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Brands, Labels, and Product Longevity: The Case of Salmon in UK Grocery Retailing

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ABSTRACT

In recent years, the number of ecolabels and country-of-origin labels has grown substantially in seafood markets globally. This makes it more difficult for retailers and producers to communicate and demonstrate their differentiating claims to consumers. In addition, it has recently been suggested that there are both costs and supply chain benefits associated with labeling. This paper uses duration analysis to investigate factors that influence product longevity for salmon in grocery retailing. Product longevity influences cost as a prolonged product lifetime reduces costs related to product development and marketing. As has been found for wild-caught whitefish, different retail chains appear to vary in their product labeling strategies. However, in contrast to wild fish, farmed salmon with ecolabels or domestic country-of-origin labels appear to have shorter product life cycles compared to products without ecolabels or with foreign country-of-origin labeling. This is most likely due to the higher control of the production process found in aquaculture.

Introduction

In recent years ecolabels have become an increasingly important product attribute in seafood markets globally. In some markets, price premiums are observed for information about the sustainability of the production process for various seafood products whilst in other markets, or market segments, such information is a requirement for market access (Roheim, Bush, Asche, Sanchirico, & Uchida, 2018). In addition, country-of-origin labeling is mandatory in many countries (Asche, Larsen, Smith, Sogn-Grundvåg, & Young, 2015). Studies have found price premiums of 10–25% for ecolabels on products of Alaska pollock, Atlantic cod, haddock, and salmon in the UK (Asche et al., 2015; Roheim, Asche, & Santos, 2011; Sogn-Grundvåg,

Larsen, & Young, 2013, 2014; Zhang, Sogn-Grundvåg, Asche, & Young, 2018). A number of studies show similar premiums or a positive willingness to pay for ecolabeled seafood in other markets, although the results are more mixed with respect to country-of-origin labeling (Asche & Bronnmann, 2017; Brécard, Hlaimi, Lucas, Perraudeau, & Salladarré, 2009; Fonner & Sylvia, 2015; Garlock, Nguyen, Anderson, & Musumba, 2020; Uchida, Onozaka, Morita, & Managi, 2014; Wakamatsu, Anderson, Uchida, & Roheim, 2017). Moreover, Asche et al. (2015) demonstrated that UK retailers vary in how they price ecolabels with a higher premium in low-end retail chains and no statistically significant premium in high-end retailers. Asche and Bronnmann (2017) and Bronnmann and Hoffmann (2018) also show that the price premiums for ecolabels vary by species, and that there are no premiums associated with some species.

The number of available seafood ecolabels, as well as the types of sustainability claims they aim to include, is increasing rapidly (Osmundsen et al., 2020; Zander & Feucht, 2018). Alfnes, Chen, and Rickertsen (2018) find that salmon producers can choose between 48 different labels; these include labels that cover all seafood, salmonspecific labels as well as generic labels such as organic. The existence of zero premiums in several market segments and for some species does, however, beg the question are there other reasons for using ecolabels? One explanation is provided by Roheim et al. (2018) and Amundsen, Gauteplass, and Bailey (2019), who suggest that ecolabels can be used as a form of insurance against negative publicity in relation to sourcing of unsustainable seafood[1,2]. Another reason for using ecolabels is given by Roheim and Zhang (2018), who report that the ecolabel of the Marine Stewardship Council (MSC) reduces substitutability in Germany, making products with this label less exposed to competition. Finally, Sogn-Grundvåg et al. (2019) argue that ecolabels may also reduce costs in the supply chain associated with new product development and marketing by extending product longevity. Their findings indicate that in the UK market, whitefish products with MSC and "line-caught" labels have a longer lifespan than products without these labels. In this study, we investigate the longevity of salmon products, in the UK market and how different factors influence product longevity. There will be a particular focus on two credence attributes: "made in Scotland" and the ecolabel "organic"[3]. In this context, product longevity refers to the number of consecutive weeks that a product is carried by a retailer.

Farmed salmon is the most important seafood product consumed in the UK (Anderson, Asche, & Garlock, 2019; Asche et al., 2018), and differs from the whitefish studied by Sogn-Grundvåg, et al. (2019) in several important aspects. Unlike wild fish on the European market, the "farmed" status is a prerequisite for consideration for any organic claim, but also precludes the use of

the MSC ecolabel which applies exclusively to wild fish. Being farmed also gives producers a greater level of control over the supply (Asche, et al., 2018) and may influence product longevity in either direction. In contrast to wild fish, farmed salmon is mostly sold fresh, a highly perishable product form (Landazuri-Tveteraas, Asche, Gordon, & Tveterås, 2018). This makes coordination in the supply chain especially important (Kvaløy & Tveterås, 2008), and has led to the use of risk reducing instruments, such as contracts (Larsen & Asche, 2011) and futures (Asche, Misund, & Oglend, 2016), and avoiding auctions—a transaction mechanism that is much more common for wild fish (Sogn-Grundvåg, Zhang, & Iversen, 2019). On the other hand, the control over the production process allows salmon farmers to have product available year round, with minimal exposure to seasonality in production as is the case in wild fish production (Bertheussen & Dreyer, 2019; Birkenbach, Cojocaru, Asche, Guttormsen, & Smith, 2020). This means that there will always be a company able to supply salmon if one is willing to pay the price (Oglend & Straume, 2019; Straume, Landazuri-Tveteraas, & Oglend, 2020). Moreover, a consequence of the large share of salmon being sold fresh is fewer branded products (Landazuri-Tveteraas et al., 2018). As such, durable relationships and new product development may be less valuable. Asche et al. (2015) documented retailer heterogeneity in their pricing of ecolabels and country-of-origin labeling for salmon, suggesting that the strategies with respect to longevity may also differ by retailer.

The methodological approach for this study follows Sogn-Grundvåg, et al. (2019) in using duration analysis to investigate how various factors influence product longevity. Duration analysis has seen limited applications in empirical studies of seafood markets, although Smith (2004) used this method to examine individual fishermen attrition under limited entry. More recently, duration analysis has been applied to several new fields within the seafood market and industry. For example, Straume (2017) and Asche, et al. (2018) investigate trade duration in the salmon and cod markets, respectively, and Straume et al. (2020) investigate trade duration of Norwegian seafood exports. Wang, Tran, Wilson, Chan, and Dao (2019) analyze the impact on trade duration of the Association of Southeast Asian Nations seafood exports, Zhang and Tveterås (2019) study how the EU trade policies affect trade duration of seafood from developing countries, and Cojocaru et al. (2019) look at the duration of landing locations. However, Sogn-Grundvåg, et al. (2019) is the only study using duration analysis at the retail level. We follow Sogn-Grundvåg, et al. (2019) and use retail data to explore the impact of country-of-origin and organic labeling on product longevity of salmon.

The article is organized as follows. Initially the empirical setting and the procedure for data collection are described in detail and the duration

analysis is outlined. The empirical results from the estimation of the models are then presented and discussed. Concluding remarks are provided in the final section.

Empirical setting and data

The UK grocery retail sector industry is highly concentrated, with a few large retail chains, including Lidl, Marks & Spencer, Morrisons, Sainsbury's, Tesco, and Waitrose, dominating the market. These chains have national pricing strategies and aim to have similar offerings in their different store concepts nationally, but distinguish themselves through their profiles with respect to price, quality, product positions, wider store atmospherics and communications such as sustainable sourcing and traceability (Competitive Commission, 2000, 2008; Lan & Dobson, 2017; Lloyd et al., 2014). For instance, Marks & Spencer and Waitrose emphasize (upmarket) quality, while Lidl's main focus is on (low) price. This has also been the case for seafood, where Marks & Spencer and Waitrose emphasize sustainable sourcing to such an extent that they do not charge a premium for eco-labeled seafood (Asche et al., 2015; Zhang et al., 2018). Different chains have also been shown to have different strategies with respect to product longevity and labeling for wild fish (Sogn-Grundvåg et al., 2019).

Our dataset consists of weekly personal in-store observation of 223 different salmon products sold in Glasgow, Scotland, U.K., over a period of 137 consecutive weeks starting at the end of 2010 and lasting until May 2013. In comparison to scanner data, personal observation data havethe advantage of offering more detail and a complete list of available product attributes (Ward, Lusk, & Dutton, 2008). A trained assistant collected the data by visiting six grocery retailers in this region: Lidl, Marks & Spencer (M&S), Morrisons (MORS), Sainsbury's (SAIN), Tesco, and Waitrose (WAIT). The assistant purchased all the monitored products and photographed the front side of each package. The data on labels and prices were collected directly from the photographs and all attributes for each product were identified and registered. In this way, the assistant's primary role was to make the weekly price observations of the monitored products and to record if any products had been removed, or if new products had appeared—in which case they would be purchased and their details registered in the database.

As shown in the last row of Table 1, except for Lidl, the number of salmon products offered by the retailers is not substantially different from each other, indicating similar product ranges. The dataset includes product attributes such as price, country of origin, organic or conventional, and any branding. All six retailers surveyed sold both domestic (Scottish) and imported salmon during the sample period, but the Scottish origin appeared much more

Table 1. Variable definition and number of products by attribute and retailers.

Dummy variables	Base	Mean	Product numbers by retailer						
			Lidl	M&S	MORS	SAIN	Tesco	WAIT	Sum
Conservation—chilled	Fresh and frozen	0.892	9	42	30	48	43	27	199
Cuts—slices	Flakes and trimmings	0.269	3	14	9	15	10	9	60
Cuts—other		0.686	8	28	25	31	35	26	153
Smoked	Non-smoked	0.502	7	23	22	26	17	17	112
Gravlax	Non-gravlax	0.018	1	1	1	0	1	0	4
Ingredient	Without ingredient	0.242	3	10	6	13	16	6	54
Weight—individual	Fixed weights	0.081	0	0	6	2	8	2	18
Brand—other national	BEY, Young's, Trawlic	0.193	9	0	8	13	8	5	43
Brand—private		0.776	0	42	27	37	37	30	173
Organic	Non-organic	0.049	0	2	0	0	4	5	11
Origin—Scotland	Imported	0.83	2	42	35	46	30	30	185
Total products by retailer			11	42	36	51	47	36	223

frequently compared to imported products (185 versus 38 times). In contrast, only M&S, Tesco, and WAIT offered organic salmon. There was a total of 11 organic salmon products sold by these three retailers.

Asplund and Sandin (1999) note that product longevity can be regarded as a spell in the duration modeling terminology. A spell is defined as the number of periods (weeks, in this case) between the time a product enters the marketplace and its withdrawal from the marketplace. Product longevity, or product duration, is then measured as the number of periods in a spell. The mean spell, or duration for products of Scottish origin was 33.9 weeks, compared to the 34.2 weeks for products of foreign origin. Organic salmon has a longer mean duration than conventional salmon (38.9 versus 33.7 weeks).

Like the data used in other studies (e.g., Sogn-Grundvåg, et al., 2019; Cojocaru et al., 2019), our data have a censoring issue, as some spells may have begun before and/or ended after the sample period. In the literature, the hazard rate (and survival function) is estimated by using the Kaplan–Meier (product-limit) estimator, which is robust to censoring (Bojnec & Fertő, 2012). Thus, this approach is adopted here. It should be noted that there were no instances of products reentering the marketplace during the study period. We use econometric methods to explore how country-of-origin and organic labels affect product longevity for salmon.

Empirical model

A duration model investigates the probability of survival (termination) of a spell at each point in time. The survival function is given as:

$$S(t) = \text{Probablity}(T \geq t) \tag{1}$$

where the value of $S(t)$ is the probability of a commodity's longevity not shorter than time t.

From the survival function, the hazard rate can be derived. The hazard rate is an estimate of the instantaneous rate at which a spell (product longevity) ends after t periods, conditional on it having survived until t. The hazard function is given by:

$$\lambda(t) = \lim_{\Delta t \to \infty} \frac{P(t \leq T \leq t + \Delta t | T \geq t)}{\Delta t} = \frac{F(t + \Delta t) - F(t)}{\Delta t S(t)}$$

$$= \frac{f(t)}{S(t)} \tag{2}$$

where $F(t)$ and $f(t)$ are the cumulative distribution function and the probability density function of the spell, respectively. A high hazard rate means that product longevity terminates more rapidly. Covariates can potentially affect the hazard rate (and survival). If changes in a covariate increase the hazard rate, this covariate reduce product longevity.

We apply the Cox proportional hazard model (Cox, 1992) to evaluate the impact of the covariates on hazard rate (and commodity longevity). The Cox model assumes a proportional relationship between the baseline hazard and the unique effect of a covariate, which makes it unnecessary to specify the baseline hazard. The Cox model is given as:

$$\lambda(t_i) = \exp(X_i'\beta)\lambda_0(t_i) \tag{3}$$

where X is a vector of covariates; β is the parameter matrix and $\lambda_0(t_i)$ is the base hazard rate. The exponential of a parameter represents the ratio of the hazard rate due to a one-unit change in the corresponding covariate and the baseline hazard. For example, for the coefficient β_j of X_j :

$$\exp(\beta_j) = \frac{\exp(\beta_{j\sim}X_{j\sim} + \beta_j(X_j + 1))}{\exp(\beta_{j\sim}X_{j\sim} + \beta_jX_j)} \tag{4}$$

where $X_{j\sim}$ and $\beta_{j\sim}$ represent the vector of all covariates except for X_j and the vector of all coefficients except for β_j, respectively.

The variables used in our empirical analysis are primarily binary variables. For a binary variable, a significant coefficient with a positive sign indicates that its exponential is greater than one, and the relevant products have a high hazard (short duration) following changes in the binary value (from 0 to 1); the opposite is valid for a negative coefficient.

When testing the impact of the organic label and country-of-origin label on product longevity, we need to control for other factors that also affect product longevity. According to Sogn-Grundvåg et al. (2019), the price of fish products and their attributes, such as conservation, cuts, smoked or not, gravlax or not, with or without ingredients, weights and brand, are the main determinants influencing product longevity in the market. Additionally, heterogeneity has been found among retailers in how they

price products according to their attributes (Asche et al., 2015; Zhang et al., 2018). This indicates that the influence of organic labels and country-of-origin labeling on product longevity may vary across retailers. In order to account for retailer heterogeneity, we add interaction terms between retailers and *Organic* for Model 1 and between retailers and *Origin—Scotland* for Model 2. This specification gives:[4]

$$
\begin{aligned}
\log\ (\lambda_i) = {} & a_1 \log(Price_i) + b_1 Conservation\text{—}chilled_i + c_1 Cut\text{—}slices_i \\
& + c_2\ Cut\text{—}other_i + d_1 Smoked_i + e_1 Gravlax_i + f_1 Ingredients_i \\
& + g_1 Weight\text{—}individual_i + h_1 Brand\text{—}priviate_i \\
& + h_2 Brand\text{—}other\ national_i + m_1 Organic_i + r_1 Lidl_i \\
& : Origin\text{—}Scotland_i + r_2 M\&S_i : Origin\text{—}Scotland_i + r_3 MORS_i \\
& : Origin\text{—}Scotland_i + r_4 SAIN_i : Origin\text{—}Scotland_i + r_5 Tesco_i \\
& : Origin\text{—}Scotland_i + U_i,
\end{aligned}
$$

$$(5)$$

$$
\begin{aligned}
\log\ (\lambda_i) = {} & a_1 \log(Price_i) + b_1 Conservation\text{—}chilled_i + c_1 Cut\text{—}slices_i \\
& + c_2\ Cut\text{—}Other_i + d_1 Smoked_i + e_1 Gravlax_i + f_1 Ingredients_i \\
& + g_1 Weight\text{—}individual_i + h_1 Brand\text{—}priviate_i \\
& + h_2 Brand\text{—}other\ national_i + n_1 Origin\text{—}Scotland_i + r_1 Lidl_i \\
& : Organic_i + r_5 Tesco_i : Organic_i + WAIT_i : Organic_i + U_i,
\end{aligned}
$$

$$(6)$$

where λ_i is the base hazard rate; log ($Price_i$) is price in the logarithmic scale; other attributes and retailers are coded as binary variables and U_i is the error term. Table 1 presents the definition of the binary variables and descriptive statistics. The mean value of each binary variable is the share of salmon products with this corresponding attribute in the full sample. For example, for the conservation categories, chilled salmon products account for 89.2% of all products.

As a robustness test, we combine Model 1 and Model 2 to obtain Model 3, which includes interaction terms between retailers and *Organic,* and between retailers and *Origin—Scotland*.

Results and discussion

We first apply the Kaplan–Meier filter to estimate the survival function, which is modeled as a sequence of conditional probabilities that the product will remain beyond week *t,* given that it has already survived *t* weeks. Figure 1

presents the estimated survival probabilities for organic salmon, conventional salmon, and the full sample.

Figure 1 shows that the survival probability of organic salmon is generally greater than the probability for conventional salmon and all salmon products (the full sample). Additionally, organic salmon has gradually changed its pattern of survival. For example, the survival probability of organic salmon is stable in the early periods, then falls to 0.8. This dynamic pattern may be due to the limited number of organic salmon products in the market in the study period.

Figure 2 presents the results for Scottish salmon, imported salmon, and the full sample. In Figure 2, at each point in time before 2013, Scottish salmon had a lower survival rate than imported salmon. However, the survival probability of imported salmon products after 2013, given that they were already in the market, was much smaller than the counterpart of Scottish salmon. At the end of the sample period, Scottish salmon had a higher probability of staying in the market than imported salmon.

Table 2 presents the estimation results of Model 1 with interaction terms between retailers and *Organic*, Model 2 with interaction terms between retailers and *Origin—Scotland*, and Model 3 with the two types of interaction terms.

For Model 1, the results indicate that the interaction terms between *Origin—Scotland* and MORS, and between *Origin—Scotland* and Tesco are statistically significant. For the other four retailers, the interaction terms are not significant. The different impacts of the Scottish country-of-origin label on product longevity are in line with retailer heterogeneity regarding the price premium of attributes. Asche et al. (2015) found different price premiums for Scottish salmon in retailers based on the positioning of the retailer and store size. Moreover, the coefficients are positive and statistically significant for Morrison and Tesco, which is indicative of a higher risk of exit for Scottish salmon sold by these two retailers. In Model 1, the individual variable *Organic* reveals the impact of organic salmon on product longevity, relative to conventional salmon and regardless of retailers. The coefficient of *Organic* is significant and positive, suggesting that organic salmon has a higher risk of exit than conventional salmon.

Model 2 investigates how the survival risk of organic salmon compares to that of conventional salmon from Lidl, Tesco, and WAIT. For the three interaction terms, only the one between *Organic* and Tesco is significant. Organic salmon sold by Tesco has a higher risk of exit than conventional salmon o in the market. However, organic salmon sold by Lidl and WAIT has the same survival rate as conventional salmon in the market, holding other factors (attributes) constant. Asche et al. (2015) estimated the price premium of organic salmon at around 22% in WAIT. In a different market, Ankamah-Yeboah, Nielsen, and Nielsen (2016) documented the price
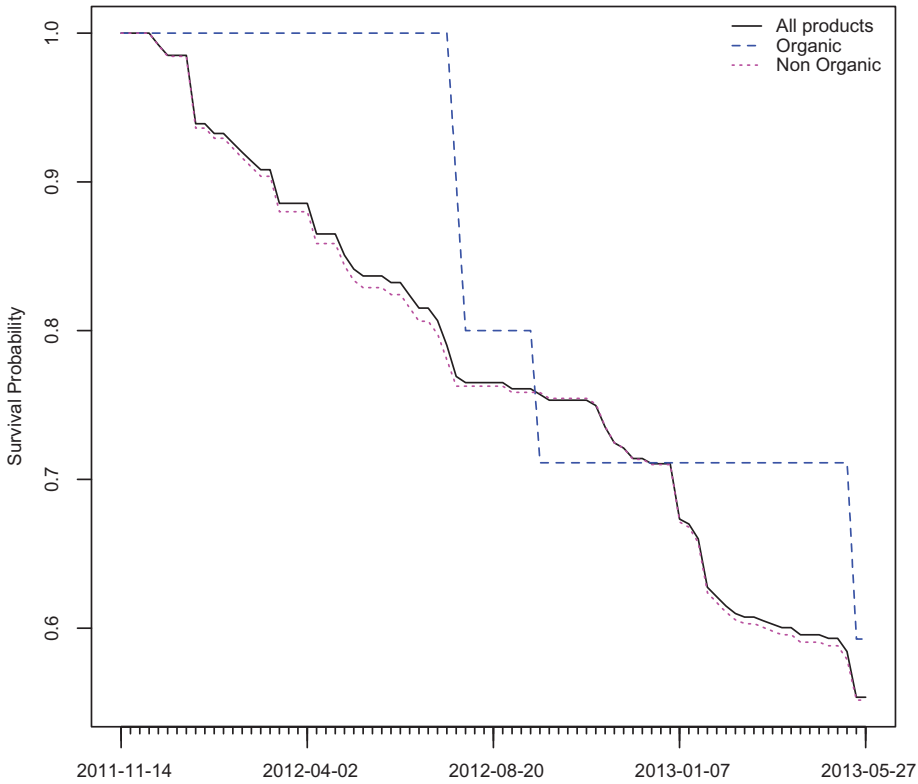
Figure 1. Empirical Kaplan–Meier survival functions for organic and conventional salmon.

premium of organic salmon at 20%. A high price premium does not extend the product's lifetime on the retailers' shelves, but this may occur due to other factors, such as substitutability between organic and conventional salmon products, or simply consumer demand for organic salmon and the marketing strategies of other actors in the value chain. The individual variable *Origin—Scotland* is significant and positive, indicating that the risk of withdrawal is much higher for Scottish salmon than it is for imported salmon on the market, regardless of retailer. For whitefish, Sogn-Grundvåg et al. (2019) found that products labeled with Scottish origin do not stay on the shelves any longer than imported fish, which may be attributed to mixed impacts of product origins on various species and in different marketplaces.

The robustness of the results estimated by Model 1 and Model 2 is confirmed by the estimation results of Model 3, noting the consistency between the estimated coefficients of the interaction terms in Model 1 (Model 2) and Model 3, regarding both significance level and magnitude. The interaction terms between MORS and *Origin—Scotland,* and between Tesco and *Origin—Scotland* are significant under Models 1 and 3, with marginally different parameter values. The interaction term Tesco and
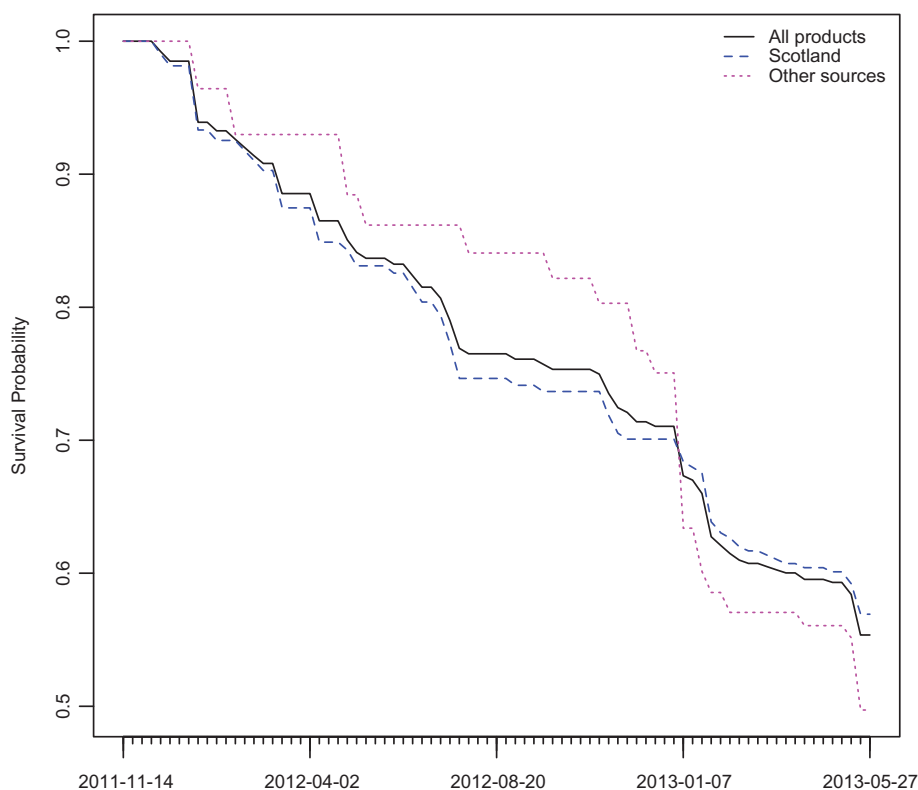
Figure 2. Empirical Kaplan–Meier Survival functions for Scottish and imported salmon.

Organic is significant in models 2 and 3, with slightly different parameter values.

For the control variables, the estimation results from the three models are similar. The only exception is the price variable, which is only significant in Model 2. The chilled salmon is the dominant product regarding conservation forms (see Table 1). The significant parameter of *Conservation—chilled* indicates that the chilled salmon products have a higher risk of withdrawal than the much less perishable frozen products. Compared to unsmoked salmon, smoked salmon has a high hazard rate, which reflects the dynamic pattern of the niche market. Products labeled with small national brands and private brands have a much lower risk of withdrawal than the base products with the dominant national brands. Suppliers with the prevailing national brands may have strong product development capabilities which they use as marketing strategies to optimize profit.

Conclusions

Ecolabeling is becoming increasingly popular in the seafood market, with a rapidly increasing number of labels as well as certified fisheries or

Table 2. Cox model estimation results.

Variable	Model 1 Estimate	Model 2 Estimate	Model 3 Estimate
Log (Price)	−0.454 [0.376]	−0.756** [0.353]	−0.49 [0.384]
Conservation—chilled	1.345** [0.645]	1.369** [0.645]	1.253* [0.654]
Cuts—slices	0.645 [0.764]	0.757 [0.748]	0.634 [0.766]
Cuts—other	0.635 [0.773]	0.84 [0.762]	0.624 [0.775]
Smoked	1.007*** [0.333]	1.044*** [0.325]	0.994*** [0.334]
Gravlax	0.283 [0.773]	0.38 [0.769]	−0.285 [0.773]
Ingredient	0.274 [0.292]	0.335 [0.281]	0.252 [0.294]
Weight—individual	0.438 [0.567]	0.323 [0.627]	0.213 [0.638]
Brand—other national	−1.903** [0.791]	−1.927** [0.786]	−1.82** [0.797]
Brand—private	−2.441*** [0.788]	−2.563*** [0.778]	−2.382*** [0.791]
Organic	0.958* [0.551]		
Origin-Scotland		0.737* [0.402]	
Lidl: Scotland	0.531 [0.82]		0.546 [0.826]
M&S: Scotland	0.373 [0.479]		0.458 [0.511]
MORS: Scotland	0.749* [0.412]		0.826* [0.433]
SAIN: Scotland	0.432 [0.48]		0.493 [0.497]
Tesco: Scotland	1.092** [0.468]		1.151** [0.483]
WAIT: Scotland	0.207 [0.489]		0.3 [0.511]
Lidl: Organic		0.75 [1.046]	0.772 [1.061]
Tesco: Organic		1.825* [0.969]	1.697* [0.965]
WAIT: Organic		0.675 [0.773]	0.685 [0.792]

Notes: "***," "**," and "*" denote the significance at the 1, 5, and 10% levels, respectively.

aquaculture plants (Osmundsen et al., 2020; Roheim et al., 2018). Moreover, in a number of countries, country-of-origin labeling is mandatory and is believed to lead to a preference for domestic origin (Asche et al., 2015). In addition, there are differences between retail chains regarding how ecolabels are used in terms of number of products, price premiums and product longevity (Sogn-Grundvåg et al., 2019). However, the literature provides mixed results with respect to whether there is a price premium associated with ecolabeled or country-of-origin labeled products, indicating that there may also be other reasons for using ecolabels. The findings of Sogn-Grundvåg et al. (2019) suggest that cost considerations may be one such factor and that, for whitefish products, longer product

longevity may reduce new product development and marketing costs associated with ecolabels. However, the same study did not find any effect of country-of-origin labeling on product longevity for whitefish (Sogn-Grundvåg et al., 2019).

In this study, we investigate factors that influence product longevity for salmon products in grocery retailing in Scotland. In contrast to whitefish, salmon comes primarily from aquaculture, a production process with significantly more control over the quantity produced compared to fishing where future catches are uncertain due to poor weather conditions and variations, *inter alia*, in fish migrations and stock sizes. Additionally, salmon is primarily sold as fresh, in contrast to whitefish where less perishable product forms, such as frozen, salted and dried, are more common in some markets. These characteristics differentiate salmon supply chains significantly from those of whitefish (Asche et al., 2018; Asche, Roll, & Tveterås, 2007).

The empirical results indicate that the farmed species salmon is indeed different from wild-caught whitefish with respect to product longevity. In particular, the most important factors for increased product longevity for salmon are private brands, followed by national brands. The impact of credence attributes such as ecolabels or domestic origin labels on product longevity varies by retail chain. While all chains carry salmon labeled with the Scottish origin, only three carry organic salmon, suggesting different strategies with respect to how the labels are used. The specific effects also vary in that the origin label has a statistically significant impact in two of the chains and the organic in one. Moreover, in contrast to whitefish, these attributes are shown to reduce product longevity. This suggests that coordination in the supply chain is the most important factor influencing product longevity, as argued by Kvaløy and Tveterås (2008), a feature that is not too surprising given the high share of salmon being marketed as fresh. The availability of salmon year-round in Scotland also indicates that domestic salmon has a reduced longevity as it is easy to find an alternative source in case of a supply disruption, in contrast to what is typically the case for whitefish. For the two high-end retail chains, organic and Scottish origin do not influence product longevity at all. This supports the results from Asche et al. (2015) who argue that sustainability attributes are integrated in their general pricing and product strategy.

Notes

1. Roheim et al. (2018) discuss cases where environmental organizations may damage retailers' brands by demonstrating that they are sourcing unsustainable seafood.
2. There are also examples of fisheries that stop using ecolabels as shown by Blomquist et al. (2020).

3. Initially, most seafood ecolabels focused on wild fish and few labels certified farmed fish. Hence, organic labels became a popular signal for fish farmers who want to signal sustainable production practices (Asche et al., 2015; Ankamah-Yeaboah et al., 2016; Ankamah-Yeaboah, Nielsen, & Nielsen, 2019; Ankamah-Yeaboah, Asche, Bronnmann, Nielsen, & Nielsen, 2020)

4. Asche et al. (2015) applied the same data to evaluate the determinants of salmon price in this market. The attribute variables used in this study are marginally different from their coding results. For some attributes, we use the dominant category/categories as the binary variable(s) in the model, with the minority category/categories being the base. The preliminary estimation results show the specification with the same variables in Asche et al. (2015) are not convergent.

Funding

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