An analysis of the household demand for fish and seafood in Great Britain

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Abstract

Although seafood is high in nutrients that provide a range of health benefits, most people in Great Britain only eat around half the amount of seafood recommended by health professionals. Therefore, this study aims to analyse consumers' demand for fish and seafood in Great Britain. This is done using the Rotterdam demand model and data from a home-scanner dataset for Great Britain, which covers food and drink purchases for consumption at home for the period 2013-2021. Price and income elasticities were estimated for eleven fish and seafood groups across seven household groups: pre-family, young family, middle family, older family, older dependents, empty nests, and retired family. Our analysis reveals that families with children consistently allocate a lower share of their grocery spending to fish and seafood consumption compared to households without children, and they prefer ready-to-use and convenient fish products. Most household groups show a higher responsiveness to changes in prices for chilled fresh/smoked fish products compared to frozen fish items. However, across all household groups, the demand for most fish products is price-inelastic. To investigate the evolution of consumption, we decomposed the growth in consumption of fish and seafood into income, relative price, and change in taste and seasonality. Income and taste were identified as pivotal determinants of consumption changes across all groups, while price played a prominent role in certain fish groups.

Keywords: Fish and seafood, Household groups, Rotterdam model, Demand elasticities, Decomposition Analysis

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1. Introduction

Eating fish and seafood is important because strong scientific evidence confirms the beneficial effects of fish consumption on human health. Fish nutrients including omega-3 fatty acids play an important role in cognitive development and immune regulation, whereas fish consumption has been associated with a decreased risk of cardiovascular disease and dementia (FAO/WHO, 2010, Béné et al., 2015; Golden et al., 2016, Lofsted et al. 2021). Fish is also a valuable contributor to the reference nutrient intakes for a range of micronutrients, including vitamins A and D, iron, selenium, zinc, and calcium, and therefore, fish consumption may contribute to alleviating highly prevalent micronutrient deficiencies (De Roos et al. 2020, Bogard et al. 2017). It is also important to note that the increased fish and seafood consumption has environmental impacts. Whilst overfishing has had significant impacts on marine ecosystems (Jackson et al., 2001; Myers and Worm, 2003, Lucas, Soler and Revoredo-Giha 2021, Rathnayaka et al. 2021), greenhouse gas emissions linked to fish consumption are significantly lower than those linked to consumption of red meat and pork (Cochrane et al. 2009; MacLeod et al. 2020).

The United Kingdom (UK) is a significant producer of fish and seafood. However, because consumption patterns do not align with production, the country is also a net importer. In 2019, the per-person weekly seafood consumption in the UK, both at home and outside, was 152.8g, marking a 3.9 percent decrease compared to two years prior (USDA Report 2021). This translates to just over one portion (1.09), or 140g, per person per week. Notably, this falls below the recommended intake by health professionals, who advise consuming at least two portions of seafood per week, with one being oily. This recommendation, developed by the Scientific Advisory Committee on Nutrition (SACN), which advises the Food Standards Agency (FSA) and Public Health England, is based on this level of fish consumption is associated with a significant reduction in risk for cardiovascular mortality (Zheng J et al. 2012; Xun P et al. 2012). The decline in UK seafood consumption is primarily attributed to a 25 per cent reduction in retail purchases over the past decade, resulting in approximately $7.7 billion lost in retail seafood sales (USDA Report 2021). Therefore, a detailed analysis of fish consumption patterns using more recent data in the UK is imperative. This paper attempts to analyse the consumer demand for fish and seafood in Great Britain (GB) using recent time-series data and employing the Rotterdam demand model.

Only a very few empirical studies can be found in the literature that estimate the demand for fish and seafood in the UK. Burton (1992) analysed the demand for wet fish in the UK, using both the direct and indirect Translog models, and suggested that quantities determine prices rather than the other way round. Burton and Young (1992) examined the interactions between aggregate fish demand and demand for four meat species. In this study, the observed variation in meat and fish consumption in Britain since 1960 was decomposed into changes due to economic factors (relative prices and expenditure) and those that may be attributable to shifts in consumer preferences. Their findings revealed that although in recent years tastes have changed in favour of chicken and fish and against red meats, this was not the case for the whole period considered.

Jaffry, Pascoe, and Robinson (1999) estimated the long-run own and cross-price flexibilities for a number of highly valued species on the UK market. Four species (bass, lobster, sole and turbot) were examined and long-run own and cross-price flexibilities were estimated using Johansen's (1988) multi-variate approach based on a vector error correction model (VECM). They found that bass has the largest absolute long-run own price flexibility. Moreover, Bass and lobster were found to be weak substitutes while sole and turbot were found to be substituted. Fouskeis and Revell (2004) examined the retail demand for fish using retail panel data for 14 fish species and fish products in Great Britain. They estimated a two-stage demand model using a dynamic Almost Ideal Demand System (AIDS) and calculated both conditional and unconditional expenditure, own- and cross-price elasticities of demand. According to their findings, Haddock, salmon, flatfish, shellfish, and smoked fish are expenditure elastic, and most species are own-price inelastic.

In a departure from the previous studies, our study compares the fish consumption patterns of different household groups which are classified based on the composition of the family. This is crucial as household structure plays a significant role in shaping dietary choices. Studies in high-income countries have consistently demonstrated the impact of household composition on food consumption, reflecting the diverse needs and preferences of different family types (Groth et al. 2001, Rodrigues et al. 2020). In addition, the availability of resources and the proportion of food expenditure may vary according to household composition, modulating the availability of food at home (Friel et al. 2006, Borges et al. 2015). The dynamics of family composition, such as the presence or absence of children and the life stage of family members, determine the selection of food, owing to the particularities in nutritional needs and food preferences (Elstgeest et al. 2012). Therefore, our study delves into these distinctions,

providing valuable insights into how the composition of households may shape fish consumption behaviours, contributing to a broader understanding of dietary patterns and potential implications for health and nutrition.

We estimate and compare the price and expenditure elasticities for eleven fish and seafood groups over seven household groups: pre-family, young family, middle family, older family, older dependents, empty nests, and retired using the Rotterdam demand model. Analysing the responses of fish demand to changes in prices and income holds paramount importance when assessing the effects of technological advancements, infrastructure development, or economic policies on the future landscape of production, consumption, and trade across diverse fisheries products. Beyond this, it becomes imperative to understand the demand relationships existing between various fish product categories, shedding light on which categories possess the most promising potential for capturing expanded market shares. For major stakeholders in the seafood industry, accurate estimates of market parameters pertaining to different product categories are indispensable. These estimates serve as foundational pillars for strategic planning, marketing initiatives, promotional campaigns, forecasting, and pricing strategies, providing essential guidance for navigating the complexities of the seafood market.

Unlike most of fish and seafood demand studies in the literature, the current study also attempts to decompose the changes in consumer demand for fish and seafood into income, relative price, and change in taste and seasonality. This process involves identifying the proportion of observed changes in quantities demanded attributed to shifts in prices, expenditures, tastes, and seasonality. Changes in demand frequently arise from simultaneous shifts in commodity prices, total expenditure, tastes, and seasonal influences. Consequently, the variations in quantities consumed over time encompass the impact of all these factors. Through our decomposition analysis, one can pinpoint the specific drivers of demand changes of different fish groups in GB. Moreover, the findings of the decomposition analysis, which show the effect of simultaneous changes in many exogeneous variables, can be applied to policy considerations.

The remainder of this paper is organized as follows. A description of the market data used and the demand model estimated are presented in Section 2. The results of the preliminary data analysis and demand analysis are then presented in the next section. The results of the decomposition analysis are reported in Section 4. In the last section of the paper, we provide our concluding comments and discuss market and policy implications concerning the findings.

2. Methodology

The purpose of this section is to present the empirical work carried out. It starts with a description of the data used in the demand analysis, followed by a discussion of the Rotterdam demand model and a brief description of the estimation technique.

2.1 Data

The data used for this study were drawn from the Kantar Worldpanel dataset for the UK that contains weekly acquisition data of food and drink purchases for consumption at home for 12,492 UK households covering the period January 2013 to December 2021. The recruited households are representative of the UK population, however, not all of them are observed every year as the dataset is a rotating panel (Hsiao, 2011) and households remain in the sample for a maximum of three years. Participating households are asked by the data company to record all purchases using barcode scanners and to send digital images of cash register receipts to the company. The till receipts are used to provide information on prices and places of purchase. For each product, the dataset contains rich information on a number of attributes such as brand, manufacturer, the origin of the product and whether the product is a private label, organic, gluten-free, fair trade, or animal-friendly product. The dataset also contains information on purchases, including the price paid, the quantity purchased by the household, the retail chain from which the product was purchased, and the type of promotion used. In addition, the dataset also includes household neighbourhood information (e.g., rural/urban, local authority) and socio-demographic characteristics for all the households (e.g. age, social class, level of deprivation, household size).

For our analysis, using data for Scotland, Wales, North, Midlands, East, South, and London, time series for Great Britain (GB) were constructed considering that approximately every year had 13 periods of 4 weeks each (i.e., approximately monthly). This implied a total of 117 observations. In our study, as illustrated in Figure 1, we employed a systematic method to categorize fish products, ensuring a comprehensive yet manageable classification. Initially, all available fish products in the dataset were grouped into five overarching categories: canned fish, chilled or fresh smoked fish, chilled prepared fish, frozen fresh or smoked, and frozen processed. This initial classification provided a broad overview of the types of fish products under consideration. In the subsequent stage, each category was further subdivided into four distinct groups: oily products, lean products, shellfish products, and other resulting in a total of 20 fish subgroups. To streamline our analysis and accommodate instances of zero consumption

levels, we performed necessary aggregations, ultimately arriving at eleven distinct fish and seafood groups for detailed examination as shown in Figure 1. This methodological approach ensured a comprehensive and detailed exploration of fish consumption patterns across various categories and subcategories. Moreover, based on a classification by Kantar, seven socioeconomic groups were considered, namely: pre-family, young family, middle family, older family, older dependents, empty nest, and retired. The basis of this classification was the age of the household wife and the number of adults and children in the family[1].

Figure 1 here

2.2 Model specification

Several demand systems have been used in applied demand analysis such as the Rotterdam model (Barten 1964; Theil 1965), the Translog demand system (Christensen et al. 1975), the Almost Ideal Demand System (AIDS) (Deaton and Muellbauer 1980), the Miniflex Laurent Demand System (Barnett 1983), CBS (Central Bureau of Statistics) demand system (Keller and van Driel 1985) Quadratic Almost Ideal Demand System (QUAIDS) Banks et al. (1997) and the Exact Affine Stone Index (EASI) (Lewbel and Pendakur 2009). In this study, we have opted for the Rotterdam demand model, because it aligns with demand theory (Theil 1980), exhibits excellent aggregate properties (Barnett 1983, Selvanathan 1991), can be interpreted as approximations to the true, unknown ones (Mountain 1988), and is characterized by simplicity, making it easy to estimate and interpret parameter values. This model has been consistently utilized since its development and also permits the incorporation of external factors influencing demand, either with or without imposing theoretical constraints (Brown and Lee, 1993, Clements and Gao 2015, Patalee and Tonsor 2019).

Considering the basic specification of the Rotterdam demand model, i^{th} equation of our estimated model is given by

$$\bar{w}_{it} dlnq_i = \alpha_i + \theta_i dlnQ + \sum_{j=1}^{n} \pi_{ij} dlnp_j + \sum_{j}^{12} \beta_{ij} D_j + \varepsilon_i \qquad i, j = 1,2, \dots, n \quad (1)$$

[1] 1.Pre-family (< 45, no children) 2. Young family (Any, children aged 0-4 years) 3. Middle Family (Any, children aged 5-9 years) 4. Older Family (Any, children aged 10+) 5. Older Dependents (45+, no children, 3+ adults) 6. Empty Nest (45-65, no children, 1-2 adults) 7. Retired (65+, no children, 1-2 adults)

In equation (1) $\bar{w}_{it,}$ is the is the arithmetic average of the budget shares in period *t* and *t*-1, p_i, and q_i, are the price and the quantity respectively, $dlnp_i$ and $dlnq_i$ are the time rates of change of p, and q, and $dlnQ_i = \sum_{i=1}^{n} \bar{w}_{it} dlnq_i$, is the Divisia volume index of the aggregate quantity demanded. D_j is a monthly dummy variable included for seasonality. α_i is the constant term of the i[th] demand equation satisfying the adding up restriction $\sum_{i=1}^{n} \alpha_i = 0$. The use of the constant term in the demand equations is to take into account any trend-like changes in tastes, etc. The parameter θ_i is the marginal share which satisfies $\sum_i \theta_i = 1$. This marginal share, θ_i answers the question, "if income increases by one dollar, how much of this increase will be allocated to commodity i?" The π_{ij} are the price coefficients in (1), which satisfies the adding-up restrictions $\sum_{i=1}^{n} \pi_{ij} = 0$.

These price coefficients also satisfy the following constraints:

$$\sum_{j=1}^{n} \pi_{ij} = 0 \qquad i = 1,2, \dots, n \tag{2}$$

The above equation (2) reflects the homogeneity property of the demand system, which postulates that an equi-proportionate change in all prices has no effect on the demand for any good under the condition that real income is held constant.

The price coefficients are symmetric that is

$$\pi_{ij} = \pi_{ji} \qquad i, j = 1,2, \dots, n \tag{3}$$

This means that an increase in the price of any good *j* will cause an increase in the compensated quantity demanded of *i* equal to the increase in the compensated quantity demanded of *j* caused by an increase in the price of *i*. Also, the Slutsky matrix $[\pi_{ij}]$ is symmetric and negative semi-definite with rank (*n*-1).

The term ε_{it} is the disturbance term of the *i*[th] equation. It is assumed that the disturbance terms, ε_{it}, i=1,…,n, are serially independent and normally distributed with zero means and with a contemporaneous covariance matrix. The income (total expenditure) elasticity implied by demand system in Equation (1) is given by:

$$\eta_{it} = \frac{\theta_i}{\bar{w}_{it}} \tag{4}$$

The compensated price elasticities associated with Equation (1) are given by:

$$\eta_{ijt} = \frac{\pi_{ij}}{\bar{w}_{it}} \tag{5}$$

The uncompensated price elasticities are given by:

$$\eta_{ijt} = \frac{\pi_{ij}}{\bar{w}_{it}} \bar{w}_{jt} \frac{\theta_{it}}{\bar{w}_{it}} \quad (6)$$

Before estimating demand equations, we examined the stationarity of all variables in the demand systems to prevent spurious results. Based on the outcomes of the Augmented Dickey Fuller unit root test (Dickey and Fuller 1979) detailed in Appendix 1, all variables slated for use in the demand systems are stationary.

Subsequently, we conducted estimations for the demand system and assessed the homogeneity and symmetry of the demand theory hypotheses to ascertain their compatibility with the data. We used the sample size-corrected statistic, as developed by Court (1968) and Deaton (1974), for testing homogeneity and Slutsky symmetry. The calculation of the test statistic follows the approach outlined in Court (1968) and Deaton (1974);

$$F = \frac{tr\left(\Omega^R\right)^{-1}\left(\Omega^R - \Omega^U\right)/q}{tr\left(\Omega^R\right)^{-1}\Omega^U/\left(n-1\right)\left(T-k\right)}$$

where $\boldsymbol{\Omega}^R$ and $\boldsymbol{\Omega}^U$ denote the estimated residual covariance matrices with and without restrictions imposed, respectively, T is the number of observations, n is the number of equations in the system, k is the number of estimated parameters in each equation, and q is the number of restrictions. The test statistic F follows an approximate distribution as $F[q, (n-1)(T–k)]$. This statistical measure has been widely applied in empirical studies, as evidenced by various works in the literature (see Baldwin et al. 1983, Chambers 1990, Li et al. 2004, Wu et al. 2011, Rathnayaka et al. 2019b, 2022). The results of the tests are presented in Table 1. Upon comparing the observed test statistic values with the corresponding critical values, we can infer that all the household groups, homogeneity and Slutsky symmetry at the 5% significance level are consistent with the data. Therefore, the homogeneity and symmetry restricted version of the Rotterdam demand Equation (1) was estimated in Stata 16 using the Seemingly Unrelated Regression (SUR).

Table 1 here

3. Results

3.1 Fish consumption patterns

The weekly fish purchasing behaviour in Table 2 indicates distinct patterns among British consumers, notably with higher mean values observed in the empty nest and retired groups, suggesting a propensity for purchasing larger quantities of fish. Conversely, younger family categories, such as young family and middle family, show lower mean values, indicative of more modest fish consumption. With greater financial stability resulting from the absence of the financial responsibilities associated with raising children, empty nest and retired groups may allocate more resources to discretionary spending, including premium or larger quantities of food items like fish. Additionally, the newfound culinary freedom, coupled with a focus on health and wellness, encourages these households to explore a variety of fish products. The absence of dietary restrictions from picky eaters allows for diverse grocery choices, while the availability of time fosters intentional meal planning and preparation. Furthermore, the inclination of empty nests and retired groups to engage in social activities and entertaining at home contributes to the preference for larger quantities of fish, given its versatility in catering to various culinary preferences. Overall, the purchasing behaviour of empty nest and retired households reflects a blend of financial flexibility, culinary exploration, health-conscious choices, and a lifestyle conducive to socializing and entertaining. Standard deviation values reveal moderate variability within each category.

Furthermore, while "Canned oily fish" appears to be popular across various household groups, the retired group shows a distinct preference for frozen processed oily lean shellfish and other. The popularity of canned oily fish across various household groups can be attributed to its convenience, versatility, and perceived health benefits. Canned oily fish, such as tuna or mackerel, requires minimal preparation, making it a practical and time-saving choice for busy families or individuals. Its versatility allows for easy incorporation into various dishes, catering to diverse culinary preferences. Furthermore, the omega-3 fatty acids present in oily fish contribute to its reputation as a nutritious option, appealing to health-conscious consumers. On the other hand, the distinct preference for frozen processed oily lean shellfish and other among the retired group may be influenced by factors such as a desire for culinary exploration during retirement, a focus on gourmet and flavourful options, and the availability of time for leisurely meal preparation. Health considerations, including the nutritional content of shellfish, may also play a role in the retired demographic's preference for this specific category.

Table 2 here

Figure 2 shows the share of the whole fish group in each household group's total grocery expenditure. Retired individuals allocate the highest percentage, emphasizing a potential health-conscious approach to their dietary choices, as fish is often recognized for its nutritional benefits. When comparing the expenditure share of fish in families with children (young family, middle family, and older family) to those without children (pre-family, older dependents, empty nest, and retired), a noticeable trend emerges. The families with children consistently allocate a relatively lower percentage of their total grocery expenditure to the whole fish group, ranging from 2.12% to 2.16%. In contrast, households without children tend to allocate a slightly higher percentage, ranging from 2.40% to 3.23%. This suggests that families without children may prioritize fish products more significantly in their grocery budgets, possibly due to different dietary preferences, health-conscious choices, or a higher emphasis on the nutritional benefits of fish. The contrast in expenditure shares between these two groups indicates distinct patterns in fish purchasing behaviour influenced by family composition and lifestyle considerations.

Figure 2 here

The expenditure shares of each fish product at the sample mean presented in Table 3 reveal distinctive patterns across household groups. Expenditure shares reveal a consistent pattern across various household groups, indicating a shared inclination towards specific fish products. Chilled fresh/smoked oily, canned oily fish, and frozen processed oily, lean, shellfish and other consistently command the highest expenditure shares in all demographics. This suggests a widespread preference for convenient and ready-to-use options, reflecting the importance of time-saving and versatile choices in fish consumption.

Table 3 here

3.2 Demand elasticities

Table 4 shows the uncompensated own-price elasticities and cross-price elasticities of each fish product for seven household groups. The own-price elasticities across various household groups reveal nuanced patterns in the responsiveness of consumers to changes in prices for

different fish products. Except for uncompensated own-price elasticity for chilled fresh or smoked other in the retired family group which were positive (statistically significant at 10%), all own-price elasticities for five fish categories in seven household groups were negative. Most of the own-price elasticities are statistically significant at the 5% level.

Among the own-price elasticities across the seven household groups, the demand for the chilled fresh/smoked oily is the most price-responsive; whereas the frozen fresh/smoked oily, lean and other has the lowest price elasticity of demand. Overall, all the household groups exhibit greater sensitivity to own-price changes in chilled fresh/smoked fish products compared to frozen fish items. This heightened responsiveness may stem from the perceived perishability and shorter shelf life of fresh products, prompting consumers to be more price-conscious to avoid waste. In contrast, the longer shelf life and convenience of storage associated with frozen fish products may contribute to a lower sensitivity to price fluctuations. The immediacy of consumption and freshness concerns are likely to contribute to the observed differences in price sensitivity between these two categories.

Moreover, apart from own price elasticity for chilled fresh/smoked oily in young families and retired group, all the other own-price elasticities are less than one in absolute values, indicating the demand for most of the fish products is inelastic with response to price changes. The estimated cross-price elasticities that are statistically significant account for 36%, 28%, 29%, 46%, 40%, 32% and 45% of the total number of cross-price elasticities for the pre-family, young family, middle family, older family, older dependents, empty nests and retired family groups, respectively. The magnitude of cross-price elasticities varies considerably across household groups, but not necessarily in any systematic pattern. Examining substitutes for canned oily fish, a popular choice among various household groups, reveals diverse consumer preferences and potential shifts in purchasing behaviour. In the pre-family group, where chilled fresh/smoked lean and chilled prepared oily, shellfish and other group emerge as substitutes, there appears to be a preference for alternatives with distinct textures and flavors, possibly influenced by health considerations or culinary preferences. In the middle family group, substitutes like chilled fresh/smoked shellfish and chilled prepared lean suggest a desire for versatility and convenience, indicating a tendency to explore varied options for meal preparation. For the older family group, substitutes such as canned fish, shellfish and other and chilled fresh/smoked oily point towards a potential inclination towards diverse seafood choices, reflecting a curiosity for culinary exploration. In the older dependents group, a broad range of substitutes like chilled fresh/smoked lean and frozen fresh/smoked oily, lean and other indicates a flexible approach to fish consumption, accommodating various tastes and

preferences within the demographic. Empty nests show substitutes like chilled prepared lean and frozen fresh/smoked oily, lean and other for canned oily fish, signalling a preference for convenient and versatile options. In the retired group, substitutes like chilled fresh/smoked oily and frozen fresh/smoked oily, lean and other suggest a continued interest in flavourful and gourmet choices, aligning with the group's potentially heightened focus on culinary experiences during retirement.

We found the complementarity relationships (cross-price elasticities that are negative and significant) between some of the fish categories. For example, in the pre-family group, canned shellfish and other, chilled fresh/smoked other fish, frozen fresh/smoked shellfish, frozen fresh/smoked oily, lean and other fish are complementary products to frozen processed oily, lean, shellfish and other.

Table 4 here

Expenditure elasticities in Table 6 indicate the percentage change in quantity demanded of fish groups in response to a 1% change in total household grocery expenditures. The findings show that all expenditure elasticities for all household groups are positive and significant (with the exception of canned shellfish and other and chilled prepared oily, shellfish and other in young families which are non-significant but positive), implying their appeal and affordability in higher-income brackets. The varied expenditure elasticities for different product categories within family groups emphasize the nuanced nature of consumer choices. Notably, all household groups, for chilled prepared oily shellfish and other products display relatively inelastic responses to income changes, indicating a consistent demand regardless of income fluctuations.

Table 5 here

4. Decomposing the growth in fish and seafood consumption

Although elasticity estimates are useful for measuring how consumer demand shifts in response to income and price changes, it is also important to understand the level of contribution of income and prices to consumption changes. Several studies in the literature emphasize the significance of considering the distributional effects of various policies alongside changes in demand (e.g., Nelson, 1997, Heien and Wessells 1988, Karagiannis and Velentzas 1997, 2004, Dong 2006, Irz and Kuosmanena 2013, Selvanathan et al. 2016, Rathnayaka et al. 2019a,

2021). Therefore, in this section, we use the estimation results presented in Section 3.2 to decompose the growth in fish and seafood consumption in terms of autonomous trend, effects of income, own-price, and cross-price and seasonal effects.

Dividing both sides of the demand system in equation (1) by the budget share $\overline{w}_{it}$ gives:

$$dlnq_i = \alpha_{it}^* + \eta_i dlnQ_t + \eta_{ii} dlnp_{it} + \sum_{j=1}^{n} \eta_{ij} dlnp_{jt} + \sum_{j}^{12} \beta_{ij}^* D_j + \varepsilon_{it}^*$$
$$i = 1, \dots, n; t = 1, \dots, T \qquad (11)$$

where $\alpha_{it}^* = \alpha_i / \overline{w}_{it}$ is the autonomous trend in consumption of item *i*, which measures the proportionate change in consumption of food item *i* in year t in the absence of changes in prices and income. The constant terms in differential demand systems represent trends and the coefficients of seasonal dummies represent seasonal deviations from these trends (Fousekis and Revell 2000). Therefore, α_{it}^* is generally interpreted as a trend effect, due to the effect of changes in tastes and preferences. The coefficients η_i and η_{ij} are expenditure and price elasticities. Therefore, growth in consumption of item i $(dlnq_i)$ in each year can be decomposed into the following six components: (1) Autonomous trend component (α_{it}^*), (2) Income component $(\eta_i dlnQ_t)$, (3) Own-price component $(\eta_{ii} dlnp_{it})$, (4) Cross-price component $\left(\sum_{j=1}^{n} \eta_{ij} dlnp_{jt}\right)$, (5) Seasonal component $(\sum_{j}^{12} \beta_{ij}^* D_j)$ and (6) Residual component(ε_{it}^*).

Table 6 presents the components in the above equation at sample means for each fish group for each of the seven household groups using the elasticity estimates corresponding to Equation (1). Looking at the row for the empty nest group of the section for canned oily fish in the table, it can be seen that, on average, the total growth in consumption of canned oily fish in the empty nest group is 1.31% per annum. This growth comprises: autonomous trend (−3.88%), income component (4.60%), own-price component (−0.39%), cross-price component (0.76%), seasonal component (0.22%) and residual component (0.001%). The two terms involving the income and cross-prices cancel the negative effect of autonomous trend and own prices, leaving income as the dominant component in the growth in canned oily fish consumption in empty nest family group. The results for the remaining family groups and other fish groups can also be interpreted in a similar way. For all fish and seafood groups, demand changed from 2013 to 2021, but at very different speeds. For instance, the consumption of chilled prepared oily, shellfish and other fish group increased about 4.21% annually, while the consumption of chilled fresh/smoked other fish group has declined by 1.48% annually.

Table 6 here

As shown in Section 3.1, the consumption of canned oily fish was notably high across various household groups. However, as seen in Table 6, the annual consumption growth rate of canned oily fish is less than one per cent in most household groups. This suggests a complex interplay of factors influencing consumer behaviour. Despite the current popularity and widespread consumption of canned oily fish, the sluggish growth rates may imply a potential stagnation or saturation in demand over time. The decomposition analysis sheds light on this phenomenon, identifying a substantial divergence in consumer preferences away from canned oily fish, as indicated by the mean autonomous trend effect of -2.30%. This insight underscores the complexity of factors influencing long-term trends in the fish market, emphasizing the need for a comprehensive understanding beyond current consumption patterns.

For all fish groups, among the six determinants, income and autonomous trend (changes in consumer taste) are the most important factors that affect consumption. However, price plays a comparatively dominant role in the consumption growth of the chilled fresh/smoked oily fish group and chilled fresh/smoked lean fish. The trend effects indicate that changes in consumer preferences have reoriented fish consumption away from canned oily fish, canned shellfish and other group, chilled fresh/smoked lean fish, chilled fresh/smoked other fish, frozen processed oily lean, shellfish and other group and toward chilled fresh smoked oily fish, chilled fresh/smoked shellfish, chilled prepared lean fish (except in pre-family and young family groups), chilled prepared oily, shellfish and other, Frozen fresh/smoked shellfish group and frozen fresh/smoked oily, lean and other.

5. Conclusions and policy implications

This study analysed the demand for fish and seafood for consumption at home across different household groups for the period 2013-2021.

The analysis reveals several patterns in consumption behaviour. Notably, the empty nest and retired groups exhibit a propensity for larger fish purchases. Conversely, younger family groups tend to exhibit more modest fish purchases. Our analysis reveals that families with children consistently allocate a lower share of their grocery spending to whole fish

compared to households without children. This observation suggests a systematic difference in the prioritization of whole fish within these family demographics, which may have implications for understanding consumer preferences and behaviours in the context of grocery expenditures. Also, we discovered that households with children preferred ready-to-use and convenient options, reflecting the importance of time-saving and versatile choices in fish consumption.

In general, every household category shows a higher responsiveness to changes in prices for chilled fresh/smoked fish products compared to frozen fish items. The majority of own-price elasticities, being less than one in absolute values, implying that demand for most fish products is inelastic, meaning consumers are less responsive to price changes. While the cross-price elasticities differ notably among household groups, there is no apparent systematic pattern. The diverse expenditure elasticities observed across product categories within family groups underscore the intricate nature of consumer preferences. Nevertheless, the consistent finding of relatively inelastic responses to chilled prepared oily shellfish and other products across all household groups indicates a stable demand for these items despite fluctuations in income levels. Our decomposition analysis of fish consumption revealed diverse growth rates among different fish groups in different household groups over the 2013-2021 period. Among all the fish groups, chilled prepared oily, shellfish and other group demonstrates the highest annual consumption growth, indicating a consistent and substantial preference, potentially influenced by factors like convenience or culinary exploration. Income and taste were identified as pivotal determinants of consumption changes across all fish groups, while price played a prominent role in certain fish groups.

Our study contributes to the food demand literature by econometrically estimating the demand for a variety of fish and seafood groups in different household groups in GB for the first time, and our findings have important policy and market implications. Recognizing the systematic difference in grocery expenditure patterns, policymakers might consider targeted support or promotions for whole fish products within families with children. Initiatives to educate and incentivize these households could potentially influence their purchasing behaviour and encourage a higher allocation to this category. In response to the substantial preference for chilled prepared oily, shellfish and other products, retailers can strategically place and promote these items in-store. Special displays, discounts, or bundled promotions may further enhance the appeal of these products, considering their consistent and substantial annual consumption growth.

Recognizing the higher responsiveness to price changes for chilled fresh/smoked fish group across all household categories, businesses may benefit from implementing flexible pricing strategies. This could involve periodic promotions, loyalty programs, or dynamic pricing mechanisms to cater to the varying sensitivities within different consumer groups. Businesses in the fish market can explore diversifying their whole fish offerings to meet the distinct preferences of families with and without children. Tailoring product options, packaging, and marketing strategies to align with the differing priorities of these demographics may enhance overall market competitiveness. Since the decomposition analysis reveals income as a significant determinant of fish consumption changes, policies aimed at improving household income levels could indirectly boost fish demand. Further, findings of the decomposition analysis highlight the importance of consumer taste trends in shaping fish consumption patterns. Policymakers should stay informed about these changing preferences and work collaboratively with the industry to adapt production and marketing strategies accordingly. This may involve supporting research on consumer preferences and facilitating communication between producers and consumers.

However, addressing the need for increased fish demand must be accompanied by a parallel focus on sustainable aquaculture expansion, particularly targeting fish species that elicit elastic consumer responses. Emphasising demand alone without increasing supply risks putting upward pressure on fish prices, leading to unintended consequences. Policymakers and industry stakeholders can ensure a balanced approach to meeting growing demand by strategically aligning aquaculture expansion with consumer preferences that demonstrate elasticity to income and price changes. This strategy not only supports market growth but also mitigates the negative effects of rising prices, contributing to a sustainable and resilient fish market. The success of the above policy suggestions relies on collaborative efforts between government entities, the fish and seafood industry, retailers, and consumer advocacy groups to ensure a holistic and effective approach.

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Figure 1 Classification of fish products

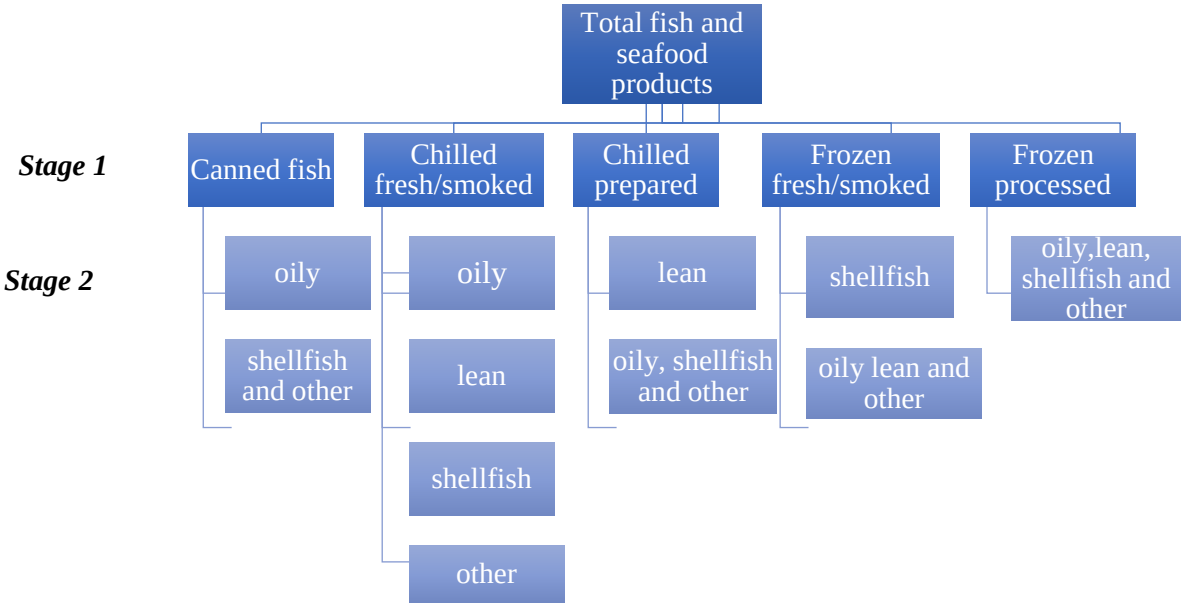


Table 1 Testing demand homogeneity and Slutsky symmetry

	Homogeneity			Symmetry		
Household group	Test statistic	$F_{Critical}$	Conclusion	Test statistic	$F_{Critical}$	Conclusion
Pre family	2.15*	1.99	Accept	1.05	1.59	Accept
Young family	1.32	1.71	Accept	1.63*	1.59	Accept
Middle family	1.36	1.71	Accept	0.84	1.59	Accept
Older family	0.76	1.71	Accept	1.63*	1.59	Accept
Older dependents	1.47	1.71	Accept	1.68*	1.59	Accept
Empty nest	1.29	1.71	Accept	1.02	1.59	Accept
Retired	0.34	1.71	Accept	1.55	1.59	Accept

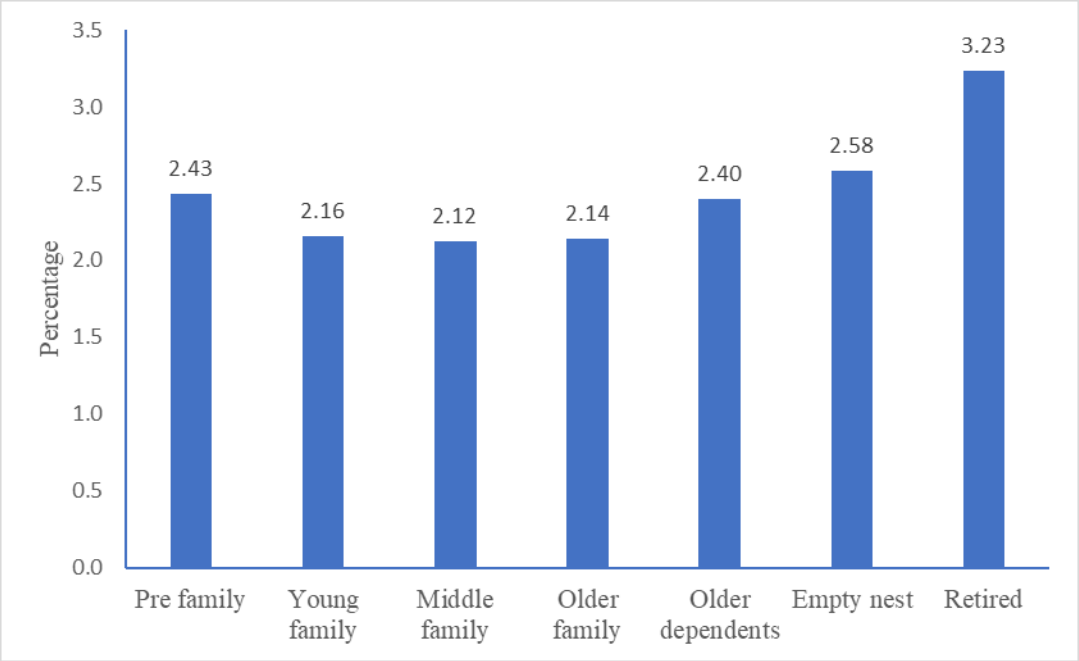
* denotes critical value and conclusion at $\alpha = 0.01$.

Table 2 Weekly purchases (grams) per capita, (2013-2021)

	Mean	SD	Minimum	Maximum		Mean	SD	Minimum	Maximum
Pre family					**Older dependents**				
Canned oily fish	40.9	1.6	1.6	42.6	Canned oily fish	20.7	1.0	1.0	17.3
Canned shellfish and other	1.2	0.2	0.2	1.6	Canned shellfish and other	0.7	0.1	0.1	0.4
Chilled fresh/smoked oily fish	21.5	2.7	2.7	28.0	Chilled fresh/smoked oily fish	10.4	1.0	1.0	9.7
Chilled fresh/smoked lean fish	6.9	0.4	0.4	7.6	Chilled fresh/smoked lean fish	4.0	0.1	0.1	2.5
Chilled fresh/smoked shellfish	8.3	0.3	0.3	8.7	Chilled fresh/smoked shellfish	3.8	0.2	0.2	3.2
Chilled fresh/smoked other	2.3	0.1	0.1	2.4	Chilled fresh/smoked other	1.3	0.1	0.1	0.9
Chilled prepared lean fish	6.0	0.8	0.8	7.3	Chilled prepared lean fish	3.8	0.3	0.3	3.2
Chiled prepared oily, shellfish and other	5.0	1.0	1.0	7.3	Chiled prepared oily, shellfish and other	2.4	0.5	0.5	3.0
Frozen fresh/smoked shellfish	7.4	0.7	0.7	8.5	Frozen fresh/smoked shellfish	5.0	0.3	0.3	4.4
Frozen fresh/smoked oily, lean and other	10.7	1.1	1.1	12.4	Frozen fresh/smoked oily, lean and other	6.7	0.4	0.4	6.2
Frozen processed oily, lean, shellfish and other	29.4	1.7	1.7	31.5	Frozen processed oily, lean, shellfish and oth	19.6	1.5	1.5	16.7
Young family					**Empty nest**				
Canned oily fish	14.3	0.7	0.7	15.8	Canned oily fish	44.1	3.3	3.3	51.8
Canned shellfish and other	0.3	0.0	0.0	0.4	Canned shellfish and other	1.8	0.1	0.1	1.9
Chilled fresh/smoked oily fish	6.5	0.9	0.9	7.8	Chilled fresh/smoked oily fish	27.7	4.4	4.4	35.6
Chilled fresh/smoked lean fish	1.9	0.2	0.2	2.0	Chilled fresh/smoked lean fish	9.7	0.6	0.6	10.7
Chilled fresh/smoked shellfish	2.4	0.3	0.3	2.9	Chilled fresh/smoked shellfish	10.7	1.0	1.0	12.1
Chilled fresh/smoked other	0.8	0.1	0.1	0.8	Chilled fresh/smoked other	3.3	0.3	0.3	3.8
Chilled prepared lean fish	1.7	0.2	0.2	2.1	Chilled prepared lean fish	9.5	1.9	1.9	13.0
Chiled prepared oily, shellfish and other	1.2	0.3	0.3	2.0	Chiled prepared oily, shellfish and other	7.1	1.9	1.9	11.2
Frozen fresh/smoked shellfish	2.7	0.4	0.4	3.4	Frozen fresh/smoked shellfish	11.1	1.5	1.5	13.7
Frozen fresh/smoked oily, lean and other	4.0	0.5	0.5	4.8	Frozen fresh/smoked oily, lean and other	15.0	1.9	1.9	18.1
Frozen processed oily, lean, shellfish and other	17.9	1.2	1.2	20.3	Frozen processed oily, lean, shellfish and oth	38.1	4.2	4.2	45.3
Middle family					**Retired**				
Canned oily fish	14.8	0.4	0.4	15.2	Canned oily fish	51.2	1.4	1.4	54.4
Canned shellfish and other	0.3	0.0	0.0	0.4	Canned shellfish and other	2.9	0.4	0.4	3.1
Chilled fresh/smoked oily fish	6.2	0.9	0.9	8.0	Chilled fresh/smoked oily fish	49.4	7.7	7.7	69.0
Chilled fresh/smoked lean fish	1.6	0.1	0.1	1.8	Chilled fresh/smoked lean fish	23.9	1.9	1.9	26.4
Chilled fresh/smoked shellfish	2.5	0.3	0.3	3.0	Chilled fresh/smoked shellfish	14.2	0.6	0.6	15.1
Chilled fresh/smoked other	0.6	0.1	0.1	0.8	Chilled fresh/smoked other	6.5	0.6	0.6	7.9
Chilled prepared lean fish	1.9	0.3	0.3	2.4	Chilled prepared lean fish	16.5	2.0	2.0	20.5
Chiled prepared oily, shellfish and other	1.5	0.5	0.5	2.7	Chiled prepared oily, shellfish and other	10.2	1.9	1.9	14.3
Frozen fresh/smoked shellfish	3.1	0.3	0.3	3.6	Frozen fresh/smoked shellfish	14.8	1.6	1.6	17.7
Frozen fresh/smoked oily, lean and other	4.3	0.4	0.4	5.1	Frozen fresh/smoked oily, lean and other	20.8	2.2	2.2	23.9
Frozen processed oily, lean, shellfish and other	16.9	1.3	1.3	17.0	Frozen processed oily, lean, shellfish and oth	51.7	2.6	2.6	56.1
Older family									
Canned oily fish	16.6	1.0	1.0	17.3					
Canned shellfish and other	0.4	0.1	0.1	0.4					
Chilled fresh/smoked oily fish	7.5	1.0	1.0	9.7					
Chilled fresh/smoked lean fish	2.2	0.1	0.1	2.5					
Chilled fresh/smoked shellfish	2.9	0.2	0.2	3.2					
Chilled fresh/smoked other	0.8	0.1	0.1	0.9					
Chilled prepared lean fish	2.6	0.3	0.3	3.2					
Chiled prepared oily, shellfish and other	1.9	0.5	0.5	3.0					
Frozen fresh/smoked shellfish	3.9	0.3	0.3	4.4					
Frozen fresh/smoked oily, lean and other	5.4	0.4	0.4	6.2					
Frozen processed oily, lean, shellfish and other	16.6	1.5	1.5	16.7					

Source: Own elaboration based on Kantar Worldpanel data.

Figure 2 Expenditure shares of total fish and seafood group*



Source: Own elaboration based on Kantar Worldpanel data.
* Expenditure shares with respect to total grocery expenditures

Table 3 Expenditure shares by household group in percentage, (2013-2021)

	Pre family	Young family	Middle family	Older family	Older dependents	Empty nest	Retired
Canned oily fish	19.9	19.8	20.8	19.8	19.2	17.0	14.0
Canned shellfish and other	1.1	0.7	0.8	0.8	1.1	1.2	1.2
Chilled fresh/smoked oily fish	25.8	22.4	21.0	21.9	21.6	24.7	25.6
Chilled fresh/smoked lean fish	7.8	6.4	5.5	6.4	8.6	8.5	13.1
Chilled fresh/smoked shellfish	8.1	6.3	6.5	6.6	6.6	8.5	7.5
Chilled fresh/smoked other	1.9	2.0	1.6	1.7	2.0	2.2	2.6
Chilled prepared lean fish	4.1	3.2	3.6	4.1	4.8	5.0	5.7
Chiled prepared oily, shellfish and other	5.0	3.2	4.0	4.5	4.1	5.2	4.8
Frozen fresh/smoked shellfish	6.9	7.4	8.3	8.9	8.4	7.8	6.7
Frozen fresh/smoked oily, lean and other	5.6	6.2	6.0	6.3	6.1	5.6	5.6
Frozen processed oily, lean, shellfish and other	13.7	22.4	21.8	19.0	17.4	14.2	13.1

Source: Own elaboration based on Kantar Worldpanel data.

Table 4 Uncompensated price elasticities

	Canned oily fish	Canned shellfish and other	Chilled fresh/ smoked oily	Chilled fresh/ smoked lean fish	Chilled fresh/ smoked shellfish	Chilled fresh/ smoked other	Chilled prepared lean fish	Chiled prepared oily, shellfish and other	Frozen fresh /smoked shellfish	Frozen fresh/ smoked oily, lean and other	Frozen processed oily, lean, shellfish and other
Pre family											
Canned oily fish	**-0.5257 (.1902)**	-1.2460 (.5207)	-0.0277 (.0560)	0.2592 (.2332)	-0.0274 (.1694)	-.0888 (.4649)	-0.9858 (.3019)	0.5088 (.2400)	-0.1434 (.1892)	-0.2983 (.1548)	-0.3553 (.1565)
Canned shellfish and other	-0.0592 (.0268)	**-0.4506 (.1434)**	0.0087 (.0068)	0.0090 (.0443)	-0.0173 (.0324)	-.2167 (.0937)	0.2875 (.0603)	-0.0203 (.0454)	-0.0091 (.0352)	-0.0526 (.0283)	0.0103 (.0296)
Chilled fresh/smoked oily fish	-0.0151 (.0437)	0.0707 (.1300)	**-0.9944 (.0392)**	0.0864 (.0634)	0.0570 (.0502)	-.0592 (.1374)	-0.0752 (.0680)	0.0230 (.0762)	-0.0178 (.0496)	0.0066 (.0523)	-0.0482 (.0340)
Chilled fresh/smoked lean fish	0.1185 (.0889)	0.0333 (.3300)	0.0365 (.0270)	**-0.9850 (.2054)**	-0.2976 (.1080)	-.5418 (.2911)	0.2625 (.1882)	0.0051 (.1575)	0.0672 (.1118)	0.0590 (.0994)	-0.1374 (.0912)
Chilled fresh/smoked shellfish	-0.0149 (.0677)	-0.1890 (.2530)	0.0076 (.0234)	-0.3293 (.1133)	**-0.3433 (.1170)**	-.6442 (.2222)	0.4385 (.1423)	-0.0237 (.1222)	-0.0977 (.0866)	-0.1686 (.0766)	-0.0924 (.0714)
Chilled fresh/smoked other	-0.0134 (.0454)	-0.4171 (.1734)	-0.0107 (.0105)	-0.1432 (.0739)	-0.1580 (.0533)	**-0.5990 (.2292)**	-0.2574 (.1050)	0.1309 (.0742)	0.0210 (.0622)	0.0388 (.0463)	0.0237 (.0535)
Chilled prepared lean fish	-0.2163 (.0606)	1.0830 (.2334)	-0.0281 (.0150)	0.1162 (.0980)	0.2111 (.0710)	-.5472 (.2215)	**-0.2016 (.2021)**	-0.3816 (.0987)	-0.0752 (.0875)	0.1010 (.0624)	-0.0552 (.0719)
Chiled prepared oily, shellfish and other	0.1147 (.0574)	-0.1394 (.2146)	-0.0118 (.0192)	-0.0195 (.0995)	-0.0244 (.0734)	.3342 (.1891)	-0.4576 (.1198)	**-0.3370 (.1507)**	-0.1075 (.0744)	-0.1683 (.0678)	-0.1357 (.0570)
Frozen fresh/smoked shellfish	-0.0438 (.0630)	-0.0976 (.2287)	-0.0044 (.0190)	0.0505 (.0980)	-0.0740 (.0721)	.0973 (.2205)	-0.0990 (.1462)	-0.1268 (.1033)	**-0.5736 (.1290)**	-0.4540 (.0768)	0.1262 (.0716)
Frozen fresh/smoked oily, lean and other	-0.0752 (.0420)	-0.3061 (.1520)	0.0053 (.0166)	0.0386 (.0715)	-0.1050 (.0524)	.1332 (.1327)	0.1629 (.0862)	-0.1671 (.1621)	-0.3628 (.0623)	**-0.2307 (.0679)**	0.0254 (.0414)
Frozen processed oily, lean, shellfish and other	-0.2542 (.1068)	0.0379 (.3877)	-0.0464 (.0310)	-0.2790 (.1617)	-0.1593 (.1209)	.1906 (.3760)	-0.1511 (.2423)	-0.3506 (.1575)	0.2289 (.1449)	0.0323 (.1032)	**-0.2760 (.1720)**
Young family											
Canned oily fish	**-0.9975 (.1819)**	-0.9463 (.6761)	0.0303 (.0587)	-0.5215 (.2952)	0.2963 (.2255)	-.8975 (.5268)	0.0973 (.3786)	0.1800 (.2983)	0.3311 (.1783)	-0.1850 (.1388)	0.0471 (.1097)
Canned shellfish and other	-0.0402 (.0247)	**-0.4565 (.1864)**	0.0007 (.0071)	0.0589 (.0512)	0.0031 (.0420)	-.2267 (.1035)	0.0037 (.0734)	0.0003 (.0548)	0.0041 (.0338)	-0.0132 (.0234)	0.0210 (.0196)
Chilled fresh/smoked oily fish	0.0537 (.0436)	0.1686 (.1747)	**-1.0500 (.0437)**	0.0774 (.0976)	-0.0004 (.0700)	-.0787 (.1245)	0.0482 (.1025)	0.1486 (.1025)	-0.0798 (.0547)	-0.0039 (.0558)	-0.0176 (.0285)
Chilled fresh/smoked lean fish	-0.1720 (.0932)	0.5367 (.4452)	0.0134 (.0347)	**-1.0180 (.2865)**	-0.2671 (.1587)	.4707 (.3203)	0.8976 (.2529)	0.6853 (.2165)	-0.1724 (.1149)	-0.1639 (.0994)	0.0342 (.0668)
Chilled fresh/smoked shellfish	0.0671 (.0714)	0.0351 (.3642)	-0.0329 (.0257)	-0.2873 (.1582)	**-0.4833 (.1761)**	.1388 (.2662)	-0.1817 (.2038)	0.0315 (.1677)	0.0275 (.0936)	-0.0033 (.0753)	-0.0903 (.0535)
Chilled fresh/smoked other	-0.0931 (.0519)	-0.6006 (.2790)	-0.0103 (.0134)	0.1478 (.0991)	0.0516 (.0828)	**-.2989 (.3126)**	-0.2230 (.1502)	-0.2231 (.1060)	0.1991 (.0721)	0.0352 (.0468)	-0.0729 (.0417)
Chilled prepared lean fish	0.0060 (.0598)	0.0246 (.3154)	-0.0056 (.0185)	0.4400 (.1255)	-0.0880 (.1015)	-.3608 (.2395)	**-0.1857 (.2456)**	-0.2165 (.1336)	-0.1213 (.0823)	0.0426 (.0580)	-0.1258 (.0467)
Chiled prepared oily, shellfish and other	-0.0037 (.0473)	-0.0132 (.2394)	-0.0145 (.0181)	0.3125 (.1092)	-0.0030 (.0847)	-.3858 (.1721)	-0.2408 (.1353)	**-0.4163 (.1624)**	-0.0715 (.0617)	-0.0826 (.0524)	-0.0386 (.0351)
Frozen fresh/smoked shellfish	0.1178 (.0654)	0.0777 (.3397)	-0.0391 (.0252)	-0.2023 (.1342)	0.0582 (.1091)	.7308 (.2681)	-0.2650 (.1918)	-0.0952 (.1431)	**-0.4904 (.1273)**	-0.5376 (.0740)	-0.0615 (.0518)
Frozen fresh/smoked oily, lean and other	-0.0552 (.0421)	-0.0706 (.1976)	-0.0040 (.0211)	-0.1522 (.0972)	0.0258 (.0734)	.1142 (.1474)	0.1031 (.1133)	-0.0926 (.1018)	0.1273 (.0613)	**-0.2603 (.0682)**	0.0217 (.0301)
Frozen processed oily, lean, shellfish and other	0.0163 (.1240)	0.7197 (.6004)	-0.0737 (.0504)	0.0936 (.2404)	-0.2603 (.1907)	-.8291 (.4706)	-0.8488 (.3324)	-0.0761 (.2507)	-0.2034 (.1597)	0.0336 (.1147)	**-0.6526 (.1257)**
Middle family											
Canned oily fish	**-0.5333 (.2220)**	-0.8250 (.6796)	0.0613 (.0559)	-0.0262 (.3269)	-0.0961 (.2071)	-1.9710 (.6709)	0.0829 (.3771)	-0.7502 (.3127)	-0.0249 (.1824)	-0.2508 (.1314)	-0.2411 (.1071)
Canned shellfish and other	-0.0270 (.0253)	**-0.6030 (.1643)**	0.0081 (.0049)	-0.0970 (.0472)	0.0111 (.0299)	0.0532 (.1025)	-0.0631 (.0574)	-0.0762 (.0444)	0.0321 (.0292)	0.0385 (.0180)	0.0226 (.0208)
Chilled fresh/smoked oily fish	-0.0235 (.0335)	0.0171 (.1040)	**-0.9058 (.361)**	-0.0664 (.0671)	-0.0588 (.0450)	0.1750 (.1220)	0.0189 (.0730)	-0.0414 (.0713)	0.0181 (.0378)	0.0371 (.0377)	-0.0605 (.0236)
Chilled fresh/smoked lean fish	-0.0405 (.0850)	-0.7434 (.3328)	-0.0285 (.0227)	**-0.2053 (.2406)**	0.0078 (.1132)	0.1567 (.3358)	-0.1336 (.1982)	-0.2452 (.1680)	-0.0154 (.0880)	-0.0523 (.0715)	-0.0347 (.0671)
Chilled fresh/smoked shellfish	0.0850 (.0632)	0.0291 (.2481)	-0.0193 (.0188)	0.0209 (.1332)	**-0.3678 (.1166)**	-0.2178 (.2526)	-0.2322 (.1492)	0.0356 (.1272)	-0.0664 (.0664)	0.0212 (.0544)	-0.0533 (.0493)
Chilled fresh/smoked other	-0.1535 (.0514)	0.1020 (.2121)	0.0211 (.0119)	0.0570 (.0986)	-0.0469 (.0636)	**0.1011 (.2846)**	0.1181 (.1180)	0.0005 (.0967)	0.0065 (.0540)	-0.0698 (.0399)	0.0369 (.0392)
Chilled prepared lean fish	0.0050 (.0637)	-0.3162 (.2627)	0.0085 (.0163)	-0.0743 (.1285)	-0.1229 (.0823)	0.2492 (.2607)	**-0.1837 (.2112)**	0.1605 (.1249)	0.0436 (.0685)	-0.1186 (.0527)	-0.1130 (.0492)
Chiled prepared oily, shellfish and other	-0.1805 (.0580)	-0.4469 (.2262)	-0.0261 (.0173)	-0.1894 (.1211)	0.0048 (.0779)	-0.0358 (.2376)	0.1564 (.1389)	**-0.2250 (.1700)**	0.1301 (.0626)	-0.0150 (.0531)	0.0479 (.0442)
Frozen fresh/smoked shellfish	-0.0188 (.0719)	0.2845 (.3100)	0.0320 (.0232)	0.0183 (.1341)	-0.0588 (.0860)	0.0196 (.2789)	0.1134 (.1604)	0.3295 (.1335)	**-0.6224 (.1134)**	-0.5358 (.0676)	-0.0873 (.0559)
Frozen fresh/smoked oily, lean and other	-0.0675 (.0377)	0.2671 (.1414)	0.0404 (.0168)	-0.0153 (.0802)	0.0507 (.0518)	-0.2567 (.1521)	-0.1782 (.0911)	0.0345 (.0832)	-0.3775 (.0492)	**-0.1850 (.0522)**	-0.0350 (.0286)
Frozen processed oily, lean, shellfish and other	-0.1875 (.1451)	0.4114 (.5897)	-0.0699 (.0473)	-0.1004 (.2728)	-0.1827 (.1711)	0.3852 (.5410)	-0.7250 (.3078)	0.3493 (.2527)	-0.3015 (.1506)	-0.2411 (.1071)	**-0.4812 (.1508)**
Older family											
Canned oily fish	**-0.5007 (.1585)**	0.4124 (.4978)	-0.0194 (.0496)	-0.0858 (.2554)	0.0940 (.1895)	-0.9579 (.5078)	-0.2067 (.2788)	0.1702 (.2352)	-0.2773 (.1459)	0.0163 (.1158)	-0.2999 (.1445)
Canned shellfish and other	0.0163 (.0197)	**-0.2611 (.1508)**	-0.0154 (.0056)	-0.0028 (.0411)	-0.0971 (.0299)	0.0830 (.0993)	0.1526 (.0494)	-0.0711 (.0399)	-0.0679 (.0273)	-0.0329 (.0165)	0.0236 (.0246)
Chilled fresh/smoked oily fish	0.0582 (.0391)	-0.3444 (.1281)	**-1.0640 (.0393)**	-0.0022 (.0853)	-0.0383 (.0680)	0.3952 (.1359)	0.1035 (.0829)	0.0199 (.0751)	-0.0102 (.0486)	-0.0202 (.0511)	-0.0104 (.0394)
Chilled fresh/smoked lean fish	-0.0032 (.0812)	0.0026 (.3324)	0.0006 (.0298)	**-0.6786 (.2474)**	0.0276 (.1337)	-0.8364 (.3419)	-0.2672 (.1925)	0.3492 (.1655)	-0.1286 (.0978)	0.0313 (.0812)	-0.0127 (.0916)
Chilled fresh/smoked shellfish	0.0025 (.0631)	-0.8346 (.2526)	-0.0640 (.0259)	-0.0253 (.1403)	**-0.0658 (.1525)**	0.1249 (.2622)	-0.3430 (.1511)	0.1103 (.1311)	-0.0028 (.0774)	-0.0709 (.0658)	-0.1463 (.0711)
Chilled fresh/smoked other	-0.0831 (.0444)	0.1853 (.2193)	0.0266 (.0128)	-0.2345 (.0935)	0.0424 (.0684)	**-0.5225 (.2929)**	-0.1025 (.1103)	-0.0904 (.0894)	0.0277 (.0573)	0.0372 (.0386)	-0.0097 (.0523)
Chilled prepared lean fish	-0.0326 (.0569)	0.8054 (.2559)	0.0148 (.0189)	-0.1780 (.1235)	-0.1867 (.0925)	-0.2347 (.2585)	**-0.4060 (.1973)**	-0.1933 (.1192)	0.1470 (.0736)	-0.0158 (.0536)	-0.0174 (.0658)
Chiled prepared oily, shellfish and other	0.0312 (.0535)	-0.4126 (.2297)	-0.0198 (.0191)	0.2224 (.1184)	0.0879 (.0895)	-0.2448 (.2333)	-0.2307 (.1329)	**-0.4953 (.1568)**	0.0887 (.0665)	0.1402 (.0524)	-0.2325 (.0612)
Frozen fresh/smoked shellfish	-0.1445 (.0659)	-0.7859 (.3127)	-0.0559 (.0260)	-0.2341 (.1397)	0.0159 (.1056)	0.1151 (.2971)	0.2778 (.1636)	0.1718 (.1328)	**-0.2196 (.1178)**	-0.5373 (.0739)	0.0207 (.0786)
Frozen fresh/smoked oily, lean and other	-0.0035 (.0368)	-0.2713 (.1352)	-0.0376 (.0194)	-0.0018 (.0827)	-0.0494 (.0638)	0.1205 (.1439)	-0.0489 (.0852)	0.1984 (.0745)	-0.3752 (.0522)	**-0.2159 (.0586)**	-0.0557 (.0381)
Frozen processed oily, lean, shellfish and other	-0.3086 (.1383)	0.5518 (.5935)	-0.0982 (.0487)	-0.1310 (.2756)	-0.3613 (.2041)	-0.1427 (.5716)	-0.1485 (.3077)	-0.9700 (.2568)	0.0652 (.1662)	-0.1614 (.1155)	**-0.1231 (.2048)**

Table 4 (continued)

	Canned oily fish	Canned shellfish and other	Chilled fresh/ smoked oily fish	Chilled fresh/ smoked lean fish	Chilled fresh/ smoked shellfish	Chilled fresh/ smoked other	Chilled prepared lean fish	Chiled prepared oily, shellfish and other	Frozen fresh /smoked shellfish	Frozen fresh/ smoked oily, lean and other	Frozen processed oily, lean, shellfish and other
Older dependents											
Canned oily fish	**-0.5322 (.1625)**	-0.2408 (.4917)	0.3281 (.0438)	0.1301 (.2229)	-0.0727 (.1677)	-0.5694 (.3697)	0.0647 (.2748)	0.7034 (.2464)	0.4427 (.1504)	0.2658 (.1205)	-0.2657 (.1362)
Canned shellfish and other	-0.0132 (.0269)	**-0.2966 (.1789)**	0.0155 (.0075)	-0.1280 (.0509)	-0.0048 (.0370)	-0.1335 (.0991)	-0.0183 (.0642)	0.0638 (.0529)	0.0759 (.0358)	-0.0266 (.0249)	0.0569 (.0319)
Chilled fresh/smoked oily fish	0.3684 (.0491)	0.3172 (.1537)	**-0.7587 (.0547)**	0.2236 (.0817)	0.0106 (.0653)	0.2093 (.1105)	0.1063 (.0881)	0.1654 (.1011)	0.2184 (.0565)	0.1513 (.0541)	0.1477 (.0452)
Chilled fresh/smoked lean fish	0.0586 (.1004)	-1.0505 (.4177)	0.0897 (.0327)	**-0.6080 (.2734)**	0.1207 (.1459)	0.1601 (.3300)	0.1697 (.2331)	-0.2357 (.2081)	-0.0578 (.1276)	0.1979 (.1016)	0.0928 (.1151)
Chilled fresh/smoked shellfish	-0.0252 (.0581)	-0.0308 (.2337)	0.0033 (.0202)	0.0928 (.1122)	**-0.0443 (.1200)**	-0.0096 (.1814)	0.1911 (.1290)	0.3175 (.1226)	-0.1839 (.0713)	-0.0835 (.0610)	-0.0126 (.0649)
Chilled fresh/smoked other	-0.0602 (.0391)	-0.2573 (.1911)	0.0197 (.0104)	0.0376 (.0775)	-0.0029 (.0554)	**-0.4879 (.2105)**	0.1640 (.0963)	-0.1304 (.0785)	-0.0816 (.0529)	-0.0584 (.0364)	0.1422 (.0488)
Chilled prepared lean fish	0.0161 (.0686)	-0.0831 (.2919)	0.0236 (.0195)	0.0940 (.1292)	0.1377 (.0929)	0.3871 (.2272)	**0.0070 (.2145)**	-0.3185 (.1351)	0.0667 (.0842)	0.1233 (.0634)	-0.1878 (.0760)
Chiled prepared oily, shellfish and other	0.1514 (.0530)	0.2503 (.2074)	0.0316 (.0194)	-0.1126 (.0994)	0.1973 (.0762)	-0.2652 (.1597)	-0.2746 (.1165)	**-0.0929 (.1548)**	-0.0799 (.0642)	-0.0568 (.0545)	-0.0536 (.0560)
Frozen fresh/smoked shellfish	0.1935 (.0657)	0.6044 (.2853)	0.0850 (.0220)	-0.0561 (.1238)	-0.2322 (.0899)	-0.3375 (.2188)	0.1169 (.1476)	-0.1624 (.1305)	**-0.4056 (.1172)**	-0.4843 (.0767)	0.1715 (.0729)
Frozen fresh/smoked oily, lean and other	0.0842 (.0382)	-0.1537 (.1440)	0.0427 (.0153)	0.1392 (.0715)	-0.0764 (.0558)	-0.1752 (.1092)	0.1566 (.0806)	-0.0837 (.0804)	-0.3511 (.0556)	**-0.0518 (.0564)**	0.0081 (.0396)
Frozen processed oily, lean, shellfish and other	-0.2414 (.1237)	0.9409 (.5290)	0.1194 (.0365)	0.1873 (.2321)	-0.0329 (.1703)	1.2220 (.4198)	-0.6835 (.2767)	-0.2264 (.2364)	0.3563 (.1515)	0.0233 (.1135)	**-0.0993 (.1926)**
Empty nest											
Canned oily fish	**-0.8536 (.2113)**	-1.7110 (.4567)	0.0467 (.0503)	-0.3438 (.2145)	-0.0862 (.1827)	-1.1574 (.4101)	0.2832 (.2582)	0.4143 (.2690)	0.1765 (.1464)	0.1177 (.1298)	-0.0775 (.1487)
Canned shellfish and other	-0.1117 (.0304)	**-0.3267 (.1319)**	0.0184 (.0082)	0.0486 (.0410)	-0.0206 (.0368)	0.0761 (.0839)	0.0178 (.0551)	-0.0550 (.0532)	-0.0254 (.0298)	0.0246 (.0246)	0.0363 (.0291)
Chilled fresh/smoked oily fish	-0.0002 (.0654)	0.2068 (.1723)	**-1.0290 (.0540)**	0.2426 (.0805)	0.0154 (.0709)	0.0573 (.1533)	-0.0319 (.0923)	-0.0222 (.1203)	-0.1211 (.0637)	-0.0554 (.0712)	-0.0201 (.0588)
Chilled fresh/smoked lean fish	-0.2001 (.1042)	0.2840 (.3005)	0.0773 (.0289)	**-0.7949 (.1869)**	-0.0451 (.1180)	0.0498 (.2690)	-0.0309 (.1740)	0.1163 (.1694)	0.0861 (.0946)	-0.0837 (.0833)	-0.0671 (.0921)
Chilled fresh/smoked shellfish	-0.0630 (.0903)	-0.2102 (.2736)	0.0084 (.0264)	-0.0361 (.1200)	**-0.3686 (.1503)**	-0.0925 (.2446)	0.2400 (.1607)	-0.1598 (.1534)	-0.0370 (.0854)	-0.1303 (.0737)	-0.2170 (.0840)
Chilled fresh/smoked other	-0.1500 (.0507)	0.1307 (.1565)	0.0095 (.0137)	0.0188 (.0685)	-0.0202 (.0612)	**-0.0760 (.1988)**	-0.2067 (.0924)	0.1716 (.0872)	-0.0646 (.0499)	-0.0090 (.0416)	0.0600 (.0489)
Chilled prepared lean fish	0.0378 (.0734)	0.0075 (.2360)	-0.0384 (.0196)	-0.0468 (.1019)	0.1085 (.0923)	-0.5178 (.2123)	**-0.1567 (.2030)**	-0.3805 (.1226)	0.0120 (.0803)	0.0187 (.0575)	-0.1081 (.0747)
Chiled prepared oily, shellfish and other	0.0897 (.0807)	-0.3096 (.2415)	-0.0280 (.0263)	0.0522 (.1046)	-0.1239 (.0933)	0.3773 (.2122)	-0.3865 (.1295)	**-0.2790 (.1962)**	-0.1408 (.0731)	-0.1812 (.0693)	-0.0292 (.0703)
Frozen fresh/smoked shellfish	0.0524 (.0641)	-0.2348 (.1983)	-0.0451 (.0214)	0.0776 (.0858)	-0.0439 (.0761)	-0.2538 (.1778)	0.0612 (.1247)	-0.1819 (.1077)	**-0.3476 (.0983)**	-0.5558 (.0638)	-0.0406 (.0634)
Frozen fresh/smoked oily, lean and other	0.0301 (.0406)	0.0828 (.1174)	-0.0056 (.0168)	-0.0443 (.0539)	-0.0807 (.0470)	-0.0276 (.1067)	0.0630 (.0639)	-0.1609 (.0731)	-0.3851 (.0456)	**-0.2830 (.0528)**	0.0130 (.0359)
Frozen processed oily, lean, shellfish and other	-0.1474 (.1200)	0.2935 (.3549)	-0.0550 (.0379)	-0.1465 (.1536)	-0.4132 (.1374)	0.3183 (.3203)	-0.2593 (.2131)	-0.0595 (.1908)	-0.1049 (.1171)	-0.0277 (.0936)	**-0.2859 (.1544)**
Retired											
Canned oily fish	**-0.4993 (.1659)**	-0.1562 (.3380)	0.0434 (.0289)	-0.5281 (.1614)	0.1474 (.1532)	-0.0990 (.2736)	-0.3569 (.1861)	0.2890 (.2019)	0.2552 (.1422)	0.1244 (.1090)	-0.2737 (.1322)
Canned shellfish and other	-0.0188 (.0287)	**-0.3223 (.1417)**	-0.0105 (.0052)	-0.0320 (.0384)	-0.0152 (.0375)	0.3101 (.0788)	0.0473 (.0472)	-0.0123 (.0454)	-0.0245 (.0396)	-0.0177 (.0241)	-0.0389 (.0334)
Chilled fresh/smoked oily fish	0.0472 (.0389)	-0.1403 (.0902)	**-1.1090 (.0327)**	-0.0710 (.0506)	0.1653 (.0481)	0.1008 (.0752)	0.0370 (.0553)	0.1326 (.0710)	-0.0215 (.0477)	0.0270 (.0460)	0.0680 (.0425)
Chilled fresh/smoked lean fish	-0.5580 (.1485)	-0.3549 (.4171)	-0.0843 (.0330)	**-0.6670 (.2738)**	-0.4834 (.1943)	0.0809 (.3367)	0.7633 (.2332)	-0.4121 (.2464)	0.0326 (.1751)	0.3200 (.1354)	0.3830 (.1606)
Chilled fresh/smoked shellfish	0.0370 (.0821)	-0.1036 (.2375)	0.0157 (.0184)	-0.2831 (.1132)	**-0.1076 (.1507)**	-0.5517 (.1934)	-0.1242 (.1275)	0.0538 (.1391)	0.1264 (.0969)	-0.1297 (.0745)	-0.1535 (.0897)
Chilled fresh/smoked other	-0.0246 (.0510)	0.6898 (.1731)	0.0076 (.0096)	0.0233 (.0680)	-0.1846 (.0672)	**0.2349 (.1933)**	-0.0996 (.0857)	-0.1542 (.0820)	-0.1745 (.0677)	-0.0930 (.0438)	0.0110 (.0592)
Chilled prepared lean fish	-0.1927 (.0760)	0.2072 (.2273)	-0.0306 (.0161)	0.3175 (.1034)	-0.1088 (.0971)	-0.2502 (.1881)	**-0.0421 (.1650)**	0.0055 (.1228)	0.0114 (.0904)	-0.1194 (.0657)	-0.3331 (.0823)
Chiled prepared oily, shellfish and other	0.0679 (.0678)	-0.0575 (.1807)	0.0004 (.0160)	-0.1564 (.0899)	0.0305 (.0873)	-0.2971 (.1484)	0.0126 (.1013)	**-0.2783 (.1632)**	-0.1228 (.0775)	-0.0771 (.0635)	-0.0411 (.0742)
Frozen fresh/smoked shellfish	0.0844 (.0669)	-0.1449 (.2213)	-0.0351 (.0161)	0.0119 (.0896)	0.1125 (.0851)	-0.4664 (.1723)	0.0294 (.1046)	-0.1687 (.1087)	**-0.3965 (.1273)**	-0.5338 (.0714)	-0.0244 (.0771)
Frozen fresh/smoked oily, lean and other	0.0237 (.0422)	-0.0833 (.1105)	-0.0129 (.0130)	0.1380 (.0571)	-0.0906 (.0539)	-0.2098 (.0916)	-0.0968 (.0626)	-0.0809 (.0737)	-0.4380 (.0591)	**-0.1937 (.0584)**	-0.0827 (.0443)
Frozen processed oily, lean, shellfish and other	-0.3439 (.1223)	-0.4546 (.3646)	-0.0354 (.0303)	0.3628 (.1616)	-0.2813 (.1549)	-0.0021 (.2942)	-0.7433 (.1869)	-0.1173 (.2047)	-0.0606 (.1511)	-0.2210 (.1066)	**-0.2309 (.1826)**

Note: Standard errors are in parentheses

Table 5 Expenditure elasticities

	Pre family	Young family	Middle family	Older family	Older dependents	Empty nest	Retired
Canned oily fish	0.9847 (.1354)	1.1008 (.1347)	1.2848 (.1237)	0.9679 (.1124)	1.4270 (.1293)	1.3160 (.1275)	1.3771 (.0994)
Canned shellfish and other	1.6208 (.4069)	0.5248 (.5553)	1.8236 (.3748)	0.9525 (.3552)	1.1942 (.4071)	1.7871 (.3346)	0.9206 (.2298)
Chilled fresh/smoked oily fish	1.0654 (.1216)	1.1866 (.1331)	0.8781 (.1360)	1.3320 (.1126)	0.9298 (.1412)	1.0413 (.0984)	1.2518 (.0822)
Chilled fresh/smoked lean fish	1.1962 (.2065)	1.0515 (.3046)	0.6780 (.2464)	1.3521 (.2361)	1.0503 (.2155)	0.9725 (.1561)	0.8841 (.1276)
Chilled fresh/smoked shellfish	0.9382 (.1568)	0.6670 (.2191)	0.8596 (.1608)	0.5309 (.1975)	0.6246 (.1717)	1.0788 (.1391)	0.8159 (.1233)
Chilled fresh/smoked other	0.7434 (.3406)	1.0253 (.3935)	1.3410 (.4455)	1.0550 (.3796)	0.7297 (.2895)	1.2465 (.2999)	1.1497 (.1889)
Chilled prepared lean fish	0.6729 (.2113)	0.7952 (.3170)	1.0260 (.2670)	1.2198 (.2354)	0.8127 (.2321)	0.4069 (.1813)	0.5733 (.1407)
Chiled prepared oily, shellfish and other	0.7392 (.2371)	0.0743 (.3187)	0.4282 (.2651)	0.8002 (.2153)	0.8630 (.2672)	0.5968 (.2333)	0.7432 (.1817)
Frozen fresh/smoked shellfish	1.0702 (.1554)	1.0156 (.1702)	1.1778 (.1406)	0.7528 (.1406)	1.0068 (.1487)	0.9522 (.1257)	0.8129 (.1221)
Frozen fresh/smoked oily, lean and other	1.1350 (.1631)	1.1386 (.1744)	1.3718 (.1419)	0.8295 (.1511)	1.0097 (.1426)	1.1652 (.1400)	0.9143 (.1182)
Frozen processed oily, lean, shellfish and other	1.3768 (.1325)	0.9354 (.0878)	0.8451 (.0866)	0.8637 (.1107)	0.8309 (.1184)	0.7362 (.1121)	0.7165 (.1080)

Note: Standard errors are in parentheses

Table 6 Decomposition of changes in consumption (in percentages), 2013-2021

		Components of growth					
	Total growth	Autonomous trend	Income	Own-price	Cross-price	Seasonal	Residual
Canned oily fish							
1. Pre family	0.39	-1.80	0.74	-0.14	1.42	0.22	-0.004
2. Young family	0.69	-1.87	1.36	-0.36	1.40	0.15	0.003
3. Middle family	0.40	-2.18	1.61	-0.12	0.88	0.22	0.002
4. Older family	-1.29	-2.06	0.73	-0.12	0.06	0.10	-0.001
5. Older dependents	0.54	-2.34	1.96	-0.22	0.94	0.20	-0.002
6. Empty nest	1.31	-3.88	4.60	-0.39	0.76	0.22	-0.001
7. Retired	0.35	-1.97	2.35	-0.11	-0.23	0.32	0.002
Mean	**0.34**	**-2.30**	**1.91**	**-0.21**	**0.75**	**0.20**	**0.000**
Canned shellfish and other							
1. Pre family	-1.82	-4.90	1.22	-0.53	2.16	0.23	-0.002
2. Young family	0.16	-1.78	0.65	-1.09	2.48	-0.09	-0.001
3. Middle family	3.10	0.42	2.57	-0.81	1.16	-0.24	0.002
4. Older family	-0.12	-0.33	0.72	-0.57	0.24	-0.18	0.001
5. Older dependents	-2.18	-3.89	1.64	-0.87	0.69	0.23	0.002
6. Empty nest	-0.48	-6.94	6.25	-1.08	1.41	-0.11	0.001
7. Retired	-1.87	-3.44	1.57	-1.34	1.27	0.06	0.003
Mean	**-0.46**	**-2.98**	**2.09**	**-0.90**	**1.34**	**-0.02**	**0.001**
Chilled fresh/smoked oily fish							
1. Pre family	2.85	3.05	0.80	-2.01	1.22	-0.22	0.002
2. Young family	2.89	2.19	1.47	-1.68	1.16	-0.25	-0.003
3. Middle family	2.07	1.65	1.24	-2.00	1.33	-0.14	0.001
4. Older family	1.94	1.73	1.01	-1.82	1.20	-0.17	0.003
5. Older dependents	1.43	1.19	1.28	-2.12	1.28	-0.20	0.002
6. Empty nest	5.16	2.28	3.64	-2.09	1.51	-0.18	0.001
7. Retired	2.13	1.32	2.13	-2.54	1.38	-0.17	-0.001
Mean	**2.64**	**1.92**	**1.65**	**-2.04**	**1.30**	**-0.19**	**0.001**
Chilled fresh/smoked lean fish							
1. Pre family	-1.98	-1.62	0.90	-2.25	0.79	0.20	0.001
2. Young family	-3.56	-5.38	1.30	-2.42	2.57	0.37	0.004
3. Middle family	-1.80	-2.89	0.95	-0.69	0.62	0.20	-0.001
4. Older family	1.16	1.17	1.02	-1.68	0.34	0.30	0.002
5. Older dependents	0.33	-0.41	1.45	-2.09	1.24	0.14	0.000
6. Empty nest	2.65	1.18	2.40	-2.25	1.02	0.31	0.001
7. Retired	-1.46	-2.60	1.51	-2.06	1.54	0.15	0.002
Mean	**-0.67**	**-1.51**	**1.36**	**-1.92**	**1.16**	**0.24**	**0.001**
Chilled fresh/smoked shellfish							
1. Pre family	1.26	0.95	0.71	-0.58	0.27	-0.09	-0.001
2. Young family	2.25	1.52	0.83	-0.06	0.13	-0.16	-0.002
3. Middle family	2.84	1.04	1.21	-0.44	1.32	-0.29	-0.001
4. Older family	1.22	1.73	0.40	-0.08	-0.75	-0.08	0.001
5. Older dependents	2.46	2.08	0.86	-0.07	-0.08	-0.32	0.002
6. Empty nest	3.83	1.44	3.77	-1.84	0.64	-0.18	0.001
7. Retired	1.50	1.21	1.39	-0.13	-0.86	-0.11	-0.001
Mean	**2.19**	**1.42**	**1.31**	**-0.46**	**0.10**	**-0.18**	**0.000**
Chilled fresh/smoked other							
1. Pre family	-5.40	-2.38	0.56	-2.14	-1.84	0.40	0.002
2. Young family	-1.15	-2.32	1.27	-0.88	0.78	0.00	0.001
3. Middle family	-2.55	-6.08	1.89	-0.41	2.02	0.04	-0.001
4. Older family	-1.37	-1.24	0.80	-1.75	0.65	0.17	0.001
5. Older dependents	0.21	-1.54	1.00	-1.31	1.48	0.57	-0.001
6. Empty nest	0.15	-5.74	4.36	-0.15	1.21	0.47	0.002
7. Retired	-0.26	-3.03	1.96	-1.01	1.58	0.24	-0.001
Mean	**-1.48**	**-3.19**	**1.69**	**-1.09**	**0.84**	**0.27**	**0.000**

Table 6 (continued)

		Components of growth					
	Total growth	Autonomous trend	Income	Own-price	Cross-price	Seasonal	Residual
Chilled prepared lean fish							
1. Pre family	-0.45	-1.42	0.51	-0.50	0.67	0.28	0.002
2. Young family	-0.22	-1.29	0.98	-0.23	0.17	0.14	0.001
3. Middle family	2.38	1.10	1.44	-0.26	-0.31	0.41	-0.001
4. Older family	3.17	2.03	0.92	-0.95	1.05	0.12	0.002
5. Older dependents	3.06	2.59	1.12	0.02	-0.26	-0.40	0.001
6. Empty nest	3.06	1.53	1.42	-0.37	0.29	0.19	-0.002
7. Retired	4.37	1.62	0.98	-0.02	1.48	0.32	-0.001
Mean	**2.20**	**0.88**	**1.05**	**-0.33**	**0.44**	**0.15**	**0.000**
Chilled prepared oily, shellfish and other							
1. Pre family	2.21	2.50	0.56	-0.24	-0.15	-0.46	0.002
2. Young family	1.89	2.14	0.09	-0.42	0.83	-0.74	-0.008
3. Middle family	5.67	4.04	0.60	-0.21	1.37	-0.12	-0.002
4. Older family	4.43	4.51	0.61	-0.05	0.26	-0.89	0.001
5. Older dependents	5.77	5.75	1.19	-0.03	-1.74	0.60	0.003
6. Empty nest	5.54	4.28	2.09	-0.03	0.19	-0.98	-0.001
7. Retired	3.95	3.54	1.27	-0.06	-0.38	-0.42	0.001
Mean	**4.21**	**3.82**	**0.91**	**-0.15**	**0.05**	**-0.43**	**-0.001**
Frozen fresh/smoked shellfish							
1. Pre family	1.72	1.07	0.81	-1.20	1.22	-0.17	0.001
2. Young family	3.22	2.73	1.26	-1.07	0.48	-0.18	-0.002
3. Middle family	1.11	0.43	1.66	-1.57	0.77	-0.18	0.001
4. Older family	1.02	0.89	0.57	-0.45	0.22	-0.21	0.000
5. Older dependents	2.19	1.72	1.39	-1.22	1.15	-0.86	0.001
6. Empty nest	4.87	1.37	3.33	-0.75	1.18	-0.27	0.002
7. Retired	3.45	1.68	1.39	-0.85	2.07	-0.83	-0.001
Mean	**2.51**	**1.41**	**1.48**	**-1.01**	**1.01**	**-0.39**	**0.000**
Frozen fresh/smoked oily, lean and other							
1. Pre family	3.23	1.57	0.86	-0.20	1.10	-0.09	-0.001
2. Young family	1.66	0.37	1.41	-0.18	0.11	-0.05	-0.001
3. Middle family	2.34	0.81	1.93	-0.21	-0.09	-0.10	0.000
4. Older family	-0.01	0.52	0.63	-0.58	-0.55	-0.03	0.002
5. Older dependents	2.34	2.03	1.39	-0.04	-0.27	-0.77	-0.001
6. Empty nest	4.36	0.71	4.07	0.16	0.41	-0.99	-0.002
7. Retired	2.25	1.10	1.56	0.00	0.32	-0.73	0.000
Mean	**1.50**	**1.01**	**1.69**	**-0.15**	**0.15**	**-0.39**	**0.000**
Frozen processed oily, lean, shellfish and other							
1. Pre family	0.16	-1.29	1.04	-0.48	0.78	0.12	0.000
2. Young family	1.96	1.17	1.16	-1.11	0.62	0.12	0.001
3. Middle family	-1.43	-2.48	1.19	-0.88	0.54	0.20	-0.001
4. Older family	-2.22	-3.57	0.65	-0.13	0.65	0.18	-0.002
5. Older dependents	-0.37	-2.48	1.14	-0.32	1.03	0.25	-0.001
6. Empty nest	1.30	-1.15	2.57	-0.62	0.31	0.18	0.000
7. Retired	1.45	-0.98	1.22	-0.44	1.68	-0.02	0.002
Mean	**0.12**	**-1.54**	**1.28**	**-0.57**	**0.80**	**0.15**	**0.000**

The annual average rates of changes have been calculated by multiplying the monthly average rates of changes by 13.