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# Consumer's food motives and seafood consumption

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ABSTRACT

The role of personal factors in driving seafood choice behavior was investigated. The individual psychological factors (i.e., food motives) and socio-demographic variables were measured on a national representative sample (n = 996) of French adults. The personal factors were used to predict consumption frequencies of three typical seafood products (i.e., fish, shrimp and mussels) by estimating ordered probit models. Convenience and weight control are the most important motives driving the seafood consumptions, suggesting that convenience oriented-people choose seafood as meals less regularly, while weight control oriented-people eat seafood more regularly. People who live alone are less likely to eat any type of the seafood; elderly and high income people are more likely to eat fish. Large size families avoid buying fish and shrimp probably due to the economic reason. The implications of the findings for marketers, nutritionists and health educators are discussed.



## 1. Introduction

Food choice is influenced by many interrelating factors, e.g. product properties, environmental situations, consumers' characteristics. Of these, personal factors play a central role and reflect salient needs and preferences derived from psychological and physiological traits of individuals (Furst, Connors, Bisogni, Sobal, & Falk, 1996; Shepherd, 1989). Personal factors shape the boundaries of food choices and incorporated cravings, preferences for particular foods or types of foods (Furst et al., 1996). This paper investigates the role of personal factors (i.e. psychological and socio-demographic variables) in seafood consumption behavior. An understanding of personal traits associated with the intake of important protein sources such as seafood, fish oil and multivitamin made from aquatic animals may be useful for marketers, nutritionists and health educators to improve their promotion communication, product perception and distribution.

Seafood is perceived as a healthy food and recommended for regular intake. Medical research has shown that high consumption of fish and fish oil (omega-3) may reduce depressive symptoms and the risk of several lifestyle diseases (Connor, 2000; Kris-Etherton, Harris, Appel, & Committee, 2002; Sidhu, 2003; Tanskanen et al., 2001). Consumers' beliefs and behaviors according to food's importance to health is associated with higher fish consumption (Olsen, 2003; Trondsen et al., 2004). However, health is not the only factor that people take into account when choosing seafood. Other product attributes such as taste, texture, convenience, price, and natural content are also found to be important aspects determining the seafood choice (Olsen, 2003; Thong & Olsen, 2012; Trondsen, Scholderer, Lund, & Eggen, 2003). In addition, the individual factors related to lifestyles and situations also play an important role in determining the seafood consumption (Myrland, Trondsen, Johnston, & Lund, 2000; Olsen, 2003; Trondsen, Braaten, Lund, & Eggen, 2004). For instance, high income and elderly consumers were found to be more likely to choose fish and other seafood products frequently, compared to young and low income groups (Myrland et al., 2000; Olsen, 2003; Trondsen et al., 2003; Trondsen et al., 2004).

The role of motivational factors in food choice behaviors has been studied intensively over the last two decades. Steptoe, Pollard, and Wardle (1995) measured various dimensions of individuals' motives of food choice by developing the Food Choice Questionnaire (FCQ), which have been updated and confirmed invariant across countries and cultures (e.g., Fotopoulos, Krystallis, Vassallo, & Pagiaslis, 2009; Honkanen & Frewer, 2009; Januszewska, Pieniak, & Verbeke, 2011; Lindeman & Väänänen, 2000; Milošević, Žeželj, Gorton, & Barjolle, 2012; Pieniak, Verbeke, Scholderer, Brunsø, & Olsen, 2008). The FCQ have also been applied widely in food consumption research. For instance, Honkanen and Frewer (2009) and Milošević et al. (2012) used the FCQ to identify consumer segments in Russia and six Western Balkan countries, respectively; Pieniak et al. (2008) investigated the association between food motives and traditional food consumptions in six European countries. Other studies used part of

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the FCQ for their particular purposes to study causal effects between food motives and consumption, including Honkanen, Verplanken, and Olsen (2006), Glanz, Basil, Maibach, Goldberg, and Snyder (1998), Konttinen, Sarlio-Lähteenkorva, Silventoinen, Männistö, and Haukkala (2013), Lee and Yun (2015). To the best of our knowledge, no existing study has investigated direct effects of motivational factors on food consumption. Previous studies usually applied deterministic models (e.g. structural equation modeling, correlation techniques) or classification techniques (e.g., cluster analysis) to investigate the relationships. We found only one study by Pollard, Steptoe, and Wardle (1998) using multiple regression analysis to associate food choice motives and variation in dietary intake. However, the authors used ordinary least square (OLS) techniques that cannot fully exploit the information of ordinal category data measuring consumption frequencies and may lead to biased results (Daykin & Moffatt, 2002).

This study differs from previous ones in that it applies a probabilistic model to investigate direct relationships between personal factors and the consumption of three seafood products, i.e. fish, shrimp and mussels. The three products are different from each other, with regard to the biological nature, sensory appeal, and the way of preparation and price, which may help consumers fulfilling their various motives. The ordered probit model is recognized for its capability to exploit information from ordinal categorical data and for its flexibility to capture different effects (i.e. main and interaction effects) of explanatory variables. An online survey (n = 996) including a questionnaire measuring consumers' motives, seafood consumption frequencies and social-demographic information were conducted in France in August 2011. Consumers' motives measured on 27 items are tested for validity by confirmatory factor analysis, and then used to extract nine latent motivational factors. Ordered probit models are estimated to examine the main effects and interaction effects of personal factors on the consumption.

The rest of the paper is organized as follows. We briefly present the ordered probit model, our measurements and data in section two, and present the estimation results in section three. Discussion and conclusion are presented in the last section.

## 2. Data and method

### 2.1. Ordered probit model

Given that consumption frequency as a dependent variable takes on more than two values, and these values have a natural ordering (e.g. two times or three times a week), the ordered probit (or logit) model would be an appropriate approach. It would be inappropriate to use the multinomial logit model (MNL) or ordinary least squares (OLS) because MNL does not account for the ordered nature of the dependent variable and OLS requires equal differences between categories of the dependent variable. The results would be substantially different if ordered dependent variables are analyzed using MNL or OLS instead of using the ordered logit or probit model (Becker & Kennedy, 1992; Train, 2009). Therefore, we use the ordered probit model developed by McKelvey and Zavoina (1975).

For consumer $i$ ($i = 1,\ldots N$), let $y_i^*$ be the unobserved continuous dependent variable such that $y_i^* = \beta x_i + \varepsilon_i$, where $x_i$ is a matrix of known values of the independent explanatory variables (e.g., consumer motives and characteristics) for consumer $i$, $\beta$ is a vector of unknown slope parameters to be estimated, and $\varepsilon_i$ is an unobserved random variable that has a standard normal distribution, i.e. $\varepsilon_i \sim N(0,1)$. In addition, suppose that we observe rank ordered values of the dependent variable, say $y_i$, which has J categories, instead of observing $y_i^*$. The relationship between $y_i^*$ and observed variable $y_i$ in the ordered probit model takes the following general form:

$$y_i^* = \beta x_i + \varepsilon_i \tag{1}$$

where $y = 1$ *if* $y^* \leqslant k_1$, $y = 2$ *if* $k_1 < y^* \leqslant k_2$, $y = J$ *if* $k_{J-1} < y^*$.

The general form now can be modified to give the probability that consumer $i$ has a consumption frequency falling within the range of values $j$ ($j$ = 1,2..$J$) as

$$\begin{aligned}
&Prob(y_i = 1|x_i,\beta) = Prob(\beta x_i + \varepsilon_i < k_1) = \Phi(k_1 - \beta x_i)\\
&Prob(y_i = 2|x_i,\beta) = Prob(k_1 < \beta x_i + \varepsilon_i < k_2) = \Phi(k_2 - \beta x_i) - \Phi(k_1 - \beta x_i)\\
&\ldots\ldots\\
&Prob(y_i = J|x_i,\beta) = Prob(k_{j-1} < \beta x_i + \varepsilon_i) = \Phi(k_j - \beta x_i) - \Phi(k_{j-1} - \beta x_i)
\end{aligned} \tag{2}$$

The parameters $k_j$, $j$ = 1,2,..J−1, are unknown threshold (cut-point) parameters, providing information about the distribution of the ordered dependent variable, such as whether the categories are equally spaced in the probit scale. Since our model is ordered probit,Φ is the standard normal cumulative distribution function.

The ordered probit model (2) is estimated by maximum likelihood estimation (MLE). The parameters $\beta$ are interpreted as the impact of the explanatory variables on the consumption frequency, and the cut-points $k_j$ are estimated simultaneously by an iterative procedure of the MLE method, with the log likelihood function as:

$$Log\ L = \sum_i y_i\ \ln[\Phi(k_j - \beta X_i) - \Phi(k_{j-1} - \beta X_i)] \tag{3}$$

The ordered probit model is a popular model in the literature of discrete choice models, readers may refer to Train (2009), Becker and Kennedy (1992), Daykin and Moffatt (2002), and (McKelvey and Zavoina (1975) for further discussion.

### 2.2. Data

The questionnaire of consumers' motives and seafood consumption is part of a large survey conducted in France in August 2011. France is a leading country in seafood consumption with 36 kg per capita per year (Food Export, 2016). The questionnaire was constructed in English language and then translated into French by a professional translator. The questionnaire was pre-tested with a small sample of individuals (40) that aimed to assess the overall understanding of the survey format by the consumers. The pre-tested surveys were conducted by means of a web-based survey administered by a commercial research agency based in Paris (Ipsos-International Market Research Company). The company distributed the questionnaire to members of its consumer panel. Respondents who completed the survey were rewarded with an actual monetary deposit into their account at the research company, with the idea that such an incentive would increase the response rate and quality.

The measures used in this study are based on existing validated scales. The *Food choice questionnaire* developed by Steptoe et al. (1995), and modified and applied in many previous studies (e.g., Fotopoulos et al., 2009; Honkanen & Frewer, 2009; Januszewska et al., 2011; Lindeman & Väänänen, 2000; Milošević et al., 2012) was applied. Food choice motives were measured by 27 items, aiming to extract 9 motivational factors: *health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity and ethical concern*. The respondents were asked to evaluate the statement "It is important to me that the food I eat on a normal day…" for each item, and to evaluate the importance on a scale from 1 (*extremely unimportant*) to 7 (*extremely important*).

Consumption frequencies for three typical seafood products (i.e., fish, shrimp and mussels) are measured with the question "How often do you eat any of the following types of food?" The