

# **Value chain and price integration in the Spanish salted cod market**

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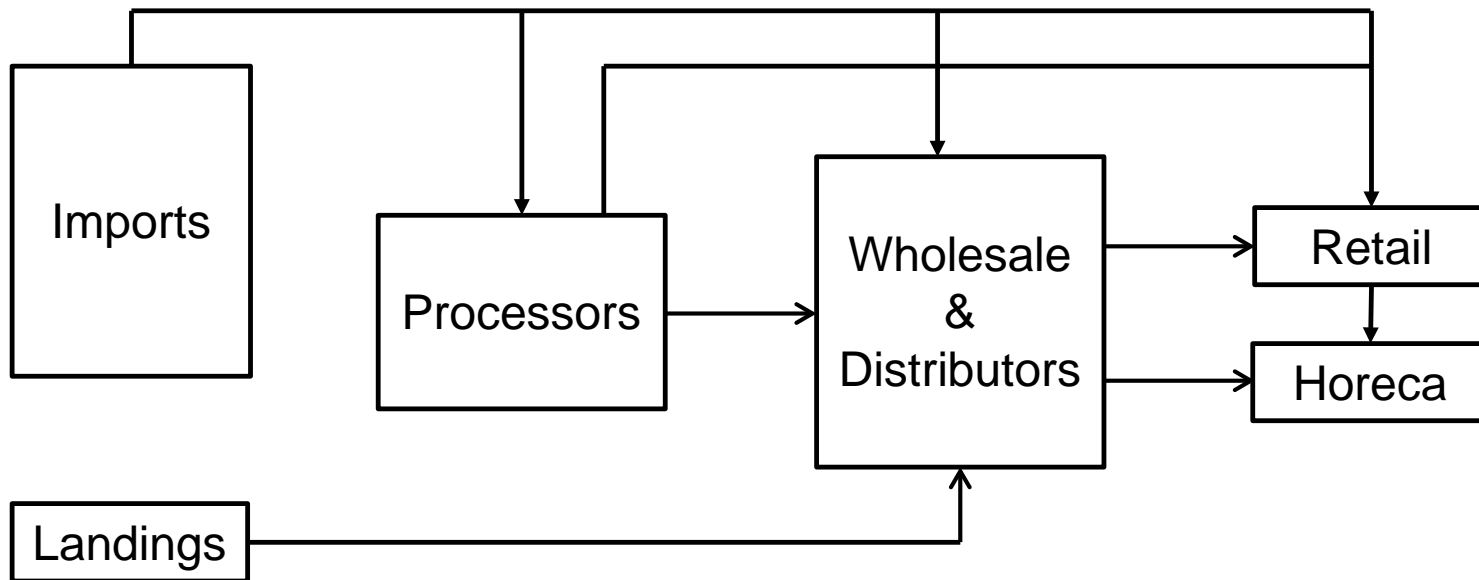
## Background

- ❖ Salted fish has been extensively processed and consumed in Spain for centuries. Records and archaeological findings go back in time to the beginning of history.
- ❖ Cod became the most popular raw material for the salted fish industry by the XVII century, due to the development of the long distance fishery in Newfoundland. The Spanish fleet has been intensively fishing cod until 1990.
- ❖ Originally, cod was salted on board in the trip back to Spain. Improvements in transport and preservation methods during the second half of the XX century allowed the development of a prominent salted cod processing industry with facilities located in the country.

## Background

- ❖ The collapse of the Newfoundland fishery dramatically restricted processors' access to raw material. Imports from North Atlantic countries became the main source of cod for the Spanish processing plants.
- ❖ The main imported commodity is wet cod in brine, which will be further processed (dried, cut and packed) in the Spanish facilities. Recently, the level of maturation supplied to customers and consumers has been decreased.
- ❖ Dependency of imports resulted in an important change in the structure of the value chain which, in last term, may have altered the mechanisms of competition, price transmission and distribution of revenues along the chain

# The value chain of salted cod in Spain



## Value chain analysis in seafood markets

Gudmundsson et al (2006) producers receive a relatively low share of the final product value compared with other agents in the chain. The share amount was found higher for fresh rather than for highly processed fish and also higher for producers in developed countries rather than for those in developing.

Gudmundsson, E.; Asche, F. & M. Nielsen. 2006. Revenue distribution through the seafood value chain. FAO Fisheries Circular. No. 1019. Rome, FAO.

Bjørndal et al., (2014). Project was funded by the Norwegian Agency of Cooperation (NORAD) between 2010 and 2012. Since the project covered many different geographic locations and development levels, the value chains analyzed differed significantly. In general terms, and with exceptions, the case studies found that processors and retailers are those receiving the largest benefits from the value chain, sometimes due to their stronger bargain power.

Bjorndal, T., Child, A. & A.Lem, eds. 2014. Value chain dynamics and the small-scale sector: policy recommendations for small-scale fisheries and aquaculture trade. FAO Fisheries and Aquaculture Technical Paper No. 581. Rome, FAO.

## Price integration analysis

Law of one price (LOP), which states that all products in the same category are equally priced in an efficient market.

Considering a market of two products, the relationship studied in the analysis of integration is given by the expression:

$$\ln(p_{1t}) = \alpha + \beta \ln(p_{2t})$$

When  $\beta = 0$ , then the prices are unrelated to each other. The products in question are not competitors.

if  $\beta = 1$ , the Law of One Price (LOP) is verified and it can be concluded that both commodities are competing in the same delimited market.

# Price integration analysis

**Horizontal integration**, or market delimitation, describes price linkages across different market places and commodities (Asche et al, 1999; Singh et al, 2015).

Asche, F., Bremnes, H., & Wessells, C. R. (1999). Product aggregation, market integration, and relationships between prices: an application to world salmon markets. *American Journal of Agricultural Economics*, 81(3), 568-581.

Singh, K., Dey, M. M., Laowapong, A., & U. Bastola, 2015. Price transmission in Thai aquaculture product markets: An analysis along value chain and across species. *Aquaculture Economics & Management*, 19(1), 51-81.

**Vertical integration** focuses on the study of price transmission along the value chain (Asche et al, 2007).

Asche, F., S. Jaffry, & J. Hartmann (2007) Price transmission and market integration: vertical and horizontal price linkages for salmon. *Applied Economics*, 39(19), 2535–2545.

## Case study description

This case study analyzes integration across the **price of imports from different countries and the retail price in Spain** for salted cod commodities and countries of origin.

Horizontal price integration will test for **competition across imports** of the same or similar commodities from different countries. Vertical price transmission will test whether the **prices** resulting from the competitive relations across imports are **transferred to the consumers** through the retail sector.



## Data

**Imports** (Cámaras, 2015; EUROSTAT, 2015).

03053019/219 – Fillets of salted cod of the species *G morhua* and *G ogac*.

03055110 – Cod dry & unsalted.

03055190 – Cod dry & salted.

03056200 – Cod salted or in brine (Green cod).

**Retail.** (MAGRAMA, 2015).

Series of quantities and values of salted fish (75% salted cod) purchased at the retail places.

## Data

Table 5. Evolution of Spanish salted and dried cod imports by commodities

Source: Eurostat External Trade & Base de datos de comercio exterior

	Green cod	Fillets	Dry & salted	Dry unsalted
2000	22.371,10	8.632,60	1.346,50	44,80
2001	19.685,30	10.723,20	2.869,00	42,90
2002	21.193,70	12.856,10	1.149,60	55,40
2003	26.033,50	12.486,40	736,00	92,40
2004	24.905,40	11.226,60	1.023,50	43,60
2005	23.851,60	13.374,70	1.379,20	29,20
2006	23.867,30	11.203,30	1.230,00	40,80
2007	23.860,50	11.867,60	1.083,30	83,80
2008	19.293,70	10.628,50	860,70	56,30
2009	20.443,30	10.519,40	1.219,40	36,60
2010	21.667,20	11.697,10	1.359,60	15,40
2011	19.606,50	9.891,00	1.069,00	0,70
2012	18.676,10	4.022,70	1.763,30	31,50
2013	18.356,80	5.327,50	1.972,60	23,90

## Data

Table 7. Quantities, and prices of green cod imports by country in 2013.

Source: Base de datos de comercio exterior

	Quantity (tm)	€/Kg
Germany	1.689,70	4,26
China	419,9	3,74
Denmark	1.305,80	3,40
France	69	3,46
Greenland	236	3,58
Ireland	33,9	3,66
Iceland	5.491,60	4,03
Faeroe	3.510,70	4,39
Norway	1.308,60	3,42
Netherlands	808,9	3,59
Portugal	805,3	3,32
UK	784,2	1,82
Russia	546,5	4,53
Sweden	1.346,80	3,13
Total	18.356,80	3,82

## Integration across commodities

Table 7. Price integration across salted cod commodities and retail price (unrestricted constant, restricted trend)

Rank	Eigenvalue	Trace test	Lmax test	
0	0.31911	67.878***	36.897***	
1	0.22248	30.980**	24.158***	
2	0.060216	6.8217	5.9621	
3	0.0089142	0.85960	0.85960	
Granger Causality				
Causes				
	Fillets	Wet cod	Dried cod	Retail
Fillets	38.860***	14.608***	0.93028	0.11434
Wet cod	19.737***	12.885***	0.35978	15.691***
Dried cod	2.4077	1.5999	0.33928	5.8081***
Retail	0.051011	0.49868	5.0754**	265.58***

The prices of the three commodities, including wet “green” cod for the domestic processing industry, are related in a horizontal and vertical system. The retail prices are also a cause of variation on the prices of salted and dried cod imports, as well as on wet “green” cod, which is the raw material used in the domestic processing industry.

## Integration across harvesting countries

Table 10 Price transmission from wet salted cod producers to Spanish retailers (unrestricted constant and restricted trend)

Rank	Eigenvalue	Trace test	Lmax test
0	0.50253	70.079***	41.894***
1	0.31092	28.186**	22.344***
2	0.092776	5.8419	5.8419
Granger Causality			
Causes			
	Iceland	Norway	Retail
Iceland	0.51769	3.7364**	2.0071
Norway	4.4514***	1.2427	2.0345
Retail	4.3246***	2.6318**	2.9355**

\*\*\* 99percent CL; \*\* 95percent CL; \* 90percent CL

When only producer countries are considered, the prices at the retail level are caused by the price of imports. Spanish processors are transferring the raw material costs to the retailers and these to the final consumers.

## Integration across producers and re-exporters

Table 11 Price transmission from wet salted cod producers and re-exporters to Spanish retailers  
Norway – Denmark – Retail (unrestricted constant)

<i>Rank</i>	<i>Eigenvalue</i>	<i>Trace test</i>	<i>Lmax test</i>
0	0.64508	89.276***	62.152***
1	0.36105	27.124***	26.876***
2	0.0041220	0.24783	0.24783
<i>Granger Causality</i>			
	<i>Causes</i>		
	<i>Norway</i>	<i>Denmark</i>	<i>Retail</i>
<i>Norway</i>	22.078***	2.4054	7.2009***
<i>Denmark</i>	7.2476***	0.059324	3.5141**
<i>Retail</i>	3.1053**	0.64276	10.823***

\*\*\* 99 percent CL; \*\* 95 percent CL; \* 90 percent CL

When an EU re-exporter is able to provide the product at a lower or similar price than the original producers, including transport costs, then, the bargain position of traders in the importing country improves.

## Summary – Horizontal integration

At the **commodity level** green cod and fillets are direct competitors, while imports of salted & dried cod affect the reference price at the retail level for all commodities. Local retailers can make their choice of purchasing locally processed salted cod or imported. Although there is a premium for locally processed cod, as it better fits with consumers' preferences, this premium will maintain the same proportion with regard the prices of imported salted cod products.

At the **country level** producing countries are in direct competition, but no relation was found across the prices of producers and re-exporters. The prices of green cod imports from Iceland and Norway are related in a bidirectional link indicating direct competition. However, the prices of imports from Denmark are independent from those of Norway and Iceland rejecting substitution.



## Summary – Vertical integration

**Price transmission along the value chain has been verified at Extra-EU trade when working with producing countries.** In this case, a shock in the price of Icelandic and Norwegian producers is transferred to retail through the value chain. The price is set in origin and Spanish retailers take it. This also means that the shocks in raw material prices are being transmitted by local processors to upcoming levels in the chain.

**intra-EU trade improves the potential ability of Spanish traders for exerting bargain power on producers/exporters.** The most significant case takes place when considering Norway and Denmark into the price transmission model. Although Norwegian prices are causing both Danish and Spanish prices, Spanish retail price has been found to be a cause of the price of Norwegian imports. Such a link allows some kind of indirect competition between Denmark and Norway through an opportunistic behavior of Spanish retailers.



Thank you!!

