Effects of Generic Advertising on Perceptions and Behavior: The Case of Catfish

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Abstract

An eight-equation partially-recursive econometric model is specified to indicate the effects of catfish advertising on product awareness, beliefs, attitude and consumption. Results indicate the ad campaign in its first year (i) increased consumers' awareness of farm-raised catfish 15 percent, (ii) improved consumers' perceptions of and attitude toward catfish 3 to 6 percent, and (iii) increased at-home and restaurant purchases of catfish 12 to 13 percent. The response to the ad campaign is broken down into an "attitude effect" and a "reminder effect" to determine the relative behavioral importance of the affective and cognitive components of the ad copy. Model simulations suggest primacy of the reminder effect, implying the factual content of the ads had less impact on behavior than the mere presence of the ads.

Key words: advertising, advertising evaluation, generic advertising, catfish, promotion check-offs, The Catfish Institute

Generic advertising, a marketing tool of growing importance to such large and established industries as dairy, beef, and pork, is attracting increased interest among smaller and emerging industries. Producers of apples, raisins, potatoes, almonds, walnuts, wool, avocados and other specialty crops have a long history of supporting generic promotion programs (Morrison). In recent years, several aquacultural groups, including catfish and crawfish, have undertaken consumer information and promotion programs (Keithly and Roberts). All together there are some 312 federal- and state-legislated programs covering over 80 farm commodities, most of which have limited budgets (Armbruster and Frank).

Despite the proliferation of the programs and the large sums spent (some $530 million in 1986, according to Armbruster and Frank) relatively little is known about the effects of generic advertising on consumers' perceptions or purchase behavior. The studies that have been done tend to focus on the well-financed programs (e.g., citrus and dairy—see e.g., Nerlove and Waugh; Lee and Brown; Ward and Dixon; Liu and Forker; Kinnucan; Kinnucan and Forker; Chang and Kinnucan) and use aggregate time series data to generate sales-response estimates.

Studies based on consumer-level data are few and those that do exist tend not to elucidate the interrelations among the various elements comprising response, namely ad exposure, evaluative criteria, beliefs, attitude, purchase intentions and consumption (for exceptions, see Jensen and Kesavan and Hoover.).

A major objective of the research reported in this paper, therefore, is to determine whether a limited-budget generic advertising campaign can be effective in terms of favorably influencing consumers' perceptions and increasing consumption. Catfish serves as the focus of analysis because of the modest size of the industry promotion program (about $1 million per year) and the availability of appropriate data. A secondary objective is to shed light on the nature of consumer response to generic advertising, so these insights can be used to improve the design of future ad campaigns.

The research objectives are accomplished by estimating an eight-equation econometric model linking advertising awareness to consumers' beliefs and attitudes toward catfish, which in turn are linked to purchase behavior. The model is then simulated to determine the impacts of ad awareness on consumers' perceptions of catfish and purchase frequency. As a byproduct of the simulation exercise, the estimated ad response is broken down into separate components labeled the "attitude effect" and the "reminder effect" to indicate the relative contributions of each in explaining the total response.

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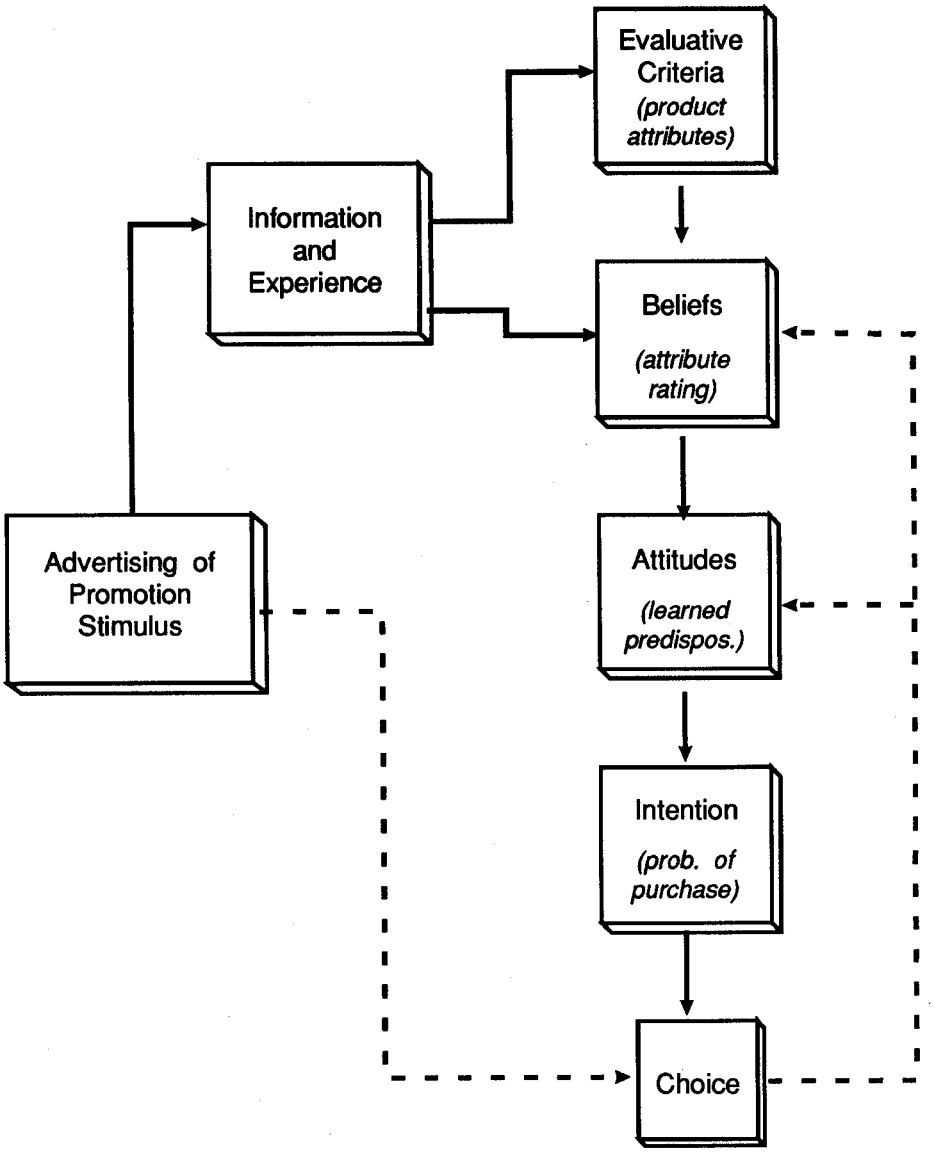

Figure 1. A Theoretical Model of Advertising Response*
*Adapted from Engel *et al.*, p. 121.

THEORY

The theoretical framework used to specify the empirical model is summarized in Figure 1. Advertising is hypothesized to influence purchase behavior both indirectly via its effect on consumers' beliefs and attitudes about product attributes and directly via its effect on consumer recall of the product itself. Thus the total effect of advertising on sales can be broken down into two separate effects, an "attitude effect" and a "reminder effect." The attitude effect of the advertising stimulus implies a sequential (or recursive) linkage among the three elements comprising consumers' perceptions and preferences: evaluative criteria, beliefs and attitude. That is, the information conveyed in the ad operates first on evaluative criteria or the consumer's belief structure about product characteristics (Bagozzi; Engel *et al.*). Then, depending on how the belief structure was modified, the consumer's attitude toward the product is changed (Fishbein). (Following Engel *et al.* p. 119, "attitude" is defined as "...a learned predisposition to respond in a favorable or unfavorable manner with respect to a given alternative.") The attitude effect, if positive, increases the consumer's subjective probability of purchasing the advertised product (intention), leading ultimately to an increase in purchase frequency.

The foregoing implies a rational *thinking* response to the ad message. This cognitive response and its operative mode in the model is consistent with the "attitude-before-behavior" paradigm promulgated by Krugman (1977) to describe the effects of advertising under conditions of high consumer involvement (Batra and Ray). The reminder effect, by contrast, characterizes the consumer's affective or emotional response to the ad campaign or copy (Silk and Vavra). This *feeling* component of response is hypothesized to be especially operative in situations in which the consumer exhibits low involvement with the purchase decision or the advertising stimulus (Bagozzi; Krugman 1966). Low involvement, for example, might typify food purchase decisions owing to the frequency and low risk (financial or otherwise) of such decisions in an affluent society.

In contrast to the attitude effect, the reminder effect implies a "behavior-before-attitude" (Krugman, 1977) response to the ad stimulus. Accordingly, the reminder effect is manifested in the theoretical model as a direct relationship between the ad stimulus and choice or purchase frequency (Figure 1). The implicit assumption here is that the consumer response to the ad message involves no cognitive processing of ad content beyond reminding the consumer of the product's existence (in the case of prior users) or enticing the consumer to purchase the product on an experimental basis to assess characteristics (in the case of new consumers). That is, in the terminology of Nelson, the reminder effect describes how advertising "signals" to the consumer (indirect) information concerning the product's existence and possibly quality. Then, depending upon the consumer's experience with the product, beliefs or attitude might be altered as indicated in the dashed lines in Figure 1.

MODEL

Based on the foregoing theoretical framework, an 8-equation empirical model was specified as follows[1]:

Awareness Equations:

(1) $SEENAD = f_1 (Z_1, e_1)$

(2) $AWARCAT = f_2 (SEENAD, Z_1, e_2)$

Belief Equations:

(3) $NUTR = f_3 (AWARCAT, SEENAD, Z_1, e_3)$

(4) $FLAV = f_4 (AWARCAT, SEENAD, Z_1, e_4)$

(5) $NOODOR = f_5 (AWARCAT, SEENAD, Z_1, e_5)$

Attitude Equation:

(6) $ATT = f_6 (NUTR, FLAV, NOODOR, ATHOME, REST, e_6)$

Purchase Equations:

(7) $ATHOME = f_7 (SEENAD, ATT, Z_2, e_7)$

(8) $REST = f_8 (SEENAD, ATT, Z_3, e_8)$

where SEENAD and AWARCAT are binary variables indicating self-described awareness of catfish ads and farm-raised catfish; NUTR, FLAV and NOODOR are the consumers' rankings of catfish for nutritional value, flavor and absence of undesirable fishy odor (1-10 scale); ATT is consumers' ranking of catfish relative to other fish and seafood (1-10 scale); ATHOME and REST are the frequency of monthly purchases (0-4) of catfish for home and restaurant consumption; Z_1 is a vector of socio-demographic characteristics defining the target audience, while Z_2 and Z_3 are vectors of exogenous variables affecting catfish purchases for home and restaurant consumption; and e_i are random error terms.

The variables representing beliefs NUTR, FLAV and NOODOR) were selected based on the general objective of the ad campaign which was to efface the image of catfish as a "...common fish that is almost always fried..." (The Richards Group, p. 91) by describing three attributes: absence of fishy odor; mild, delicate flavor; and nutrition (The Richards Group, p. 65). The variables selected to represent the demographic variables in the awareness equations (the Z_1) were based on the target audience for the ad campaign (The Richards Group), which consisted of adults aged 25-49 (with a 65 percent emphasis on females), characterized as achievers, experimental, and socially conscious; having household incomes in excess of $30,000; and located in the "Heartland" (Oklahoma, Louisiana, Arkansas, Tennessee, Mississippi, Alabama, Illinois, Texas, Kansas and Missouri).

DATA

The ad campaign itself began in April 1987 using print media. Color full-page advertisements were placed in regional editions (Heartland and Los An-

[1] A similar model, albeit with a different theoretical framework, is specified by Jensen and Kesavan in their study of calcium advertising. Our model permits consumption to affect attitude but not beliefs. This is done to simplify estimation and model simulation. While a more complete test of the model would require including consumption as an additional (endogenous) variable in the belief equations, to facilitate identification of the reminder and attitude effects, the simpler specification is preferred.

Table 1. Descriptive Statistics of the Variables Used in the Study, 1988 Survey Data, U.S.

Variable Name	Description	Sample: All Observations (N = 3600) Mean	Sample: All Observations (N = 3600) Std. Deviation	Sample: Catfish Consumers only (N = 2172) Mean	Sample: Catfish Consumers only (N = 2172) Std. Deviation
INCLT20[a]	1 annual household income is less than $20,000; 0 otherwise	0.2547	—	0.2647	—
INC2040	1 if annual household income is between $20,000 and $40,000; 0 otherwise.	0.3478	—	0.3481	—
INC4050	1 if annual household income is between $40,000 and $50,000; 0 otherwise.	0.0928	—	0.0981	—
INCGT50	1 if annual household income is greater than $50,000; 0 otherwise.	0.1306	—	0.1312	—
INCDK	1 if household does not report income; 0 otherwise.	0.1742	—	0.1579	—
WHITE	1 if race of household is white; 0 otherwise.	0.8442	—	0.8439	—
BLACK	1 if race of household is black; 0 otherwise.	0.0725	—	0.0866	—
OTHNW	1 if race of household is Hispanic, Asian or others; 0 otherwise.	0.0833	—	0.0695	—
PROFAD	1 if household head is a professional or administrator; 0 otherwise.	0.3633	—	0.3600	—
CLERIC	1 if household head is a clerk or in sales profession; 0 otherwise.	0.0872	—	0.0820	—
BCLABOR	1 if household head is a blue collar laborer; 0 otherwise.	0.2172	—	0.2265	—
AGWORKR	1 if household head is a full-time agricultural worker; 0 otherwise.	0.0372	—	0.0373	—
OTHUNEMP	1 if household head is employed in a job other than listed above or is unemp; 0 otherwise.	0.2947	—	0.2942	
LTHS	1 if household head has less than high school education; 0 otherwise.	0.1111	—	0.1234	—
HSCHSOMC	1 if household head has high school/some college education; 0 otherwise.	0.5606	—	0.5456	—
COLED	1 if household head has a college degree,0 otherwise.	0.3194	—	0.3232	—
FEMWORK	1 if female head of household works away from home; 0 otherwise.	0.5050	—	0.5028	—
SATL	1 if household head belongs to South Atlantic census subdivision; 0 otherwise.	0.111	—	0.1091	—
EAST	1 if household belongs to New England/Middle Atlantic census subdivisions; 0 otherwise.	0.2222	—	0.1234	—
HEART	1 if household belongs to East North Central/West North Central/West South Central census subdivisions; 0 otherwise.	0.444	—	0.5631	—
WEST	1 if household belongs to the Mountain/Pacific census subdivisions; 0 otherwise.	0.2222	—	0.2044	—
HHSIZE	Household size.	2.9053	1.5023	2.9236	1.5099
NKIDS	Number of kids (age below 10 years) in the household.	0.4844	0.8765	0.4802	0.8708
NTEENS	Number of teens (age 11-20 years) in the household.	0.4869	0.8557	0.4931	0.8501
SUBURB	1 if household resides in suburban or urban area; 0 otherwise	0.6842	—	0.6630	—
RURAL	1 if household resides in rural area; 0 otherwise.	0.3136	—	0.3347	—
SEENAD	1 if the household head is aware of catfish advertisements; 0 otherwise.	—	—	—	0.3849

Table 1. *continued from previous page*

Variable Name	Description	Sample			
		All Observations (N = 3600)		Catfish Consumers only (N = 2172)	
AGE	1 if the household head is between 25 and 49 years of age; 0 otherwise.	0.5136	—	0.5170	—
FEMALE	1 if the respondent is female; 0 otherwise.	0.5000	—	0.4618	—
NOODOR	Respondent's rating of absence of fishy odor in catfish. (Scale: 1-10).	5.4511	2.3866	5.8706	2.6770
FLAV	Respondent's rating of catfish flavor (Scale: 1-10).	6.1878	2.4594	6.9899	2.5700
NUTR	Respondent's rating of nutritive value of catfish. (Scale: 1-10).	6.9336	2.5245	7.7215	2.4149
AWARCAT	1 if respondent is aware of farm-raised catfish; 0 otherwise.	0.5256	—	0.6943	—
ATT	Respondent's rating of catfish compared to other fish and seafood. (Scale: 1-10).	—	—	6.5032	2.6223
ATHOME	Frequency of catfish purchases for home consumption.	—	—	0.8223	1.0456
REST	Frequency of catfish purchases at restaurants.	—	—	0.8762	0.9525
SEENAD*	Inverse Mill's Ratio of the SEENAD variable.	—	—	-0.8660D-5	0.7790

[a] Variables in italics represent omitted categories in the respective econometric equations.

geles) of ten nationally circulated magazines: Time, Newsweek, People, Better Homes and Gardens, Sunset, Family Circle, Good Housekeeping, Woman's Day, Reader's Digest and Southern Living. In addition to stressing the nutrition and flavor aspects of catfish, the ad copy variously contained pictures and narrative extolling the presumed virtues of pond culture (*i.e.*, the "natural grain" diet of farm-raised fish and the "pure" water of ponds). In this way the ads, in effect, were attempting to distinguish farm-raised fish from "wild catfish."

The foregoing themes were stressed to a greater or lesser extent in six different "creatives," three each in 1987 and 1988 (Allen). Bylines for the 1987 creatives were: "In Praise Of The Lowly Catfish," "Behind Every Catfish Recipe Is An Ugly Catfish," and "It's All In The Breeding." The 1988 creatives had the bylines "Think Of It [catfish] As A Chicken That Doesn't Cluck," "The Biggest Fish Story Ever Told," and "The Beef And Chicken People Wish They Had A Story This Good To Tell." The ads appeared April through October in 1987 and February through September in 1988. The advertisements in 1988 were expected to have a "reach" of 73 percent (*i.e.*, 73 percent of the target audience, or 31 million people, were expected to see the ads at least once) and an "effective frequency" of 54 percent (*i.e.* 54 percent of the target audience or 23 million people, were expected to see the ads at least three times (The Richards Group, p. 102)).[2]

The data used to estimate the model were obtained from a nationwide (exclusive of Hawaii and Alaska) telephone survey conducted April through June 1988 by a private research firm. The survey consisted of a random sample of 400 households from each of the nine U.S. census regions, resulting in 3600 completed interviews. The data included the socio-demographic characteristics of the respondents, the consumers' awareness of catfish ads, and information about beliefs, attitude, awareness and consumption of farm-raised catfish. Summary statistics are reported in Table 1.

In obtaining the data, the interviewer asked to speak with an adult male living in the household. If an adult male was not present, an adult female was substituted until the quota of female respondents was filled. The respondent was told that an opinion survey about people's food purchases was being conducted. The interview commenced by asking a series of general questions about the fish and seafood consumption habits, preferences and attitudes of the household. Then a series of specific questions concerning catfish consumption was posed, e.g., whether the respondent had heard of farm-raised

[2]Reach and frequency figures for 1987 were higher (85 percent and 65 percent respectively) due to a larger media budget for that year (The Richards Group, Appendix).

catfish, whether the farm-raised product was perceived as different from other catfish, whether the respondent had ever eaten catfish and if so, the place, frequency, amount and type of purchase. The consumer's attitude toward catfish was determined by posing the question:

> On a 10 point scale where 1 means catfish is *worst* and 10 means that catfish is *best*, how would you compare catfish to other fish and seafood?

Similarly, the consumer's beliefs about catfish were determined by asking the question:

> Using a scale of 1 to 10, where 1 means strong *disagreement* and 10 means strong *agreement*, do you agree or disagree with the following statements? You may use any number in between.

Ten belief statements were then read to the respondent, among which are the following three which serve as the basis for analysis in this study (letters indicate the order in which the respective statement was read):

d. Catfish has no undesirable fishy odor.
e. Catfish has a mild, delicate flavor.
f. Catfish is of high nutritional value.

Awareness of advertising was determined by asking the respondent to give a yes/no answer to: "Have you seen, read or heard any advertising for catfish?".

Consumption of catfish was determined by asking:

> How often do you or your family purchase catfish for consumption at home?
> Would you say ...
> (1) Less than once a month
> (2) 1-2 times per month
> (3) 3-4 times per month
> (4) More often
> (7) Never
> (9) Don't know, it depends.

Restaurant consumption was determined by asking: "How often do you purchase catfish at a restaurant? Would you say...," and giving the same response categories indicated above. For purposes of estimation, the "Never" and "Don't know, it depends" responses were recoded to equal zero.

Because a purpose of the survey was to obtain parallel information concerning crawfish, the respondent was then asked to answer a series of questions (similar to those posed for catfish) about crawfish. The final section of the survey dealt with the socioeconomic characteristics of the household. The survey took about 12 minutes to complete.

ESTIMATION AND HYPOTHESIS TESTING PROCEDURES

Although the survey provided data on 3600 households, the 8-equation model was estimated using only the data for those respondents who answered "yes" to the question "Have you ever eaten catfish?" There were 2172 such respondents. Nonconsumers were deleted from the analysis because information about advertising awareness was available only for catfish consumers.[3] Because such self selection of samples may lead to biased estimates of the model parameters (Heckman), preliminary analysis was performed using Heckman's 2-stage probit procedure to test for selectivity bias. Results indicated sample selection bias is not a problem in this study, *i.e.*, the deletion of nonconsumers does not bias parameter estimates.

Measurement error is an especially important consideration in advertising response studies based on cross-section data (Bagozzi; Krugman, 1985). The problem stems from relying on the consumer's memory to indicate exposure. One perspective maintains that the brain processes verbal information differently from pictoral information and therefore the ability to retrieve the two types of information will depend on the cues used in the elicitation process (Krugman, 1977). In particular, because ads tend to emphasize pictures or images in conveying information and these pictoral images are not readily converted into semantic meanings, elicitation procedures which require the consumer to articulate awareness of the ad or, even more so, which require correct identification of ad content, are likely to understate true exposure, perhaps as much as 50 percent (Krugman, 1977, p. 11). Some empirical evidence, on the other hand, suggests elicited awareness data may overstate actual exposure because of the tendency—especially among those with an interest in the product being advertised — falsely to report having seen the ad (Appel and Blum; Clancy *et al.*).

Related to the issue of measurement error is the long-standing distinction in the marketing (and psychological) literature between recall and recognition (e.g., Lucas; Wells; Neu; Flexser and Tulving; Rabinowitz *et al.* ; McDougall). A succinct definition contrasting the concepts is provided by Bagozzi and Silk who state (p. 95): "Recall is the mental reproduction of some target item experienced or learned earlier, while recognition is the awareness of having previously experienced the stimuli." Thus, for example, simply asking the respondent (as in this

[3] A routing error in the survey explains the lack of advertising awareness information for nonconsumers.

study) if he/she has seen a specific ad would qualify as a recognition measure of exposure. If, in addition to indicating awareness, the consumer had to describe accurately some aspect of the ad, say theme, picture or byline, this would constitute a recall measure of exposure.

Early research suggested that the less exacting measure of ad exposure—recognition—be avoided because scores based on such a measure were thought to "...have little if anything to do with memory," and recall scores were "...more objective and therefore more trustworthy..." (Wells, p. 8). Further, some evidence suggested recognition scores contained a larger component of systematic error than recall scores (Appel and Blum; Bogart and Tolley). Recent research, however, has rehabilitated the recognition measure, suggesting recognition not only reflects the same psychological construct (memory) as recall, but in fact may exhibit less systematic error (Bagozzi and Silk). The recognition measure, moreover, owing to its tendency to produce larger scores for ad exposure (as measured by memory) than the recall measure (Bogart and Tolley; Lucas), has the added advantage of compensating for the inherent downward bias present in verbal techniques for eliciting exposure when the content of the ad in question is largely nonverbal (Krugman, 1977; Zielske).[4]

In this study, the recognition measure is used to indicate ad exposure. Although recognition is the preferred measure, it is still subject to measurement error for the reasons discussed above. Thus, to prevent bias, a type of instrumental variable technique was used in estimating the econometric model. Specifically, following Jensen and Kesavan, prior to estimation the SEENAD variable in equations (2), (3), (4), (5), (7) and (8) was replaced with the inverse of Mill's ratio [5] (White *et al.*, p. 126) of SEENAD (labeled SEENAD*) computed from the (first-stage) probit estimates of equation (1). Because SEENAD and SEENAD* are highly correlated (r = 0.98) and SEENAD* is uncorrelated with the error terms of the respective equations (Maddala and Lee), the instrumental variable estimator is consistent (Kmenta, p. 359).[6]

A final estimation issue relates to the partially recursive nature of the econometric model. In particular, the sequential linkages indicated by theory among the endogenous variables in the awareness and belief equations suggest equations (1) - (5) can be estimated separately using single-equation procedures (e.g., OLS). However, due to the presence of binary dependent variables in the awareness equations, equations (1) and (2) were estimated using a two-stage probit procedure. In the first stage, maximum likelihood probit estimates of equation (1) are obtained. Using the resulting estimates, SEENAD* is computed. In the second stage, the SEENAD variable in equation (2) is replaced by SEENAD* and the equation is estimated by probit. This two-stage procedure simultaneously accounts for truncation error in the dependent variable and potential measurement error in the ad recognition variable. Because maximum likelihood estimation is used, the two- stage estimates are consistent (Kmenta, p. 555).

The interplay between the purchase decision and attitude suggested by theory, on the other hand, indicates equations (6)-(8) must be estimated simultaneously to obtain unbiased estimates of the coefficients. The attitude and purchase equations are each overidentified, lending themselves to estimation by two-stage least squares. However, because the error terms in the equations are likely to be correlated, the three equations were estimated as a total system using three-stage least squares (3SLS).

In reporting model results, two approaches are taken to hypothesis testing. In the case of socioeconomic variables (the Z_i in equations (1)

[4]This compensating factor, as suggested by Zielske, is probably most relevant for television advertising because of the heavy reliance on imagery. Still, given that consumers read far fewer ads than they "note" (Krugman, 1977, p.11), the compensating factor appears noteworthy even for strictly print-media campaigns.

[5]The inverse Mill's ratio is computed using the formula $\lambda = \phi(Z) / \Phi(Z)$ if $Y = 1$; and $\lambda = -\phi(Z) / (1 - \Phi(Z))$ if $Y = 0$ where Y is the value of the dependent variable from the estimated probit model and $\phi(Z)$ and $\Phi(Z)$ are the normal probability density function and the cumulative distribution function, respectively, for the response rule. Note λ is positive whenever $Y = 1$ and negative when $Y = 0$.

[6]Because SEENAD* is used to replace SEENAD, the approach taken, strictly speaking, does not yield instrumental variable estimators (see Judge *et al.*, pp. 279-281). But given the high correlation between the instrument and the mismeasured variable (r=0.98), for all practical purposes the approaches are one and the same, *i.e.*, our results will be very close to the estimates obtained by strict application of the instrumental variable formulas.

through (8), significance in general is determined by a simple *t*-test. In the case of variables relating specifically to theory (the non-Z_i in equations (1) through (8), a Bonferroni *t*-statistic for multiple hypothesis testing (Savin; Miller) is used in instances where the variables appear in combination. Otherwise a simple *t*-test is used. The philosophy here is that since the socioeconomic variables are included in the model as control variables rather than to test theory *per se*, the interest in these variables is incidental and therefore need not be subjected to the rigorous hypothesis testing demanded of the theoretical variables. In both cases, unless otherwise stated, the critical values for the statistics are based on the (nominal) 5 percent level of significance for a two-tail test. The critical values for the Bonferroni *t*-statistic are taken from Table 2 of Miller (p. 238).

ECONOMETRIC RESULTS

Awareness Equations

Estimated coefficients of the ad awareness equation indicate only three variables are significantly related to ad awareness: non-reporting of income, Western household residence, and sex of respondent (Table 2). Of these three, the sex variable has the wrong sign in terms of the stated objective of the ad campaign, *i.e.*, the negative sign indicates female respondents were *less* (rather than *more*) aware of catfish ads than male respondents. Overall, the results imply that the probability of the reference household[7] being aware of catfish ads is about .38—well below the 65 percent goal specified in the marketing plan.

The apparent failure of the ad campaign to reach the target audience may be attributable to several factors.[8] First, several of the magazines used to convey the ad message (e.g., Newsweek, Time) have no obvious gender bias in terms of intended readership nor do they appear to be necessarily targeted toward "upscale" audiences. This, coupled with the fact that the ad copy had no obvious gender appeal (though pictures in the ads of gourmet-style dishes may be construed to convey such an appeal), may account in part for the lower level of ad awareness among females. Second, and perhaps more plausibly, differences between the target audience and the socioeconomic categories historically associated with catfish consumption (low-income, poorly-educated, southern rural black households—see Hu) may have been so great as to preclude significant penetration of the advertising message given the relatively short period (about one year) between commencement of the campaign and data collection.

Despite the insignificance of a number of variables defining the target audience, the ad campaign appears to have been successful in increasing consumers' awareness of the farm-raised product. The estimated coefficient of the ad recognition variable is significant at the 1 percent level. Moreover, the probability of being aware of the farm-raised product is 12 percentage points higher for those aware of catfish ads compared to those who are unaware of the ads, *ceteris paribus*. Specifically, the probability of the reference household[9] in equation (2) being aware of farm-raised catfish is 0.62. By comparison, household heads who had seen or heard catfish advertisements have a significantly higher probability (0.74) of being aware of farm-raised catfish than household heads who had not seen catfish advertisements.

A number of the socioeconomic variables are significantly related to awareness of farm-raised catfish. The variables showing a positive relationship include: high income households ($40,000 - $50,000 range), education (high school or some college), Heartland location, and rural residence. Variables negatively related to awareness include Eastern and Western census regions. (The region in the omitted category is South Atlantic.)

Belief Equations

The belief equations contain two variables of theoretical significance, AWARCAT and SEENAD*. Therefore, a Bonferroni test for two hypotheses is applicable. Based on the critical value

[7] The concept of a "reference household" is useful in interpreting the coefficients of a probit equation (Capps and Cheng). The reference household is defined as the household whose characteristics are described when all dummy variables in the model are zero. The reference household for the ad awareness equation accordingly has the following characteristics: (i) receives an annual income below $20,000, (ii) lives in an urban or suburban community in the South Atlantic census subdivision, and (iii) has a male head under 24 years or over 50 years of age with less than a high school education who is either unemployed or working in a non-traditional job category.

[8] Note that the conclusion that the campaign failed to reach the target audience is corroborated by simultaneous hypothesis testing (Savin). Specifically, the critical Bonferroni *t*-value (at the 5 percent level) for rejecting the null hypothesis that the coefficients of PROFAD, COLED, and HEART are simultaneously equal to zero is 2.39 (Miller, p. 238). The computed *t*-values (-0.23, 1.70, and 1.19), by comparison, are insufficient to reject the null hypothesis.

[9] The reference household for the catfish awareness equation has the same characteristics as those defined above for the ad awareness equation with the added characteristic that the household is unaware of catfish ads.

Table 2. Maximum Likelihood Probit Estimates (MLE) of Awareness Equations,1988 Survey Data, U.S.

Variable	Awareness of Catfish Ads (SEENAD)		Awareness of Farm-Raised Catfish (AWARCAT)	
	MLE of the Parameter	Marginal Probability[a]	MLE of the Parameter	Marginal Probability[b]
INTERCEPT	-0.3153† (0.1224)	-0.1203	0.2996† (0.1270)	0.1026
INC2040	0.1084 (0.0761)	0.0414	0.0561 (0.0796)	0.0192
INC4050	0.0583 (0.1106)	0.0222	0.2648† (0.1207)	0.0906
INCGT50	0.0592 (0.1042)	0.0226	0.1224 (0.1111)	0.0419
INCDK	-0.1949† (0.0907)	-0.0744	0.1308 (0.0936)	0.0448
PROFAD	-0.0190 (0.0820)	-0.0007	0.1440 (0.0874)	0.0493
CLERIC	-0.0043 (0.1140)	-0.0002	-0.0676 (0.1192)	-0.0231
BCLABOR	-0.1012 (0.0848)	-0.0386	-0.0428 (0.0889)	-0.0147
AGWORKR	-0.0290 (0.1554)	-0.0111	-0.1120 (0.1637)	-0.0383
HSCHSOMC	0.1426 (0.0890)	0.0544	0.1806 (0.0920)	0.0618
COLED	0.1724 (0.1016)	0.0658	0.1948 (0.1062)	0.0667
EAST	-0.1819 (0.1157)	-0.0694	-0.2963† (0.1184)	-0.1014
HEART	0.1086 (0.0912)	0.0414	0.3229† (0.0960)	0.1105
WEST	-0.2203† (0.1041)	-0.0840	-0.2323† (0.1060)	-0.0795
RURAL	0.1093 (0.0597)	0.0417	0.1552† (0.0642)	0.0531
AGE	-0.0681 (0.0616)	-0.0260	-0.0498 (0.0654)	-0.0170
FEMALE	-0.2205† (0.0562)	-0.0841	-0.3165† (0.0595)	-0.1083
SEENAD*	—	—	0.3430† (0.0387)	0.1174

†Parameter at least twice its standard error. The figures in parentheses are estimated standard errors.

[a]The SEENAD variable evaluated at sample means, using the probit estimates is -0.2993. The standard normal density evaluated at this value is 0.3815. The product of each parameter estimate and the fixed value of the standard normal density (ie., 0.3815) gives the marginal probability.

[b]The AWARCAT variable evaluated at sample means, using the probit estimates is 0.5535. The standard normal density evaluated at this value is 0.3423. The product of each parameter estimate and the fixed value of the standard of the normal density (ie. 0.3423) gives the marginal probability.

of 2.24, AWARCAT is significant across all the equations, but SEENAD* is not (Table 3). The positive sign of AWARCAT indicates consumers' attribute ratings increase with awareness of the farm-raised product. The size of the coefficient, moreover, hints at the importance of this single variable in influencing beliefs.

The insignificance of SEENAD* suggests the ad campaign, at least in its first year, was unsuccessful in *directly* influencing consumers' beliefs about catfish. Note, however, this result does not mean advertising had no effect on beliefs whatsoever. Rather, because advertising increased awareness of the farm-raised product, which in turn improved consumers' belief ratings (as indicated by the positive coefficients for AWARCAT in Table 3), advertising still plays a role in belief formation. But the

Table 3. OLS Estimates of the Belief Equations, 1988 Survey Data, U.S.

Variable	OLS Estimated Coefficients of: Nutrition	Flavor	No Fishy Odor
INTERCEPT	7.2636† (0.2364)	7.0038† (0.2519)	5.9337† (0.2654)
INC2040	-0.0450 (0.1403)	0.0144 (0.1496)	0.0656 (0.1576)
INC4050	0.0663 (0.2045)	-0.0751 (0.2180)	0.4421 (0.2297)
INCGT50	-0.4989† (0.1923)	-0.3968 (0.2049)	0.07065 (0.2159)
INCDK	-0.1900 (0.1640)	-0.0288 (0.1748)	-0.0523 (0.1842)
PROFAD	-0.1619 (0.1513)	-0.2177 (0.1612)	-0.3535† (0.1698)
CLERIC	-0.0990 (0.2105)	-0.3186 (0.2244)	-0.5162† (0.2364)
BCLABOR	-0.2176 (0.1559)	-0.3588† (0.1661)	-0.5088† (0.1750)
AG-WORKER	-0.1083 (0.2869)	-0.3617 (0.3057)	-0.0112 (0.3221)
HSCHSOMC	-0.1427 (0.1629)	-0.3740† (0.1736)	-0.0730 (0.1829)
COLED	-0.2804 (0.1865)	-0.5852† (0.1988)	-0.0805 (0.2094)
EAST	-0.2159 (0.2128)	-0.1316 (0.2268)	0.0243 (0.2389)
HEART	0.3996† (0.1695)	0.2480 (0.1806)	-0.1299 (0.1903)
WEST	-0.0356 (0.1910)	-0.2791 (0.2035)	-0.1922 (0.2144)
AGE	0.1236 (0.1135)	0.0034 (0.1209)	-0.0980 (0.1274)
FEMALE	0.1618 (0.1041)	0.0616 (0.1110)	-0.1246 (0.1169)
AWARCAT	0.7405† (0.1156)	0.7630† (0.1232)	0.5722† (0.1298)
SEENAD*	0.0970 (0.0664)	0.0506 (0.0707)	0.1422 (0.0745)
R^2	0.0484	0.0459	0.0239
Adjusted R^2	0.0405	0.0379	0.0157

†Parameter at least twice its standard error. The figues in parentheses are estimated standard errors.

role is indirect, operating through the mediating variable "awareness of the farm-raised product."

A number of socioeconomic variables are significantly related to beliefs. High-income consumers rate catfish lower on nutrition than other consumers do. A number of occupational categories rate catfish lower on both the flavor and "no fishy odor" dimensions. Educational level is inversely related to respondent's rating of flavor. Consumers in the Heartland give catfish a higher nutrition rating relative to consumers in other regions.

Attitude Equation

Because all five of the variables in the attitude equation are of theoretical interest, a Bonferroni test based on five hypotheses is applicable. Based on the critical value of 2.58, all variables except REST are significant (Table 4). As indicated by the relative magnitudes of the elasticities associated with each coefficient estimate, the most important determinant of attitude is flavor, followed by nutrition and no fishy odor. Specifically, flavor is roughly three times as important as nutrition and six times as important as odor in influencing attitude. The apparent salience of the flavor attribute has important implications for the off-flavor problem afflicting the industry (Kinnucan *et al.* 1988). In particular, because of the paramount importance of flavor in determining attitude, events undermining the perception that catfish has desirable taste attributes, e.g., off-flavor fish entering the market, would have potentially damaging effects on consumer demand.

In addition to beliefs, theory indicates that the consumer's experience with the product can affect attitude. The significance of the coefficient for at-home consumption frequency lends support to this hypothesis. Importantly, the coefficient is positive, indicating that the respondents' experience consuming catfish at home influences their attitude toward the product favorably.[10]

Note that the significance of the belief variables in the attitude equation is consistent with the notion of an attitude effect for advertising in the case of the catfish campaign. That is, as discussed previously, the information about pond culture provided in the ads appears to have improved consumers' perceptions of catfish as measured by the three belief statements. These belief statements, in turn, are posi-

[10] A reviewer questioned whether the response might be the reverse, *i.e.*, attitude influencing consumption rather than vice-versa. This question is tantamount to asking whether the results suffer from simultaneous-equation bias. The use of 3SLS minimizes this possibility. Note too, results below (see Table 5) show attitude affecting restaurant consumption, even though restaurant consumption does not affect attitude as indicated in Table 4. That restaurant consumption does not appear to have a similar effect is an issue the industry might wish to investigate.

Table 4. 3SLS Estimates of the Attitude Equation,1988 Survey Data, U.S.

Variable	Estimated Coefficient	Elasticity at the Mean
INTERCEPT	2.6795†	-
	(0.1912)	
NUTR	0.1059†	0.1257
	(0.0226)	
FLAV	0.3144†	0.3379
	(0.0274)	
NOODOR	0.0594†	0.0536
	(0.0188)	
ATHOME	0.7665†	0.0969
	(0.2021)	
REST	-0.1941	-
	(0.2588)	
R^2	0.2507	-
Adjusted R^2	0.2490	-

†Parameter at least twice its standard error. The figures in parentheses are the asymptotic standard errors.

tively related to attitude, as required by the attitude effect.

Then too, the significance of the (at-home) consumption variable in the attitude equation lends partial support to Krugman's (1977) "behavior-before-attitude" paradigm for describing how consumers respond to advertising in situations characterized by low involvement. That is, there is evidence that in addition to beliefs, attitude toward catfish is affected by the consumer's experience with the product, *i.e.*, by behavior. If it can be shown that behavior, in turn, is affected by advertising *via the reminder effect*, this will constitute the remaining evidence needed for empirical verification of the paradigm.

Purchase Equations

Estimated coefficients of the purchase equations indicate important differences in the home and restaurant markets for catfish (Table 5). In particular, race differences exist in the home market but not in the restaurant market (blacks and other non-whites consume more catfish at home than whites).[11] The higher at-home consumption of catfish among blacks is consistent with previous research (Hu; Dellenbarger *et al.*). The amount of formal schooling matters in the restaurant market but not in the home market (more highly educated consumers have a higher level of restaurant consumption of catfish,

Table 5. 3SLS Estimates of the Catfish Consumption Equations,1988 Survey Data, U.S.

	Estimated Coefficients of:	
Variable	At-Home Consumption	Restaurant Consumption
INTERCEPT	-0.7743†	-0.3749†
	(0.1447)	(0.1428
INC2040	0.0313	-0.0190
	(0.0489)	(0.0531)
INC4050	0.0370	-0.0338
	(0.0715)	(0.0778)
INCGT50	0.0093	0.0921
	(0.0678)	(0.0736)
INCDK	0.0206	-0.0487
	(0.0575)	(0.0623)
BLACK	0.6176†	-0.0224
	(0.0725)	(0.0705)
OTHNW	0.1523†	-0.0127
	(0.0716)	(0.0773)
PROFAD	-0.0132	0.0728
	(0.0520)	(0.0575)
CLERIC	0.0310	0.1265
	(0.0728)	(0.0802)
BLACKBOR	0.0173	-0.0588
	(0.0528)	(0.0588)
AGWOKER	0.0918	0.2006
	(0.0992)	(0.1076)
HSCHSOMC	-0.0251	0.2398†
	(0.0586)	(0.0620)
COLED	-0.0402	0.2670†
	(0.0673)	(0.0714)
EAST	-0.0351	-0.0894
	(0.0741)	(0.0805)
HEART	0.3018†	0.2222†
	(0.0741)	(0.0651)
WEST	0.0186	-0.1694
	(0.0673)	(0.0724)
HHSIZE	0.0114	0.0268
	(0.0206)	(0.0224)
NKIDS	-0.0254	-0.0406
	(0.0284)	(0.0308)
NTEENS	0.0136	-0.288
	(0.0291)	(0.0315)
SEENAD*	0.0625†	0.0744†
	(0.0260)	(0.0247)
ATT	0.2057†	0.1350†
	(0.0176)	(0.0164)
FEMWORK	—	0.0192
		(0.0401)
R^2	0.1320	0.0937
Adjusted^2	0.1240	0.0849

†Parameter at least twice its standard error. The figures in parentheses are asymptotic standard errors.

[11] Note that because the equations are estimated by 3SLS, the simultaneous nature of decisions involving at-home and restaurant consumption are taken into account. Thus, for example, the estimates adjust for the fact that more educated households may prefer to eat more often in restaurants in that both equations include education variables and the estimation procedure takes into account the joint nature of the at-home /restaurant consumption decision.

ceteris paribus). Finally, whereas consumers in the West consume about the same quantity of catfish at home as do consumers in the reference region (the South Atlantic), they consume less catfish in restaurants compared to consumers in other regions.[12]

The home and restaurant markets are similar in that consumption in each market is greater in the Heartland than elsewhere. In addition, both markets are affected by advertising—both indirectly via the attitude effect and directly via the reminder effect. In particular, based on a Bonferroni test involving two hypotheses (critical value equal to 2.24), the coefficients of both the attitude and ad-recognition variables in each equation are significant. In agreement with *a priori* expectations, the signs of the coefficients are positive, suggesting increases in ad exposure or improvements in consumer attitude lead to greater consumption of catfish, *ceteris paribus*. For example, the elasticities for attitude obtained from the structural equations, evaluated at mean data points, are 1.63 for at-home consumption and 1.00 for restaurant consumption. These elasticities imply that a 10 percent improvement in attitude toward catfish, *ceteris paribus*, would be associated with increases in purchase frequencies of 16.3 percent for the at-home market and 10 percent for the restaurant market.

SIMULATION

To evaluate the effect of advertising on perceptions and behavior, the model was simulated under two scenarios: (i) consumers are not aware of catfish ads (SEENAD = 0) and (ii) consumers are aware of catfish ads (SEENAD = 1). The simulations were accomplished in two steps to accommodate the partially recursive nature of the model. In the first step, equations pertaining to the recursive portion of the model (equations (1)-(5)) were solved sequentially to obtain the desired values of the first five endogenous variables (SEENAD, AWARCAT, NUTR, FLAV, NOODOR) under each scenario (all exogenous variables held constant at sample means).

In the second step, the simultaneous portion of the model (equations (6)-(8)) was solved for the reduced form:

(9) ATT = 2.6305 + 0.0684 NOODOR + 0.3620 FLAV + 0.1219 NUTR + 0.0384 SEENAD

(10) ATHOME = 0.0256 + 0.0141 NOODOR + 0.0745 FLAV + 0.0251 NUTR + 0.0703 SEENAD

Table 6. Impact of Catfish Advertising on Awareness, Beliefs, Attitude, and Purchase Frequency

Variable	Estimated Value When: SEENAD=0	SEENAD=1	Percent Change
Probability of being aware of farm-raised catfish (AWARCAT).	0.71	0.82	15.1
Rating of catfish nutrition (NUTR).	7.61	7.97	4.6
Rating of catfish flavor (FLAV).	6.88	7.19	4.5
Rating of catfish odor (NOODOR).	5.79	6.13	5.8
Rating of catfish compared to other fish and seafood (ATT).	6.45	6.66	3.4
Frequency of purchase for home consumption (# of times per month) (ATHOME).	0.81	0.92	13.2
Frequency of purchase from restaurants (# of times per month) (REST).	0.87	0.97	11.9

(11) REST = 0.3535 + 0.0092 NOODOR + 0.0489 FLAV + 0.0165 NUTR + 0.0796 SEENAD.

Values for the remaining three endogenous variables were then obtained by inserting the appropriate values for NOODOR, FLAV, NUTR, and SEENAD (*i.e.*, values computed under scenario (i) and (ii), respectively, in the first step) into equations (9) - (11) and solving for ATT, ATHOME, and REST.

Results from the simulation exercise indicate the relative impacts of advertising on the endogenous variables. Specifically, advertising exerted its greatest influence on product awareness (15 percent increase) and purchase frequency (about a 12 percent increase in both home and restaurant consumption) (Table 6). The effect of advertising on the consumers' beliefs about product attributes and

[12]As suggested by a reviewer, the regional differences in restaurant consumption may reflect availability. This would be true, for example, if catfish appeared less often as a menu item in the West than elsewhere.

overall attitude was much less, averaging about a 3 to 6 percent increase. These results suggest in the case of the catfish campaign, the reminder effect was more important than the attitude effect in determining purchase frequency.

To confirm the inference that the reminder effect dominated the attitude effect, the model was simulated with the attitude effect "turned off," *i.e.*, with the attribute variables in equations (10) and (11) set equal to the level consistent with SEENAD = 0 but with SEENAD in the equations set equal to one. A similar simulation was run with the reminder effect "turned off," *i.e.*, the attribute variables in equations (10) and (11) set equal to the level consistent with SEENAD = 1 and SEENAD set equal to zero. A comparison of results confirmed the primacy of the reminder effect. In particular, it was determined that 63-70 percent of the behavioral response to the ad campaign is attributable to the reminder effect, with the remaining 30-37 percent attributable to the attitude effect.

The foregoing results indicating the primacy of the reminder effect admit at least two interpretations, one practical and another in relation to theory. The practical interpretation is that the factual content of the ad copy had less impact on behavior than the information conveyed by the mere presence of the ad itself. In other words, the affective content had greater relevance than the cognitive content. The theoretical interpretation is that strong support is provided for the "behavior-before-attitude" paradigm of response set forth by Krugman. That is, in the case of catfish, it appears the ad campaign accomplished sales increases with minimal effect on attitude prior to the purchase decision.

CONCLUSION

The eight-equation econometric model linking ad recognition to product awareness, beliefs, attitude and consumption yields insight into the workings of the industry ad campaign for catfish. Results suggest the ad campaign influenced purchase behavior both directly via the signaling or reminder effect of advertising and indirectly by improving consumers' attitude toward the product. The reminder effect, however, appears to dominate the attitude effect as a determinant of purchase frequency. This implies that the factual content of the ads had less impact on behavior than did the mere presence of the ad itself.

The ability to distinguish farm-raised from "wild" catfish and the consumers' perception of flavor were found to be the most important factors determining attitude. This suggests that to increase impact, future ad campaigns should stress pond culture and the flavor attributes of catfish.[13]

This research suggests that the catfish advertising program, despite its modest budget, has been successful—both in terms of improving consumers' awareness and perceptions of catfish and in increasing demand. The results suggest that commodity promotion programs do not necessarily have to be big to be effective—even limited-budget programs can have an impact. But whatever the size of the program, funds must be carefully allocated to ensure marketing resources are being used in the most efficient manner possible. Because markets are dynamic, subject to rapid change due to changes in relative prices, income, consumer preferences, new products and other factors, ongoing market research is an essential element of effective program management.

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[13] For a more specific and comprehensive listing of policy recommendations and estimates of the impacts of the advertising campaign on producers' surplus, see Kinnucan, Venkateswaran and Hatch.

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