
15	0.6067	0.2695	0.5371	0.2919
20	0.5742	0.2439	0.5036	0.2649
25	0.5455	0.2230	0.4745	0.2428
30	0.5209	0.2064	0.4499	0.2251
35	0.5006	0.1934	0.4299	0.2113

Model 1 - Three-member household, High School Education, NonCatholic, African-American, Residing in Shreveport.
Model 2 - Three-member household, Some College, Catholic, Caucasian, Residing in Lafayette.
Model 3 - Three-member household, A College Education, NonCatholic, African-American, Residing in New Orleans.
Model 4 - Three-member household, Graduate Education, NonCatholic, Caucasian, Residing in New Orleans.

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