Analysis Of The Merluccius Merluccius Market Chain. Estimated Results For Production In Galicia

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ABSTRACT

Hake is the preferred groundfish in Southern European markets. Spain is the largest hake market in the world, and accounts for one half of the total European consumption of hake. The aim of this study is to analyse the evolution of prices at first-hand sale level, at wholesale level and retail level in the commercialisation chain of one of the most-fished demersal species in the north-east Atlantic's mixed fisheries, the Merluccius merluccius. In particular, we are testing a dynamic model to identify and measure the effect the level of price uncertainty has on the evolution of commercial margins, using monthly data relating to the last five years for this species in a regional market (Galicia, NW Spain), significant for its volume of landings. The results show that transitory changes in prices at first-hand sale level are absorbed neither by the wholesale level nor the retail level. A counter-cyclical price effect is observed, with the result that in periods when prices at first-hand sale level are low the wholesale and retail percentage margin is higher

Keywords: Fishing market; Commercialization Chain; European hake

1.   INTRODUCTION

European hake (Merluccius merluccius) is a species catalogued within the demersal species group, distributed in a large area between the northern coast of Morocco and the North Sea. According to information provided by EUROSTAT, in 2007 European hake catches stood at around 64,500 tonnes, which represents slightly more than 1% of the total weight landed by EU countries. Of the producing countries in the north-east Atlantic, Spain, France and the UK stand out.

The species is particularly highly-valued by Spanish consumers, to the extent that, as its own production is insufficient to meet consumer needs, Spain resorts to importing hake from the abovementioned EU countries. In addition, other non-EU countries (especially Chile, Argentina and South Africa), supply a similar product (although different species) which are marketed under the hake label. This product is flown in fresh to Spanish markets.

As the Spanish market is a market of reference, it is highly significant and the analysis of the evolution of hake prices and their impact on the agents which participate in the distribution chain can provide relative information to regulators when making intervention decisions, with the two-fold aim of adapting to the market reality and ensuring the fishery's sustainability.

The commercialisation of fresh fish is characterised by having certain unique features, given the high level of uncertainty, with regard to both quantity and quality, therefore having direct repercussions on prices. The level of seasonality of supply and, to a lesser extent, the seasonality of demand, is also important. Finally, the perishable nature of the product means that it must be sold quickly, a determining factor in price fixing and the profit margins of fish for the agents implied in its commercialisation.

In Spain, the fresh hake commercialisation process comprises a series of participating agents which give added value to the product until it eventually reaches the consumer. It is a complex and dynamic structure which begins at the extraction stage. The production sector plays little part in its subsequent commercialisation, its role being almost exclusively limited to placing the product on the market for sale, which facilitates operations in the next link of the commercialisation chain, the wholesalers. The wholesale level, symbolised by the Mercas (the main operators at the destination which channel approximately 60% of the marketed product), constitutes a very important part of the value chain. The Mercas are intermediaries which operate from the central market stalls and re-dispatch the product to other wholesalers in other locations or to retailers (fishmongers' supermarkets, etc.), which finish the process by making the product available to consumers.

In this context, the main aim of this study is to analyse the relationships between prices at the three levels of the distribution chain –at the source, at wholesale level and at retail level- of fresh fish landed in Galicia, which enables us to analyse the representativity of these commercialisation chain links and explain leaderships. The study is structured in the following way. In section 2 the data is presented. In section 3 we will show the econometric dynamic model and the results obtained. Lastly, in section 4, we will comment on the main conclusions of the study.

2.   THE DATA: THE GALICIAN MARKET

The data base used in the study is made up of seasonal data on a monthly basis for Hake (Merluccius merluccius) between January 2004 and December 2009. In particular, we have a series of prices and quantities for fresh north-Atlantic hake landed in Galicia. The data has been obtained from the XUNTA DE GALICIA, MERCASA and the Ministry of Trade and Industry.

The ultimate aim of this study being the analysis of the hake market behaviour in Galicia, the first phase of the study is given over to this fishery during the extraction stage, bearing in mind the catches landed in Galicia's thirty-five fish markets [25].

In Table 1 we can see a lay-out of annual production over the last five years. We can observe an increase in the catches landed and also in production value, in nominal and real terms. However, it should be underlined that the increase in the value of fishermen's production is due to the pressure on catches and not on the price level, as prices have dropped by up to 17% in real terms.

Table 1. Characteristics of Galician hake production. 2004-2009

	2004	2005	2006	2007	2008	2009
Annual Production (Tm)	16,795.388	19,658.148	21,257.60	21,857.11	26,438.96	29.858,68
Value production (1000 $_{€}$)	74,406.91	86,616.537	91,834.79	90,298.926	98,267.82	88.113,82
Value production (1000 $_{€-2003}$)	67,203.66	75,342.12	78,124.63	73,754.21	79,365.78	79,165,85
Average price (€)	4.43	4.41	4.32	4.13	3.72	2.95
Average price (€$_{2003}$)	4.01	3.83	3.59	3.15	3.01	2,39

Source: Data calculated from a sample of 35 fish markets

Fragmentation at the fish-market level should be specifically highlighted. In Table 2, Galicia's most representative fish markets with regard to hake landings for the years 2004-2008 are shown. We can observe a high level of production concentration, as it is clear that approximately five fish markets, of the 35 that exist, absorb approximately 95% of the fresh hake landed in Galicia.

Bearing in mind the resource's extraction calendar and seasonal accessibility, the trend analysis of the hake fishery reveals increases in catches in recent years and, as a result, a drop in the price trend, following the usual market behaviour (see Graph 1). In this sense, considering that our study reveals important increases in hake production, and that in general world fishery resources are currently over-exploited, this would justify the interest of futures research into analysing the problem of capacity as a political priority, using fishing capacity estimations, technical efficiency and scale efficiency [6,10,14,16,20-23,].

Table 2. Distribution of hake sales in Galicia. First-hand sale.

Distribution Sales- The first-hand sale level (%)											
2004		2005		2006		2007		2008		2009	
First Sale	(%)	First Sale	(%)	First Sale	(%)	First Sale	(%)	First Sale	(%)	First Sale	(%)
Celeiro	35.27	Celeiro	33.36	Coruña	31.52	Coruña	30.09	Coruña	29.68	A Coruña	29,19
Coruña	31.03	ACoruña	30.77	Celeiro	28.33	Celeiro	25.32	Celeiro	25.73	Celeiro	26,66
Burela	18.84	Burela	17.68	Burela	16.76	Burela	17.2	Burela	15.77	Burela	15,56
Vigo	7.68	Vigo	8.12	Ribeira	12.00	Ribeira	15.27	Ribeira	15.20	Ribeira	12,81
Ribeira	3.31	Ribeira	6.02	Vigo	7.17	Vigo	7.57	Vigo	8.34	Vigo	11,93
Others	3.87	Others	4.05	Others	4.22	Others	4.55	Others	5.28	Others	3,84
Total	**100**	**Total**	**100**	**Total**	**100**	**Total**	**100**	**Total**	**100**	**Total**	**100**

Source: Data estimated from sample of 35 fish markets in Galicia.

Graph 1. Average production and prices of the first-hand hake sale level.
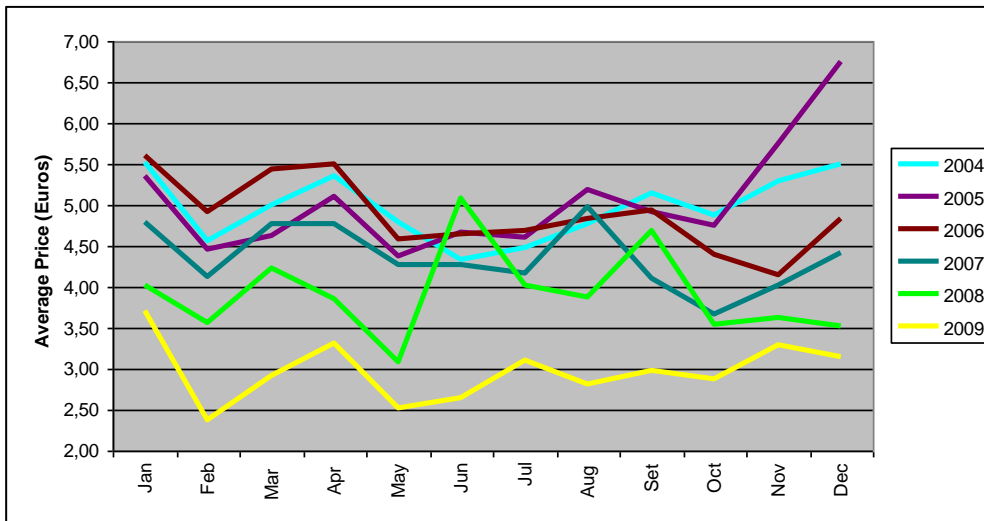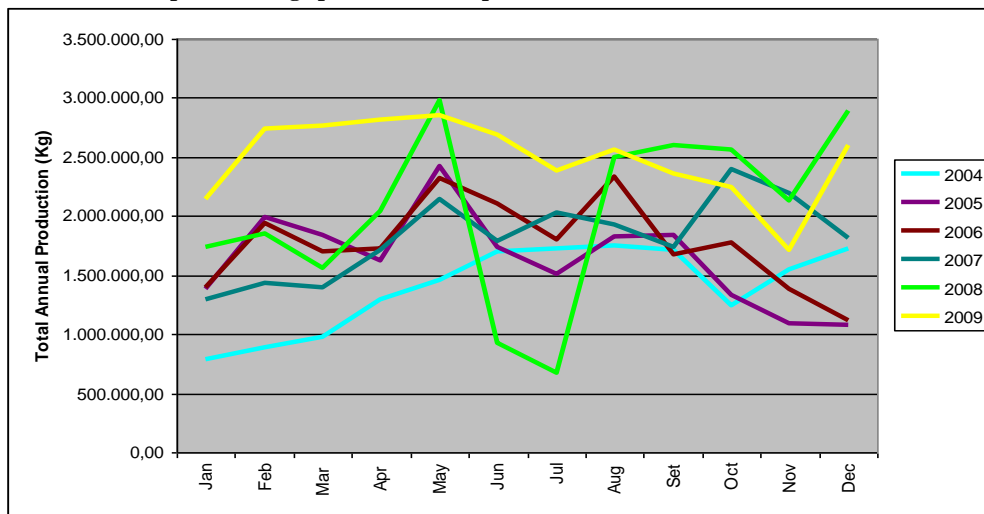
Source: Xunta de Galicia.

If we analyse the prices at the wholesale level of the commercialisation chain (see Graph 2), behaviour is homogenous at the first-hand sale level, whereas at the retail level the price level has remained stable in general, with the result that in certain periods the retail prices triple with respect to the fish market level [18-19].

Graph 2. Average wholesale and retail hake prices.
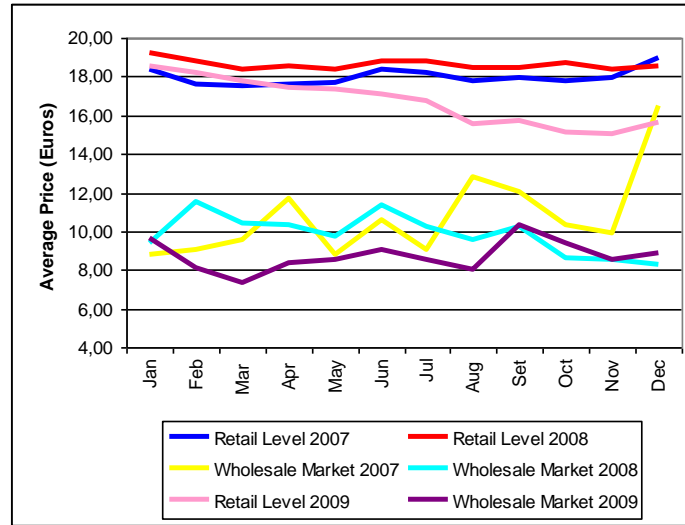
Source: Xunta de Galicia and the Ministry of Industry.

If we analyse price volatility, we can appreciate significant price falls as well as important increases within the first-hand sale level and the wholesale level, therefore proving greater variability, which could be linked to the level of uncertainty and inter-relationship at these two levels of the market chain. For its part, the retail level shows more stability and rigidity.

On the other hand, we analyse the average margins, expressed in percentages, of the first-sale/wholesale (Mwt) and the wholesale/retail (Mrt) distribution channel, as:

$$Mw_t = (Pw_t - Pf_t) * 100 / Pf_t$$

$$Mr_t = (Pr_t - Pw_t) * 100 / Pw_t$$

where Pft is the source price paid for hake in the year t, Pwt the price paid by wholesalers in the year t, and Prt the price paid by consumers at the retail level in the year t. Table 3 shows a descriptive statistics summary of the wholesale and retail margins, respectively. We can see that, in general, the retail margins are much higher than the wholesale margins, sometimes even doubling them in value.

Finally, we calculate a trend index for hake profit margins, obtained as the average of the profit margins (base=2003). (See Table 4).

In accordance with the average data for the year 2008, wholesale trend index results reflect that the margin experienced a 15.05% drop with respect to the average for 2007. This downward trend falls into line with the decreases shown in the sample as a whole, although the highest reduction occurred in 2008. On the contrary, in 2008 the retail margin showed an average increase of 10.716% with respect to the previous year, representing a significant increase in relation with the margin's average increases throughout the sample analysed.

Table 3. Annual Average Wholesale Margin (Mwt) and Annual Average Retail Margin (Mrt)

Year	Stat	HAKE	
		Commercial margin	
		Wholesale Margin (€)	Retail Margin (€)
	Mean	3.93	8.77
	Maximum	5.63	9.68
2004	Minimum	3.02	7.26
	Mean	3.96	8.30
	Maximum	5.44	9.91
2005	Minimum	2.47	7.33
	Mean	5.36	7.33
	Maximum	10.34	9.30
2006	Minimum	3.51	2.92
	Mean	6.40	7.23
	Maximum	9.21	9.61
2007	Minimum	3.97	2.50
	Mean	5.94	8.76
	Maximum	7.99	1.03
2008	Minimum	4.71	7.22
	Mean	5.89	8,79
	Maximum	7,86	1,03
2009	Minimum	4,68	7,56

Source: Data calculated from sample.

Table 4. Commercial Margin of the hake market (2003=100)

	Commercial Margin	
	Wholesale Margin	Retail Margin
	INDEX	INDEX
Annual average 2004	107.23	98.58
Annual average 2005	105.92	101.42
Annual average 2006	112.15	97..54
Annual average 2007	110.40	114.91
Annual average 2008	95.35	125.62
Annual average 2009	92,2	128,62

Source: Data calculated from sample.

3.   THE ECONOMETRIC MODEL

In order to test the possible contra-cyclical effect of the profit margins with respect to changes in the source prices, we will apply a dynamic econometric model using the Cochrane-Orcutt adjustment with the dependent variable being the profit margin of the wholesale and retail margin, respectively. The economic literature offers different theoretical structures for analysing fresh food prices considering models of perfect and imperfect competition, although empirical studies on fish markets are few and far between. The theoretical reference base [8] generates the development of numerous studies on price transmission dynamics from different approaches, mainly on food and agricultural products and, to a lesser extent, fish products [1-3,7,9,11-24]. Relevant contributions in the fisheries field are the pioneering studies which consider that during periods when the source prices of fresh products are low, the margins are high in order to increase profits [4,15,17].

The approach we follow in this study is fundamentally empirical and its aim is two-fold. Firstly, we aim to analyse the impact of price changes on the seasonal dynamics of wholesale and retail profit margins. Secondly, to identify the nature and the magnitude of the effect the variability associated with the prices has on the different margin levels. The equations of the model to be estimated have the following expressions:

$$Mw_t = \alpha + \rho Mw_{t(-1)} + \delta Pf_t^{\ d} + \varepsilon_{1t}$$

$$Mr_t = \phi + \eta Mr_{t(-1)} + \varpi Pw_t^{\ d} + \varepsilon_{2t}$$

where ε_{1t} and ε_{2t} are independent random perturbation vectors identically distributed as the normal distribution. In order to calculate the explanatory variables which incorporate market uncertainty (Pftd and Pwtd), we have used the centred moving averages for the three previous months (MM3Pft and MM3Pwt) as presented in the following expressions:

$$Pf_t^{\ d} = Pf_t - MM_3Pf_t$$

$$Pw_t^{\ d} = Pw_t - MM_3Pw_t$$

The results of the estimation of the model using the maximum likelihood method (see Table 5) enable us to obtain a statistically significant global adjustment for both market chains. In both cases, both in the first-sale/wholesale as well as the wholesale/retail chain, the constant term is highly significant, which indicates that at both levels the wholesale and retail agents, respectively, take a minimum percentage associated with the product as a starting point at which to set the margins.

Table 5. Results of the estimation of the commercial margin at the wholesale and retail levels.

Commercial margin of hake					
Distribution chain	**α/φ**	**$M_{t(-1)}$**	**P_t^d**	**R^2 Adjusted**	**DW**
First hand-Wholesale level	77.05**	0.47**	-7.05*	0.26	2.47
Wholesale-Retail level	91.71**	0.04	-10.88**	0.18	2.06

Source: Data estimated from sample * Indicates a level of significativeness with a 90% probability.** Indicates a level of significativeness with a 95% probability.
$M_{t:}$ will represent Mf_t for the first-sale/wholesale chain and Mw_t for the wholesale/retail chain
$P_t^{\ d}$: represents the explanatory variables which incorporate market uncertainty, $Pf_t^{\ d}$ for the first-sale/wholesale chain and $Pw_t^{\ d}$ for the wholesale/retail chain.

For its part, the autoregressive term is only statistically significant for the wholesale margin, which means that for each period wholesalers take the margin for the previous period as a reference, in which the remuneration components of the resources used to obtain the commercial distribution service are gathered implicitly.

The counter-cyclical effect on price changes, as the theoretical model proposes, can be seen to be statistically significant in both market chains, in such a way that when the prices undergo increases the margin narrows, and when they drop the margin widens. The coefficient of this counter-cyclical pattern is of a high significance and magnitude, especially in the wholesale-retail market chain, as it can be verified that when source prices are low this leads to more significant increases in their profit margin.

In consequence, we would contemplate a differentiated manner of behaviour in the price formation mechanism at these three levels of the market chain. At the fish market level, price-setting is probably partly determined by the supply whereas at the wholesale level, and especially at the retail level, typical market segment behaviours could have an influence, with the end aim of obtaining wider profit margins.

4.   CONCLUSIONS

The analysis of the European hake market is relevant in the European fisheries sector as it is a target species and has a high market value. In this scenario, the central aim of this study focuses on providing detailed information on the fish market/wholesale/retail market structure regarding fresh hake landed in one of its central regions (Galicia), with the end aim of obtaining a market situation diagnosis, thus making it possible to put in place suitable management measures for the stock and the sector. The sample period studied covers the years 2004-2009, using monthly data.

The fresh fish market chain is characterised by having sharp seasonal oscillations in the source prices and, to a lesser extent, at the wholesale and retail levels, respectively. This volatility is to a large degree a reflection of the uncertainty which characterises the supply in the fish markets. In the distribution process, the wholesale market trend indexes, according to average data for 2009, reflect a downward trend, in comparison with the retail margin, which shows significant increases.

The results of the estimation of the econometric model back up the theory of the counter-cyclical effect that the changes in source prices have on the evolution of the profit margins in the hake distribution chain. In particular, this effect is of a greater statistical significativity in the model estimated for the retail margin, proving that low prices at the first-sale level lead to increases in retail profit margins.

In short, the study carried out reveals a differentiated manner of behaviour in the price formation mechanism at these three levels of the market chain. At the first-sale level (fish markets), we estimate with high probability that price fixing is determined by supply (and, therefore, the state of the resource) and the very process of price fixing at the fish markets through Dutch auction. For their part, at the wholesale level, and especially at the retail level, intrinsically-motivated behaviour can be influential.

It can be concluded, therefore, that with the ultimate aim of guaranteeing consumption, fishing activity and population conservation, regulators will have to work towards implementing management measures aimed at balancing market power, be it by contemplating changes in the auction mechanism or by designing processes which make it possible to add value to the source product, therefore permitting an increase in fishermen's level of income. Regulatory measures in the catch system (decreasing catches) such as those which are being put forward within the core of the European Commission will facilitate more balanced strategic action for all the agents involved in the hake market-distribution process in the medium and long terms.

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