Measuring the Effects of the 1998/99 Pan-European Salmon Marketing Campaign in Germany and France

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Abstract. In July 1997 a trade agreement between Norway and the European Union went into effect. The agreement specifies an increase in the export levy on Norwegian salmon entering the EU from 0.75% to 3.00% *ad valorem*. The proceeds of the levy are to be used by the Norwegian Seafood Export Council in cooperation with the Scottish Salmon Board and the Irish Salmon Growers Association for generic advertising of atlantic salmon in the European markets, the so called Pan-European Salmon Marketing Campaign. Over the Agreement's five-year life, an estimated $30 million is expected to be invested in salmon promotion in Europe.

Despite the relatively large sums being spent on these and related programs, little is known about the effects of generic advertising on consumers purchase frequency. A purpose of this research is to contribute to the understanding of these effects by examining in detail the generic advertising of atlantic salmon in Germany and France in 1998/99. By using a recursive econometric model linking awareness of the advertising in the first stage to the level of at-home consumption of salmon in the final stage the economic impact of the Pan-European campaign is investigated.

1. Background

Generic advertising of Norwegian salmon in export markets has increased significantly in recent years. Industry sponsored promotion of Norwegian salmon began in 1979 with the establishment of the Norwegian Fish Farmers Sales Organization (FOS). FOS's mandate, as that of its successor, the Norwegian Seafood Export Council (NSEC), established in 1991, is to increase the demands for Norwegian seafood. Between 1979 and 1999 promotion expenditures under FOS and NSEC totaled some US $130 million.

In July 1997 a trade agreement between Norway and the European Union went into effect. The Agreement specifies an increase in the export levy on Norwegian salmon entering the EU from 0.75% to 3.00% *ad valorem* (EUR-LEX, 1997). The proceeds of the levy are to be used by NSEC in cooperation with the Scottish Salmon Board and the Irish Salmon Growers Association for generic advertising of atlantic salmon. Over the agreement's five-year life, an estimated $30 million is expected to be invested in salmon promotion in Europe.

What is the economic impact of these campaign activities? Salmon demand may change and the resulting adjustments may be in the form of higher prices for the same level of salmon consumption or more consumption at the same price. Either way, the real issue is to determine if at-home demand for salmon has increased in response to campaign activities.

The evaluation question was approached by using a recursive system of equations linking awareness of the campaign in the first stage to at-home consumption of salmon in the final stage. By using this model, a direct measure of the effects of the promotion and information activities could be estimated. By using consumer household data, a household demand model was specified and used to show the impact of salmon promotion on the household level demand for salmon.

Despite the relatively large sums being spent on these and related programs little is known about the effects of generic advertising on consumer demand and to producers who fund these activities. A purpose of this research is to contribute to the understanding of the effects of this program within the agreement by examining in detail the generic advertising of salmon in Germany and France in 1998/99.

2. Data used in this study

The major part of the campaign budget, some 85% was spent on a television commercial that was on air during three periods in 1998/99. Hence, the research reported in this paper is focused on the television ad effects. After each campaign period, a survey was launched. The first

campaign activity took place during Christmas 1998/99, and a survey was launched in January 1999. The second campaign activity was during Easter 1999 in Germany, and a summer campaign in France. The survey's were launched in April 1999, and June 1999 respectively. The third and final campaign activities took place during the fall of 1999, and a survey in both countries was launched in November 1999.

The consumer data analysed in each study were obtained by a nation-wide survey carried out by a international marketing research company. The same firm coordinated all the six survey activities so that they would be conducted in the same way each time. Based on census data, a random stratified sample of approximately 3500 households was collected within these six surveys with the aim of being representative of each country's population. Data were collected by phone, asking for a female member of the household between 15-69 years of age from each household to answer the questions.

3. A Conceptual Model

Although the aim of generic advertising is to increase demand, the means by which this is accomplished is not yet fully understood. Theory of buyer behavior from the marketing literature suggests that advertising affects sales indirectly through its effect on consumer attitudes, which in turn are determined by consumers' beliefs about relevant product attributes. Advertising can be used to modify consumers' beliefs or, what is more difficult, to modify the set of product attributes deemed relevant by the consumer. These modified beliefs or evaluative criteria lead to improved preferences toward the product which, in turn, affect purchase intentions, culminating in a choice about whether to consume the product or not.

The four elements of the consumption process - advertising, beliefs, preferences, and consumption - are linked in a recursive chain to the advertising stimulus as illustrated in Figure 1.

Awareness of advertising. The respondents where asked several questions regarding recall of food advertising in general and the generic salmon campaign in specific. The most general awareness level was "campaign" awareness which included TV and the other media that the salmon campaign was channeled through. These where; Magazines, Brochures and In-store Promotion. The most specific level was awareness of the TV campaign/ad.
The most general aided question was: "*Now I'm going to read you a list of foods and ask you to tell me if you remember having seen any advertising for them recently. Have you seen, read or heard of any adverts for ...* "(in addition to salmon there was eight other commodity categories). If they had noticed the salmon campaign they had to indicate where they had seen it. Only those who had indicated "seen it on TV" where selected for the awareness TV variable that is used in this study.
Beliefs. Beliefs represent information that "... links a given alternative to a specified evaluative criteria, specifying the extent to which the alternative possesses the desired attribute" (Engel *et al*. 1979). For example, the statement "Salmon gives you good value for money" expresses a belief about the relative benefit of consuming salmon. Beliefs are a component of attitude broadly conceived, representing the cognitive element because they express a person's conviction about the extent to which a certain product contains the desirable (or lacks the undesirable) attribute (Engel *et al*. 1995).

The empirical model consists of four components describing the links between advertising and at-home consumption of salmon. Each component have a specific econometric equation which are specified to link the empirical data to the estimated model implied by the theoretical model. The model links exposure to information from advertising to changes in beliefs about relevant product attributes, which in turn is linked to changes in revealed preference for salmon. The preference change, if favorable, is hypothesized to induce increased purchases of the advertised product. Hence, advertising is posited to affect sales both directly via "signaling" and indirectly through the effect of the advertisement on the consumer's belief and preference structure.

A recursive, sequential 15 equation model of the decision-making process is used to evaluate both the direct and indirect of awareness of the TV advertising. In addition to the aforementioned beliefs towards salmon and revealed preference a vector of sociodemographic variables is also included in the model, explaining the levels of at-home consumption of salmon. The conceptual model we use follows the outline in Kinnucan and Venkateswaran (1990 & 1991). Formally the models are given as follows:

Awareness of TV advertising equation:

$$A = f_1 (X , e_1) \qquad (1)$$

Beliefs towards salmon equations:

$$B_k = f_{2k} (X , A , e_{2k}) \qquad (2)$$

$$k=1,\ldots,12$$

Revealed salmon preference equation:

$$P = f_3 (B_k , e_3) \qquad (3)$$

Consumption of salmon at-home equation:

$$C = f_4 (X , P , A , e_4) \qquad (4)$$

where *A* is a binary variable that takes the value 1 if the respondent remembers having seen the TV commercial. Variable B_k measures the respondent's opinion toward 12 beliefs statements relating to salmon as a product form.

Beliefs about salmon where examined by reading statements about salmon and then asking for the respondents opinion on a scale reaching from 0 = "very strongly disagree" to 10 = "very strongly agree." The following 12 statements (B_k's) where used:

a) It's easy to succeed with salmonSalmon tastes good
c) Salmon gives you a good value for money
d) Salmon makes you feel a good cook
e) Salmon is inexpensive compared with other food
f) Salmon is expansive/luxury food
g) Serving salmon is impressive/gives a good impression
h) Fresh salmon has a good firm texture
i) Smoked salmon has a good firm texture
j) You feel like eating it/ makes you want it
k) It is easy to make different dishes with salmon
l) Salmon is sophisticated

Since the scale consisted of 11 levels, it was treated as an interval scale in the econometric models.

Preference. Preference for salmon is measured as the proportion of salmon consumption compared to the total seafood consumption at-home, i.e., a ratio of 0.2 indicates that 20% of the seafood consumed at-home is salmon. However, it is important to notice that this is a measure of "revealed" preference, and says nothing of the volume or quantity of salmon that is consumed, neither how often salmon is consumed. One example. If a consumer eats seafood once a year, but chooses salmon the preference is 1, or 100%, since salmon is chosen. A more experienced seafood consumer eats seafood (and salmon) more frequently, but has a larger portfolio of seafood's to choose from, hence the revealed preference is a lower number.

Consumption. In our analysis the number of at-home consumption categories of salmon is eight, and the ordinal consumption categories are as follows: $y_i = 0,1,2,\ldots,7$ according to whether respondent *i* assigns the level of salmon consumption at home as; I never eat salmon at-home (y=0), more seldom (y=1), 2-3 times a year (y=2), appr. every second/third month (y=3), appr. once a month (y=4), 2-3 times a month (y=5), appr. once a week (y=6), twice a week or more often (y=7).

In response to the question "how often do you have salmon for home consumption?" a pattern like the one in Figure 2 was found. In the econometric models, this is the dependent variable where a direct and an indirect effect of the advertising is measured against.

For the i^{th} observation (i = 1,…,N), let y_i^* be the latent unobserved continuous dependent variable such that, $y_i^* = \beta'\mathbf{x}_i + \varepsilon_i$, where $\mathbf{x}_i$ is an (N × K) matrix of known values of the independent explanatory variables (which may be either continuous or dichotomous), β is a K-dimensional vector of unknown slope parameters to be estimated, and ε_i is an unobservable (N × 1) vector of uncorrelated and identically distributed random variables. Further, suppose that, instead of observing y_i^* we observe rank ordinal values of the dependent variable, y_i, which has J+1 categories. The ordered probability model then takes the following general form (McKelvey and Zavoina 1975):

$$y_i = \beta'\mathbf{x}_i + u_i, \qquad (5)$$

where u_i is ~IN(0,1), and;

$$\begin{aligned} y = 0 \quad &\text{if} \quad y^* \le \mu_0 , \\ y = 1 \quad &\text{if} \quad \mu_0 < y^* \le \mu_1 , \\ y = 2 \quad &\text{if} \quad \mu_1 < y^* \le \mu_2 , \\ &\ldots \\ y = J \quad &\text{if} \quad \mu_{J-1} < y^* . \end{aligned}$$

It is now possible to estimate both the β's and the μ's (the unknown "threshold") parameters. The latter provide information about the distribution of the ordered dependent variable, such as whether the categories are equally spaced in the probit scale. The general model can now be modified to give the probability that the i^{th} individual takes the value J on the ordinal dependent variable as:

$$P(y_i = J \mid \mathbf{x}_i) = \Phi(\mu_J - \beta'\mathbf{x}_i) - \Phi(\mu_{J-1} - \beta'\mathbf{x}_i) \qquad (6)$$

where $\Phi(\mu_0 - \beta'\mathbf{x}_i) = 0$, and $\Phi(\mu_J - \beta'\mathbf{x}_i) = 1$, because $\mu_0 = -\infty$ and $\mu_J = \infty$ and $\mu_1 < \mu_2 < \ldots < \mu_J$. Similar expressions can be obtained for the probabilities of the other y_i values. Since our model is the ordered probit, the Φ is the normal cumulative distribution function. The likelihood function for the model is:

$$L = \prod_{i=1}^{N} \prod_{J=1}^{m} \left[\Phi(\mu_J - \beta' x_i) - \Phi(\mu_{J-1} - \beta' x_i)\right]^{d_{ij}} \qquad (7)$$

where m= J+1 and d_{ij} is a variable that equals one if y_i = J, and zero otherwise. The log-likelihood function is:

$$L^* = \log L = \sum_{i=1}^{N} \sum_{j=1}^{m} d_{ij} \log\left[\Phi(\mu_J - \beta' x_i) - \Phi(\mu_{J-1} - \beta' x_i)\right] \qquad (8)$$

The model is estimated using the maximum likelihood procedure in the econometric software package LIMDEP version 7.0 (Fry 1996). The maximum likelihood estimates of β's are those with the maximum probability of resulting in the observed set of categories, and requires that u_i is distributed as a standard normal.

4. Findings

The fifteen-equation model represents a recursive system. The one-way direction of causality among awareness, beliefs, and preferences suggests equations (1) through (4) are block recursive and can be estimated by ordinary least squares (OLS) regression. However, due to the presence of binary dependent variables, equation (1) is estimated using maximum likelihood probit estimates. Equations (2) and (3) are estimated using OLS. Finally equation (4) is estimated using the ordered probit procedure. Due to space limitations, only some highlighted findings relating to the effects of the advertising campaign is presented in this paper.

Advertising effects on consumers beliefs. We found several instances where the attitudes of the group of respondents aware of the advertising had significantly more positive perceptions about salmon, compared to the basis. Although the estimated coefficients and the subsequent elasticities where small it was found that improved positive beliefs was translated into a higher level of at-home consumption of salmon in the final stage. One example from the German survey in November: one aspect relating to convenience of salmon is the statement "It is easy to make different dishes with salmon." Respondents aware of the campaign had a *ceteris paribus* more positive attitude to this statement measured as a 0.025 elasticity. This was carried through to a positive effect of this belief in the revealed preference equation, measured as a 0.123 elasticity. In the final stage revealed preference had a positive effect on salmon consumption, measured as a 0.048 cumulative change in marginal probability.

Advertising effects on salmon consumption. In these ordered probability models the probabilities sum to 1, or 100%, and the effect of individual variables (all other factors held constant) is evaluated by looking at the change in marginal probabilities. E.g., some categories decrease, and to keep the sum at 100%, some other categories has to increase. Hence, the discussion of the findings regarding the effects of advertising focuses on the cumulative change in marginal probabilities, calculated at the sample means for the awareness of TV advertising variable. This procedure is chosen sine the estimated coefficients of these probit models do not have a straightforward interpretation (Becker and Kennedy 1992).

As an example the *ceteris paribus* effect of the awareness TV variable in the second survey from Germany is shown in Figure 3. Clearly the distributional is skewed to the right, implying a higher level of at-home consumption of salmon for this group.

The consumption category which declined most due to the salmon campaign is "more seldom" which is reduced by -5.2% (basis 18.8%). The two categories which increase most due to the campaign is the categories "approximately once a month" and "2-3 times a month" which increased by some 3% each.
For the six surveys, the following cumulative TV advertising effects was found:

Table 1. Estimated cumulative advertising effects.

Campaigns	**1st**	**2nd**	**3rd**
Advertising Germany	4.7%	8.0%	8.7%
Awareness Germany	28.4%	23.6%	27.0%
Advertising France	1.9%	4.2%	9.3%
Awareness France	30.4%	34.4%	32.9%

As we see the awareness of the TV campaign is quite stable during these three periods, but France has a slightly higher percentage recall. However the estimated advertising effects is overall higher in Germany. This table indicates a pivotal point often neglected in market research. If we where only to focus on the level of awareness, a measure very frequent used by marketing research companies, we would miss an important part of the effects of these marketing activities.

Economic impact. For generic advertising to benefit producers it must raise the farm price. In addition we are measuring a shift in demand in an export market. Hence we need a measure of the profitability that can be comparable to the domestic market. A suggested solution to this problem can be found in Kinnucan and Myrland (2000b). And the following discussion is based on this. The problem can be illustrated by reference to Figure 4. In this diagram we assume that Norway is a large-nation exporter of the promoted commodity (salmon), which means that the excess demand curve is downward sloping. This would tend to be true generally, and is certainly true for salmon since Norway produces over 50% of the world's supply of atlantic salmon. The domestic market is assumed to be integrated with international markets so that the law of one price holds.

With these assumptions, a promotion-induced increase in the demand for salmon in *any* market (domestic or foreign) would tend to raise price both in the domestic market and in the export markets. And this is true whether the Norwegian export share is large or small. With upward-sloping excess supply, any shift in the excess demand curve, no matter how small, would cause price to increase.

In this study we have found indications that the promotion expenditures from the Pan-European marketing campaign are associated with a shift in the excess demand curve from *ED* to *ED'* in Figure 4. Domestic producer welfare, which is defined as the area between the price line *P* and

the domestic supply curve *S*, increases by an amount equal to the shaded area. This area represents the *gross* gain to promotion from the domestic producer perspective.

The gross gain measured in the econometric models is indicated by the hatched area in Figure 4. Comparing the hatched and shaded areas, they are obviously not the same. Specifically, the hatched area represents the increased export revenue when price is fixed. As is clear from the diagram, this increased export revenue bears little, if any, relationship to increased domestic producer surplus, the relevant returns metric.

A returns formula that measure the net gain corresponding to the shaded area in Figure 4, is derived in Kinnucan and Myrland (2000b) as follows:

$$MRR_i = \beta_i \theta_i^{-1}/(\epsilon - \eta') - \Omega \qquad (9)$$

where $\eta' = \zeta (k_D \eta_D^T + k_X \eta_X^T)$ and $\Omega = -\eta' /(\varepsilon - \eta')$.

Here *i* indexes the market exposed to promotion (domestic or foreign), MRR_i is the market-specific marginal rate of return, i.e., the increase in domestic producer surplus net of the incremental promotion cost, β_i is the promotion elasticity, θ_i is the promotion intensity, i.e., promotion expenditure in the target market divided by industry revenue from that market, ϵ is the domestic supply elasticity, η' is the "effective" demand elasticity measured at the farm level, k_D is the domestic quantity share, k_X is the export quantity share, η_D^T is the domestic demand elasticity, and η_X^T is the export demand elasticity. Incidence is defined as Ω, the portion of advertising costs borne by producers. In situations where advertising funds are raised via per-unit levies on industry output in a competitive market, a portion of the levy is shifted to consumers unless supply is fixed (Chang and Kinnucan 1991), i.e., $0 < \Omega \leq 1$. The farm-wholesale price transmission elasticity ζ, which links the wholesale market to the farm-level market, is set to 0.65, a "best-guess" estimate that has been confirmed by econometric work (Kinnucan and Myrland 1998). In this analysis we used EU data that suggested a price transmission elasticity of 0.65 when farm prices are rising and 0.81 when farm prices are falling. Since farm prices rise in response to advertising, the smaller estimate is appropriate.

From (9) the marginal rate of return in any given market increases as: *i*) the market becomes more responsive to promotion (larger β_i), *ii*) producers or consumers become less sensitive to price (smaller ϵ, $|\eta_D^T|$, or $|\eta_X^T|$), *iii*) advertising intensity decreases (smaller θ_i), and incidence decreases (smaller Ω).

To compute the marginal returns to the Pan-European marketing campaign we used the parameter estimates indicated in table 2. In particular, η_X^T is set to -1.35 in the baseline, our "best-guess" value of the "total" export demand elasticity, i.e., the elasticity that takes into account competitor responses to promotion-induced increases in salmon price. Specifically, an increase in salmon price is expected to increase the demand and price of substitute fish, which in turn will increase the demand for salmon through second-round or "feedback" effects. Thus, the total demand elasticity, i.e., the elasticity that takes into account these feedback effects, is less elastic than the partial elasticity (Buse 1958). To test the sensitivity of results to this parameter, η_X^T is set alternatively to -0.88 and -1.78, a range that reflects empirical estimates in the literature (see table 2, note d for sources). Since 97.5% of Norway's salmon is exported, the domestic demand elasticity is not an important parameter. Accordingly, we fixed η_D^T at -1.0, a value that is consistent with the export demand elasticities in the sense that it generally reflects a less elastic demand for the domestic market.[1]

The foregoing demand elasticities are measured at the wholesale level. Since we are interested in measuring returns at the farm level, it is necessary to convert these elasticities to a farm-level elasticity. Accordingly, we multiplied η' (the quantity-share weighted sum of the domestic and export wholesale-level elasticities) by ζ the farm-wholesale price-transmission elasticity. The justification for this procedure is that it is consistent with theory provided the farm-wholesale production technology exhibits fixed proportions (Gardner 1975), a maintained hypothesis. Based on previous analysis (see table 2, note e), ζ is set to 0.65.

The supply elasticity is set alternatively to 1.00 and 1.54. These values, which are consistent with empirical estimates provided by Steen *et al*. (1997), reflect returns to promotion over different time horizons. In particular, ϵ = 1.00 represents Norwegian salmon producers' response to price over an approximate two-year period and as such represents a "short-run" response to the promotion effort.[2] The latter value, ϵ = 1.54, represents a 3-5 year supply response and thus provides a measure of the "long-run" returns.

[1] Ordinarily domestic demand is less price elastic than export demand, so one might argue that $|\eta_D^T|$ should be set to less than 0.88, η_X^T's smallest value. However, given that the domestic share is tiny (k_D = 0.025), this would have no practical effect on results.

[2] The implicit assumption here is that the response to promotion is completed within two years, which is consistent with most empirical studies of advertising response (e.g., see Kinnucan and Miao 2000, and the references cited therein). To the extent that the assumption is faulty, the short-run return estimates will be understated.

Based on the econometric analysis of the six data sets from the Pan-European survey, it was estimated that salmon advertising sponsored by the Norwegian Seafood Export Council increased at-home salmon consumption in the French and German markets by some 2% to 9% during the 1998/99 campaign year. The figures used in the simulations are a weighted average of the numbers in table 1. Based on these estimated demand shifts, and under the conservative assumption that only the at-home market was affected by the advertising, given a 100% increase in advertising expenditure in each market, the implied advertising elasticities for France and Germany respectively are 0.0508 and 0.0609. Given these advertising elasticities, at issue is whether the promotion intensities of 2.2% for France and 5.5% for Germany are efficient.

Marginal returns. Results indicate that the marginal rates of return are indeed positive, but they are sensitive to the export demand elasticity (table 3). Focusing first on short-run returns, when η_X^T = -1.35, the "best-guess" value, the marginal rate of return for France is 79% (or \$0.79 *net* producer surplus per *last* dollar spent on promotion) compared to 12% for Germany. If export demand is less elastic at η_X^T = -0.88, the France and Germany marginal rates of return increase respectively to 113% and 34%. Similarly, if export demand is more elastic at η_X^T = -1.78 the respective rates of return decrease to 56% and -2%. The negative return in this instance does not mean that the promotion investment in Germany was unprofitable; rather the level of spending was too high relative to the level that would maximize net producer rent in this market.

Turning to long-run estimates, returns are smaller due to the depressing effects of increased supplies on price. In particular, when η_X^T = -1.35, France's return declines from 79% to 62% and Germany's return declines from 12% to 10%. The returns' attenuation is sensitive to the demand elasticity. For example, if export demand is price inelastic at η_X^T = -0.88, France returns decline from 113% in the short run to 84% in the long run (26% decrease); the corresponding decline when export demand is elastic at η_X^T = -1.78 is from 56% to 45% (20% decrease). Thus, the demand elasticity affects not only the *level* of returns from export promotion, but also the *rate* at which returns decline due to supply response.

5. Conclusions

The relevant findings in terms of advertising policy and management of the Pan-European marketing campaigns are:

1. The beliefs toward salmon held by the consumer is one of the most important factors affecting both preference for salmon and at-home consumption levels. Preference (the consumer's self-described preference for salmon relative to other fish and seafood) is most strongly influenced by perceptions of the taste of salmon; the convenience aspect of preparing salmon dishes, and the liking of salmon.

2. Those respondents aware of the campaign had more positive attitudes towards salmon. Thus, it seems like advertising copy could be targeted with themes important in the decision process; e.g., convenience and the success of serving salmon as a dinner dish. Ads stressing the positive flavor attributes of salmon is important.

3. Since the measured "direct" effects of the advertising is greater than the "indirect" effect through beliefs and preferences, salmon ads should be targeted to the audience frequently and, if the budget permits, placed in media that gives repeated exposure in the market. The simple rule of thumb might be to "keep the ads out there."

4. An estimated \$0.79 *net* producer surplus per *last* dollar spent on promotion compared to \$0.12 for Germany suggest the industry ad effort is a profitable activity for salmon producers.

5. As a consequence of the estimated returns measures it appears that profits can be enhanced by diverting funds from Germany to France (in the case of a fixed budget), or by spending relatively more in France (in the case of an expanding budget).

Despite its relative small budget compared to branded advertising, the research represented in this paper suggests the Pan-European marketing campaign in Germany and France has been successful, both in terms of increasing at-home consumer demand for salmon and in improving the income of salmon producers. The results suggest that commodity promotion programs do not have to be big to be effective - even limited budget programs can be beneficial to producers. But whatever the size of the program, funds must be carefully allocated to assure that producers are receiving the maximum return possible.

Return estimates are sensitive numbers for those involved in the management and oversight of commodity promotion programs. A key part of getting the numbers right, as emphasized by Davis (1999), involves modeling the market. This entails taking into account the key forces that determine price. In the case of traded goods such as salmon, the price effect of promotion depends not only on the shift in the excess demand curve, but also on the slope of the excess supply curve, which, in turn, depends on the slopes of the supply and demand curves corresponding to the domestic market. Thus, a proper assessment of the returns to export promotion requires econometric estimates of the export promotion elasticities, but also estimates of the commodity's supply elasticity, and the domestic and export demand elasticities. 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 the *sine qua non* of effective program management.

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7. References

Ajzen, I, and Fishbein, M. (1980) *Understanding Attitudes and Predicting Social Behavior*. Prentice Hall. Engelwood Cliffs, N.J.

Becker, W. E., and Kennedy, P. E. (1992) A graphical exposition of the ordered probit. *Econometric theory*. Vol. 8, pp. 127-131.

Bjørndal, T., Asche, F., & Steen, F. (1996) Price Determination for Fresh Salmon in the EU Market. Bergen: Norwegian School of Economics and Business, unpublished manuscript.

Buse, R. R. (1958) Total Elasticities – A Predictive Device. *Journal of Farm Econ.*, 40, 881-91.

Chang, H-S. & Kinnucan, H. W. (1991). Economic Effects of an Advertising Excise Tax. *Agribusiness*, 7 (2), 165-73.

Davis, G. C. (1999). The Science and Art of Promotion Evaluation. *Agribusiness*, 15 (4), 465-83.

Engel, J. F., Warshaw, M. R., and Kinnear, T. C. (1979) Promotion Strategy (4th ed.) Richard D. Irwin. Homewood, Ill.

Engel, J. F., Blackwell, R. D., and Miniard, P. W. (1995) *Consumer Behavior*. 8th ed. The Dryden Press. Forth Worth, Tex.

EUR-LEX (1997) Community legislation in force, Document 397D0634. Official Journal L 267 , 30/09/1997, pp. 0081 - 0082.

Fishbein, M. (1963) An Investigation of the Relationships Between Beliefs about an Object and Attitudes Toward that Object. *Human Relations*. 16, pp. 233-240.

Fishbein, M. (1971) Some Comments on the Use of "Models" in Advertising Research. Proceedings: *European soc. of Market Res.* Pp. 197-318.

Fry, T. R. L. (1996) LIMDEP 7.0. *Journal of Economic Surveys*. Vol. 10, No. 4, pp. 461-465.

Gardner, B. L. (1975) The Farm-Retail Price Spread in a Competitive Food Industry. *Amer. J. Agr. Econ.* 57, 399-409.

Holbrook, M. B. (1979) Beyond Attitude Structure: Toward the Informational Determinants of Attitude. *Journal of Marketing Research*. 15, pp. 545-556.

Kinnucan, H. W. & Miao, Y. (2000) "Distributional Impacts of Generic Advertising on Related Commodity Markets." *American Journal of Agricultural Economics*, 82 (3), 672-78.

Kinnucan, H. W. & Myrland, Ø. (2000) Optimal Advertising Levies with Application to the Norway-EU Salmon Agreement. *European Review of Agr. Economics* 27 (1), 39-57.

Kinnucan, H. W. & Myrland, Ø. (2000b) A Note on Measuring Returns to Nonprice Export Promotion. Paper to be submitted to *Agribusiness: An International Journal*. May 2000.

Kinnucan, H. W. and Myrland, Ø. (1998) Producer Welfare Impacts of the Norway-EU Salmon Agreement: A Model and Some Initial Results. Report prepared for the Norwegian Seafood Export Council, September 1998.

Kinnucan, H. W. and Venkateswaran, M. (1991) Economic Effectiveness of Advertising Aquacultural Products: The Case of Catfish. *Journal of Applied Aquaculture*, Vol.1(1), 1991, pp. 3-31.

Kinnucan, H. W. and Venkateswaran, M. (1990) Effects of Generic Advertising on Perceptions and Behavior: The Case of Catfish. *Southern Journal of Agricultural Economics*, December 1990, pp. 137-151.

McKelvey, R. D., and Zavoina, W. (1975) A Statistical Model for the Analysis of Ordinal Level Dependent Variables. *Journal of Mathematical Sociology*. Vol. 4, pp. 103-120.

Steen, F., F. Asche, and K. G. Salvanes. (1997) The Supply of Salmon in EU: A Norwegian Aggregated Supply Curve. Norwegian School of Economics and Business. *SNF Working Paper 53/97*. December 1997.

8**. Figures and Tables**

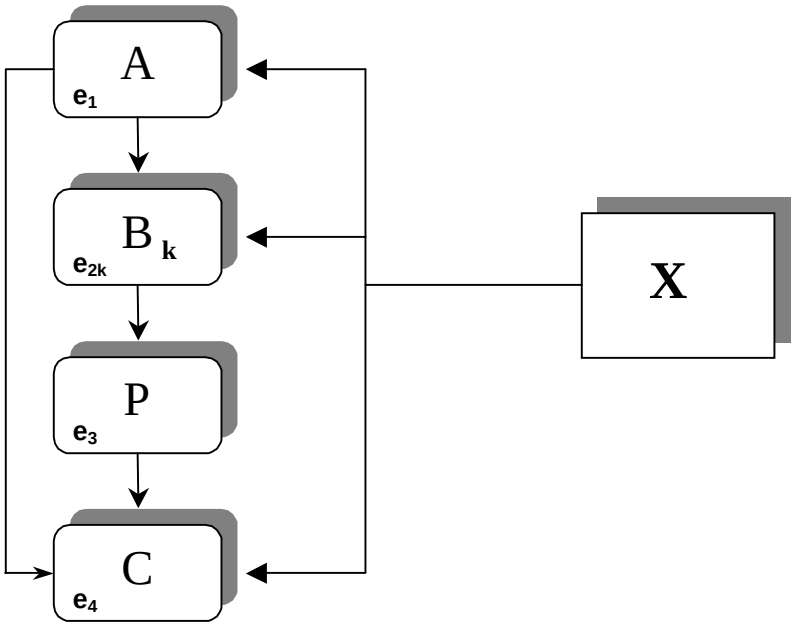

Figure 1. A conceptual model of advertising effects on at-home consumption of salmon.

A is the awareness of the TV campaign variable.
B_k is 12 belief measures of salmon.
P is revealed preference for salmon.
C is consumption of salmon at-home.
X is a vector of sociodemographic variables determining the dependent variable, and the ***e***'s are random error terms.

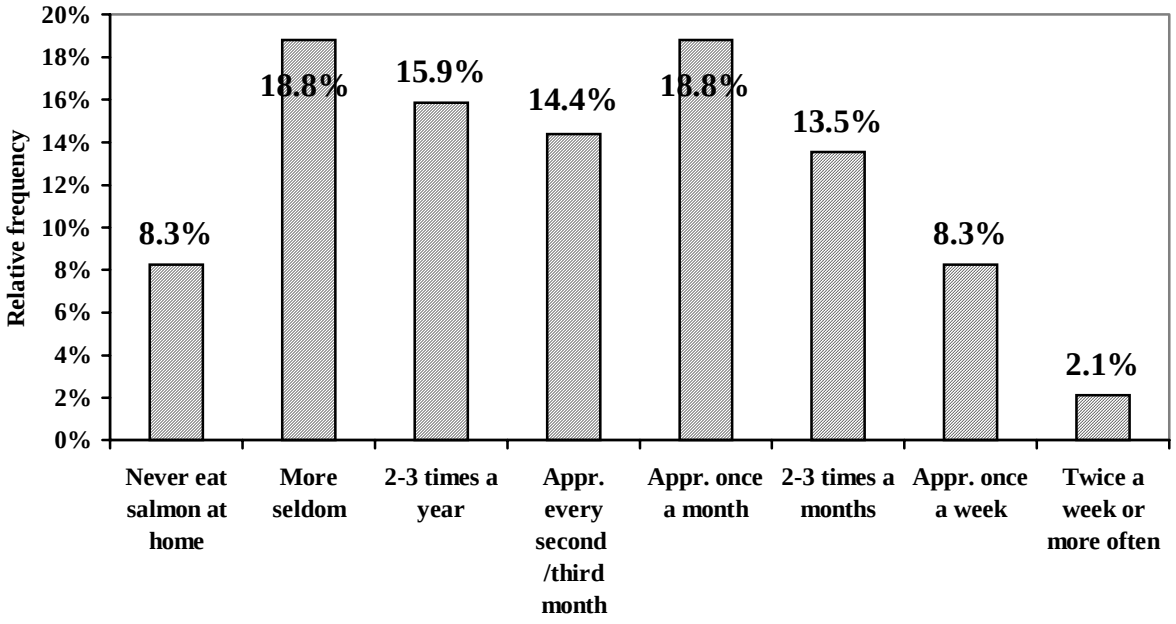

Figure 2. Example of at-home consumption of salmon, Germany April 1999 survey.

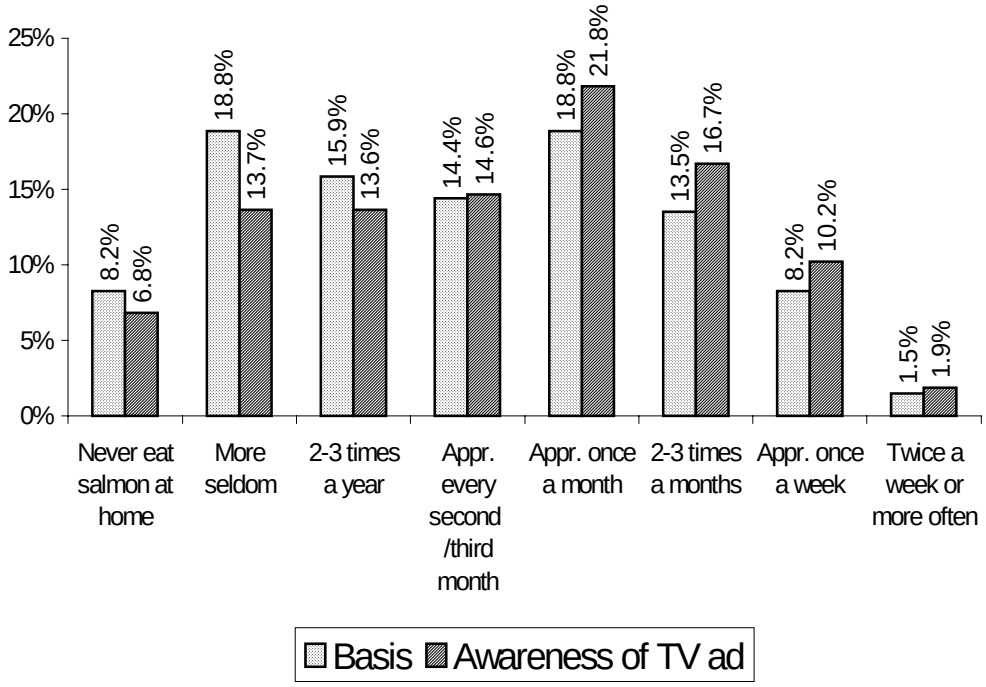

Figure 3. Example of cumulative advertising effects in Germany April 1999 survey.

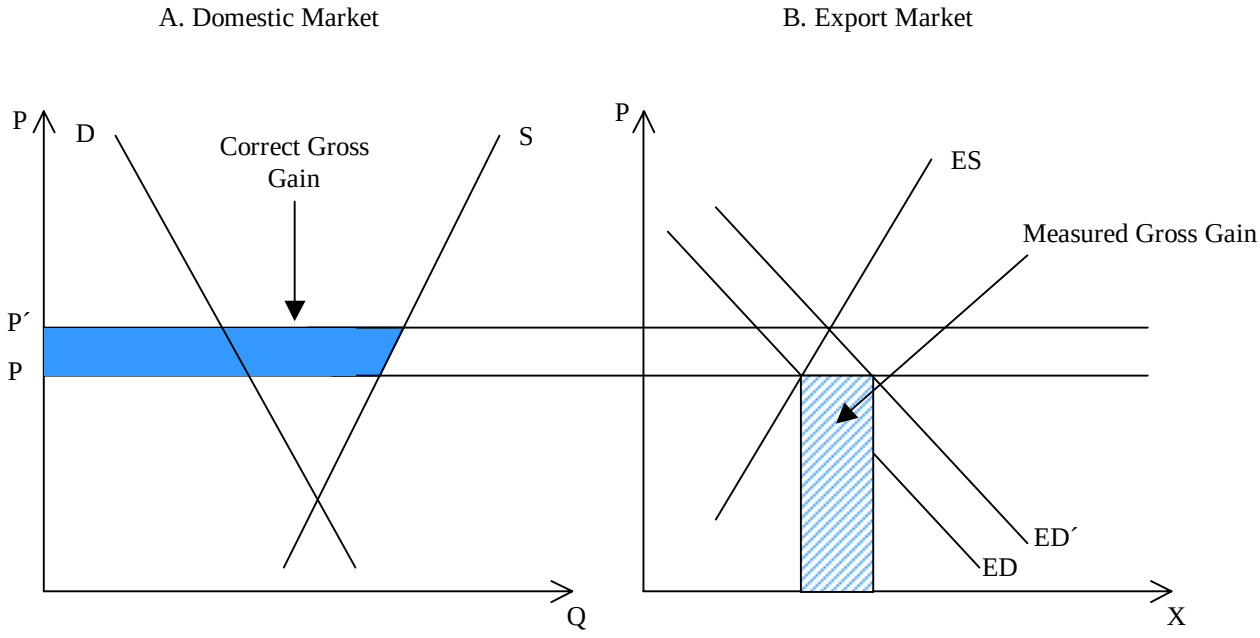

Figure 4. Returns to Export Promotion for a Large-Nation Exporter.

Table 2. Baseline Values and Parameters for the Norwegian Salmon Industry, 1999

Item	Definition	Value
θ_F	Promotion intensity in France	0.02157[a]
θ_G	Promotion intensity in Germany	0.05514[a]
k_D	Domestic quantity share	0.025[a]
k_X	Export quantity share	0.975[a]
β_F	Promotion elasticity for France	0.0508[b]
β_G	Promotion elasticity for Germany	0.0609[b]
$\eta_D{}^T$	Domestic demand elasticity	- 1.00[c]
$\eta_X{}^T$	Export demand elasticity [d]	-0.88, -1.35, or -1.78
ζ	Farm-wholesale price transmission elasticity	0.65[e]
ϵ	Domestic supply elasticity [f]	1.00 or 1.54

[a] Source: Norwegian Seafood Export Council
[b] Demand shifts estimated from Pan-European Survey Data. See text for further details.
[c] Guesstimate of "total" demand elasticity, i.e., elasticity that takes into account demand interrelationships.
[d] "Total" elasticities as computed by Kinnucan and Myrland (2000) using estimates in Bjørndal *et al.* (1996).
[e] Kinnucan and Myrland (1998).
[f] Steen *et al*. (1997).

Table 3. Marginal Returns to Pan-European Promotion in France and Germany

Export Demand Elasticity	Short-Run Return (ϵ = 1.00)		Long-Run Return (ϵ = 1.54)	
	France	Germany	France	Germany
-0.88	1.13	0.34	0.84	0.25
-1.35[a]	0.79	0.12	0.62	0.10
-1.78	0.56	-0.02	0.45	-0.01

[a] Best-guess value.

Note: Returns are estimated using the formula: $MRR_i = \beta_i/[\theta_i(\epsilon - \eta')] - \Omega$, where $\eta' = \zeta\ (k_D\ \eta_D{}^T + k_X\ \eta_X{}^T)$ and $\Omega = -\eta'/(\epsilon - \eta')$.