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Organic Salmon – Considered a Fisheries or Agricultural Product Among Consumers?

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Background

- Environmental concerns have become the forefront of consumer choice decisions and production processes.
- Market based incentives (Ecolabels) – being used as a regulation mechanism due to inadequacy of the traditional “command and control systems”.
- Capture sector – Marine Stewardship Council (MSC)
- Aquaculture – ASC (showing promising growth) and Organic Systems
- For Aquaculture ...
- EU’s implementation of the full organic aquaculture production life cycle in 2016 implies shift in production costs for member countries.



Background

- A higher price is needed to maintain profitability – a necessary condition is consumers' identification of organic products in the market.
- **Are consumers willing to pay extra price to incentivize organic producers? – ecological price premium**
- Most studies have tried to answer this with a stated preference approach – "... skeptics surrounding the hypothetical nature"
- This study provides evidence using retail market data on household salmon purchases in Denmark.



Background

- In the **capture fisheries** much empirical evidence abound for ecological price premium
- **MSC**, the most studied for different seafood products with a price premium ranging from **10% - 14%** - Roheim et al., (2011), Sogn-Grunvåg et al., (2013, 2014), Asche et al., (2012) and Blomquist et al., (2014) – UK and Sweden
- How about **Aquaculture**? Asche et al., (2012) - **25%** salmon price premium.
- **Contribute** to the literature on ecological price premium for Aquaculture, an emerging market and to inform producers if their efforts are been rewarded.
- **SIZE MATTERS**: considered fisheries or agriculture? Compare the size to MSC fisheries and organic agriculture (15-60%): Wier et al. (2008), Baltzer (2004).



The Danish Seafood Market: Some Facts

- Smaller consumption but larger production (90% trout) and a bigger export market (6th exporter of fish and fisheries products)
- It is an intermediary market – imports are as big as exports
- The leading producer of organic trout, modest salmon production
- Relatively high per capita fish (24kg/year) consumption, organic food (2nd highest) and organic market share (highest).
- The domestic seafood and organic food distribution is dominated by super market chains.
- Frequency of fish consumption is low (1.4x/week) – EU average of 1.5



Data

- GfK Household scanner panel data – rotating panel
- 2011 – 2013 : organic product records start
- Data include date of purchase, expenditure, volume and attributes of the product.....and a lot more.
- The data identifies if a product is organic (but not the type of organic label)
- Variables included in the estimation are:-----



Data Summary

Table 1 Summary Statistics and Variable Description

Variables	Mean	Std. Dev	Variable Description
Price_Dkkg	158.73	65.50	Price measured in DKK per Kg
Organic Price	190.98	109.06	Price of organic salmon in DKK per Kg
Conv. Price	158.63	65.31	Price of conventional salmon in DKK per kg
Ln(price)	4.98	0.44	Log of price
Volume (Vol)	0.28	0.23	Volume purchased in Kg
Organic (Org)	0.003	--	Dummy variable: 1if organic, 0 otherwise
Brand (Br)	0.77	--	Dummy variable: 1if brand label, 0 private label
Fresh (Fr)	0.86	--	Dummy variable: 1if fresh, 0 frozen
Pr_Smoked (Prc)	0.50	--	Dummy variable: 1if smoked, 0 otherwise
Pr_Marinated (Prc)	0.22	--	Dummy variable: 1if marinated, 0 otherwise
Fm_Fillet (Fi)	0.90	--	Dummy variable: 1if fillet, 0 whole fish
Specoffer (Sp)	0.45	--	Dummy variable: 1if on special offer, 0 normal price
Year_2012	0.36	--	Dummy variable: 1if year 2011, 0 otherwise
Year_2013	0.34	--	Dummy variable: 1if year 2012, 0 otherwise
Year_2011	0.30	--	Dummy variable: 1if year 2013, 0 otherwise
Season1(Se)	0.23	--	Dummy variable: 1if quarter 1, 0 otherwise
Season2 (Se)	0.26	--	Dummy variable: 1if quarter 2, 0 otherwise
Season3 (Se)	0.23	--	Dummy variable: 1if quarter 3, 0 otherwise
Season4 (Se)	0.24	--	Dummy variable: 1if quarter 4, 0 otherwise

Notes: Abbreviations in parenthesis were used in the model expression (see below).



The Hedonic Model

- Rosen's hedonic model – consumer choice problem

$$\max U(\mathbf{x}, \mathbf{z}) \quad \text{s.t.} \quad m = \mathbf{x} + \mathbf{p}(\mathbf{z})$$

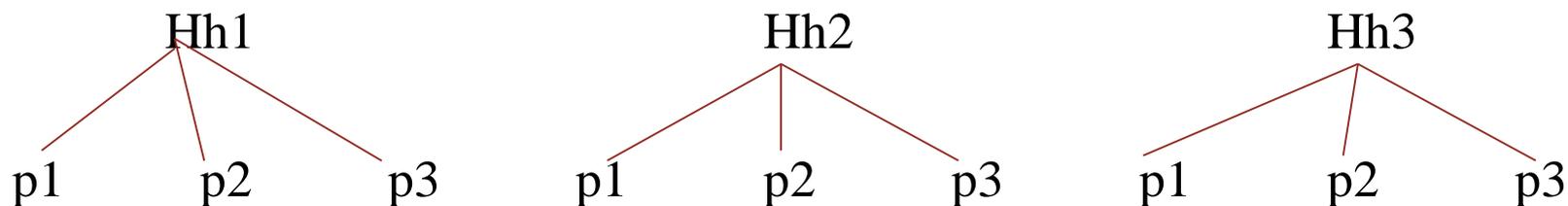
- Where \mathbf{x} =numeraire good, \mathbf{z} =vector of attributes
- The FOC solution yields price: $\mathbf{p}=\mathbf{f}(\mathbf{z})$
- Assumption: supply of attributes is perfectly inelastic (Wilson, 1984).
- **Empirical Specification:**
- Box-Cox Transformation: Log-Linear model --- OLS

$$\ln P_{it} = \alpha + bVol_{it} + \beta Org_{it} + \delta Br_{it} + \phi Fr_{it} + \sum_{n=1}^{p-1} \gamma_n Prc_{it} + \varphi Fi_{it} + cSp_{it} + \sum_{j=1}^{s-1} \theta_j Se_{it} + e_{it}$$



Empirical Specification

- Assumption of independent observations might not be realistic –OLS in panel analysis. Hence--- Mixed Linear model (Multilevel Model)



$$\ln P_{ij} = a + bVol_{ij} + \beta Org_{ij} + \delta Br_{ij} + \phi Fr_{ij} + \sum_{n=1}^{p-1} \gamma_n Prc_{ij} + \phi Fi_{ij} + cSp_{ij} + \sum_{h=1}^{s-1} \theta_h Se_{ij} + u_{0j} + e_{ij}$$

- Control for unobserved heterogeneity across households

$$u_j \sim N(0, \sigma_u^2) \text{ and } e_{ij} \sim N(0, \sigma_e^2).$$

Results

Variables	-----OLS-----		-----MLM (Random Intercept)-----		
	Coefficient Estimate	Robust Std. Error	Coefficient Estimate	Cluster Rob. Std. Error	$(e^{\theta} - 1) * 100$
Volume (Kg)	-0.505***	0.021	-0.503***	0.028	
Organic	0.363***	0.033	0.180***	0.061	19.7%
Fresh	0.294***	0.008	0.263***	0.011	30.1%
Pr_Marinated	0.265***	0.008	0.258***	0.011	29.4%
Pr_Smoked	0.248***	0.007	0.239***	0.011	27.0%
Fm_Fillet	0.072***	0.008	0.053***	0.010	5.4%
Brand Label	0.015***	0.006	0.021***	0.008	2.1%
Special offer	-0.240***	0.005	-0.198***	0.007	-17.3%
Season1	-0.001	0.007	-0.005	0.006	-0.5%
Season2	-0.014**	0.006	-0.013**	0.006	-1.3%
Season3	0.034***	0.007	0.026***	0.006	2.6%
Constant	4.712***	0.015	4.718***	0.019	

Model Performance

	OLS	MLM
σ_u^2		0.030
σ_e^2		0.074
AIC	9777	6941
Prob > LR- x^2 ($\sigma_u^2 = 0$)		0.000
Prob > F/(x^2)	0.000	0.000
R_1^2	0.477	0.476
R_2^2		0.515
Observations	18,471	18,471
Number of Households		2,342

***, **, * indicates significance at $p < 0.01$, $p < 0.05$, $p < 0.1$. MLM, multilevel model. θ is parameter estimate.

⁷ If $\sigma_u^2 = 0$, then the linear regression model (OLS) provides a better fit (thus the u_j should be omitted from the model).

Results

- Organic fish commands a price premium of approximately 20%. However, not valued over Fresh, marinated and smoked products.
- Freshness is the most valued. Value added products (such as breading and stuffing) are perceived to mask the product quality and so commands a discount.
- Private retailer labels are used to provide economy valued products as opposed to brand labels.
- Seafood prices were higher in the 3rd quarter (July-September). Highest in July (5%) and August (6%). Volatility is highest just before harvest, summer or early fall (Oglend, 2013).



Conclusion

- The estimated premium of 20% is higher than MSC fisheries (10-14%), hence valued (considered) like organic agriculture (15-60%).
- As an emerging market, this is likely to reduce with economy of scale as time evolves.
- Certainly good news for producers if the premium would be transmitted along the value chain (magnitude and speed of transmission?).
- **Limitation:**
- Comparison of premiums from same market would have been optimal. We do so due to similarities in organic market of UK and Denmark (Wier et al, 2004).
- Ability to control for fisheries/aquaculture could boost further explanatory power.



THANK YOU FOR YOUR ATTENTION !

Your Contributions are Welcome

