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How does the European seafood industry stand after the revolution of salmon farming: An economic analysis of fish prices[☆]

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Abstract

The introduction of farmed salmon on the European fish markets has coincided with major organisational changes within the value chain. The present paper investigates the extent to which the value spread between the intermediaries has been modified thereafter not only for salmon but also for a few wild-caught species. The background of cointegration theory has been extended to refine the analysis of price transmission along the fish value chain. As a result, one could admit that the introduction of farmed salmon and globalisation of fishery markets has certainly benefited to the European consumers, but probably not to the extent of the most optimistic expectations because of market imperfections.

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1. Introduction: a large-scale study of seafood prices in Europe

This article presents the outcome of a 3-year research project on margins and prices along various seafood market chains. The main objective of the study was to consider the impact of a large-scale technological change (salmon farming in Norway, Chile, Canada, Ireland and Scotland) on the organisation of the European seafood industry. Some questions which arise are—has the growth in the salmon industry created jobs in the European Union, or simply diverted them from other industries; to what degree has this product been

substituted for other domestically produced species; how has the shift from wild-caught resources to farmed products affected the organisation of the seafood industry; and how has the value been distributed along the supply chain between the different stake-holders (producers, traders, processors, retailers)?

These questions are of particular interest to the industry and have been looked at using various up-to-date economic models and techniques in order to improve both the understanding of how the changes have affected the industry, and the knowledge of the scientific concepts used in connection with market analysis. The issue of price transmission is one which is subject to intensive and ongoing discussion among economists looking at market power, transaction costs, asymmetry of transmission or imperfect information in markets. System dynamics, industrial organisation, cointegration theory, along with agricultural economics and economic sociology provide the analyst with complementary and useful tools for market analysis.

All these models and theories have been used to improve the understanding of the European fish markets along vertical chains. Such a vertical perspective raises important issues because the value chain represents an area of interacting markets where a shock on raw materials (i.e. from the depletion of natural stocks,

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quota reduction, increased levels of fishing effort, innovation on fish farming, etc.) may be transmitted to the rest of the industry (processors, wholesalers, fish-mongers). In reaction to this, companies may develop a bundle of strategic options to cope with the supply shock (vertical merger, supply agreement, contracts and sub-contracts, etc.), resulting in organisational changes within the industry.

Theoretical thinking within the transaction cost school of thought predicts that the greater the uncertainty and the specificity of assets surrounding a transaction, the more likely the latter will be organised through a hierarchical arrangement (such as a pure vertical integration). The information given by prices on markets (variability, trends and cycles, level of gross margins) is very rich for the appraisal of uncertainty and the estimation of the bargaining power on the market (for supply and demand). For instance, the decreasing trend of salmon prices throughout the world quite clearly reveals the tremendous output level achieved by the suppliers due to higher productivity permitted by technological changes and economies of scale. The smooth evolution of prices also gives some insight as to the control over production achieved by salmon breeding, reducing the unexpected shocks on both supply and demand sides. This is not possible with the harvest of wild species in the case of fishing where seasonal and weather conditions have a much bigger effect on production.

2. Theoretical and methodological approach

The results discussed in this paper are derived from a number of studies.¹ To provide a complete description is outside the scope in a paper like this where we focus on the policy implications of the results. We will therefore in this section just mention the theoretical and methodological approaches used, and refer to the original studies for further details. The starting point of the analysis in this study is the economic theory of marketing margins and price transmission, of which an excellent recent review can be found in Wohlgenant [24]. Recognising that most price series are nonstationary, a cointegration approach was used to analyse the pure marketing margin and the degree of price transmission in a number of European fish markets [2]. The approach using only price data was extended by testing for asymmetry within the price transmission process [11], and structural changes [12]. Data for exchange rates were also included in some studies to investigate whether there were cross border effects [3].

To obtain information in greater detail for some marketing chains, case studies were conducted where different theoretical and methodological approaches

were used to shed as much light as possible on each case given market characteristics and the data available. The evolution of margins and the structural pattern of marketing chains over time has been examined through the use of different models of system dynamics [13]. Market power has been estimated using structural models such as a dynamic partial adjustment model [14], or through pricing-to-market models that are able to capture price discrimination between different export markets [15]. All results obtained by such quantitative methods were analysed with the support of qualitative information obtained by ethnographic and sociological surveys [16]. Although the main focus of the project has been on economic issues, an original contribution of the present research lies in the cross referencing between the hypotheses deduced from theory in different subjects, and the feedback from the empirical work in the different areas for further model specification and in the discussion of results.

3. Distortions along the European seafood marketing chains

Fish are marketed with various intermediaries between producers and final consumers. The number and the nature of the intermediaries, market structures at each stage of the value chain and other factors related to the organisation of markets may substantially affect the transmission of information throughout the chain. Among other techniques, cointegration suits to assess the quality of price transmission when dealing with long and nonstationary price series.

The analysis of vertical transmission of prices through a cointegration approach has resulted in the acknowledgement of a rather competitive marketing chain for seafood products in Europe. Many price relations have been tested on a monthly basis, with respect to different species (salmon mainly, but also salmon trout, cod, hake) and different product forms (fresh or frozen, whole and fillets, dried-salted, smoked, etc.). Most of the 57 price relations were found to be cointegrated, indicating that prices at different stages of the value chain are moving together in the long-run. However, full price transmission² was not proved for 43% of the

²Several degrees were considered in the price transmission throughout marketing chains, according to the results obtained from the tested relation between two nonstationary prices at the upstream (P_2) and downstream (P_1) stages. In the model $P_1 = \alpha P_2^\beta$ the highest transmission comes when proportionality is found in the long run between the two series, which only can be obtained with $\beta = 1$. If $\beta \neq 1$, transmission can still be high with a trend in the relation. The mere cointegration, demonstrated without evidence of proportionality or price transmission with a trend, indicates that prices are simply moving altogether in the long run, thus showing the evidence of price transmission in its weakest form.

¹[1–5], Ferreira (2002), [6–10].

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