



Price integration in the seabream seafood value chain

José M. Fernández Polanco, Ignacio Llorente, José L. Fernández Sánchez, Maria D. Odriozola, Elisa Baraibar-Diez, and Ladislao Luna Sotorrio

University of Cantabria (UC) – Spain Faculty of Economics and Business Administration
Avda. de los Castros s/n 39005 Santander (Spain)



"This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 635188".

- **Price integration in the Seabream value chain in Spain**

- **Price integration in the Seabream value chain in Italy**

<http://www.success-h2020.eu/>



Price integration in the Spanish seabream value chain

Ignacio Llorente, José M. Fernández Polanco, José L. Fernández Sánchez, Maria D. Odriozola, Elisa Baraibar-Diez, and Ladislao Luna Sotorrio

University of Cantabria (UC) – Spain Faculty of Economics and Business Administration
Avda. de los Castros s/n 39005 Santander (Spain)

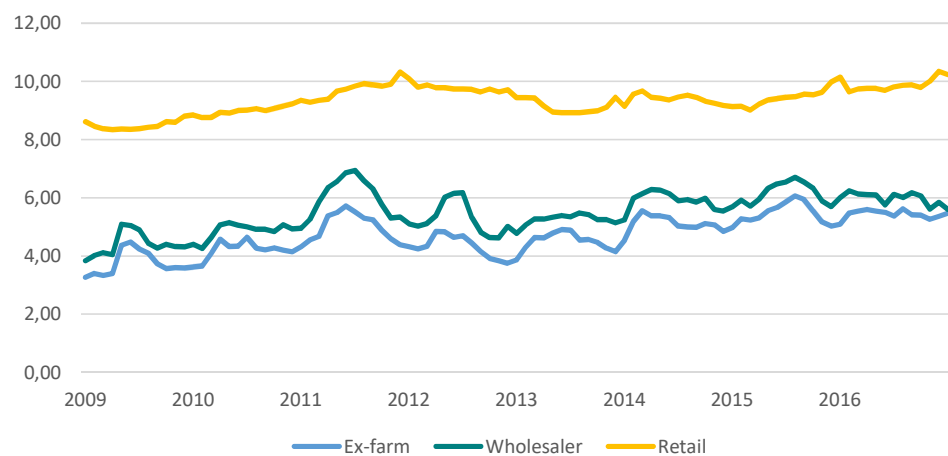


"This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 635188".

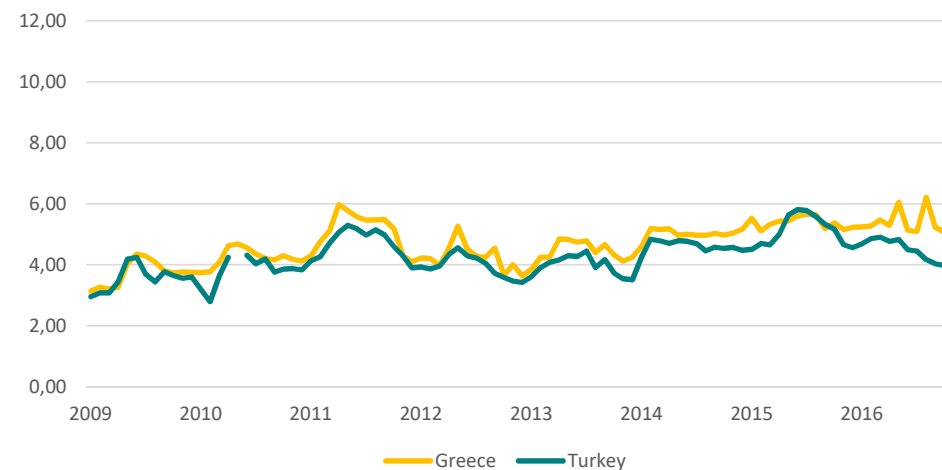
- ❑ **Traditionally, Greece, Spain and Italy** have been the main seabream producers.
- ❑ In 2012, the EU produced nearly 87 thousand tonnes, valued 518 million USD, accounting for 60% of global production volume and 62% of the value.
- ❑ In 2015, the EU produced nearly 83 thousand tonnes, valued 498 million USD, accounting for 50% of global production volume and 53% of the value.
- ❑ **Increasing importance of non-EU producers** (Turkey, Egypt, Tunisia)
- ❑ **Turkey and Greece** are the **world gilthead seabream leading producers** with 31% and 21% of the volume **followed by Spain, Egypt and Tunisia**

<http://www.success-h2020.eu/>

Evolution of seabream prices in the Spanish value chain (€/kg)



Evolution of seabream imports prices in Spain (€/kg)



Source: MAPAMA

<http://www.success-h2020.eu/>

Research goals

- **Sea bream aquaculture in the Mediterranean Sea faces various constraints that include:**
 - Increasing supply in fully developed markets
 - Effects of financial crises in many consumer countries
 - Difficulties of negotiating with concentrated retailers
 - Increasing importance of new producers

- **These constraints have raised interest in analyzing the ways in which prices are set in the international market and along the value chain**

- **Accordingly, the aims of this work are:**
 - Analyze international competition in the Spanish seabream market depending on the country of origin. (Horizontal price integration analyses)
 - Analyze the price transmission mechanisms on the Spanish seabream market in order to know how the negotiation power is distributed along the value chain. (Vertical price integration analyses)

<http://www.success-h2020.eu/>

Aquaculture : Seabream

- The prices for sea bream at **ex-farm, wholesale and retail levels** have been collected **weekly** for sea bream from 2009 to 2016 by **Spain's Ministry of Agriculture and Food through the Observatory of Food.**
- Prices for Spain's **imports from Greece and Turkey** were obtained from 2009 to 2016 from **the European Commission's Eurostat trade database.**

<http://www.success-h2020.eu/>

Seabream Results

- The **Augmented Dickey-Fuller (ADF)** test (Dickey & Fuller, 1979; 1981) is used to test the time series properties of the data (non-stationarity).

	Constant		Linear trend		Quadratic trend	
	Levels	1st diff.	Levels	1st diff.	Levels	1st diff.
Greece	-2.401	-8.122***	-3.517	-8.142***	-3.460	-8.162***
Turkey	-2.582	-8.075***	-2.574	-8.207***	-2.655	-8.149***
Spain	-1.867	-8.165***	-3.094	-8.177***	-3.025	-8.220***
Wholesale	-2.259	-8.189***	-2.898	-8.181***	-2.964	-8.136***
Retail	-1.428	-9.437***	-1.597	-9.393***	-1.331	-9.467***

*** 99% CL; ** 95% CL; * 90% CL

- **Unit root can not be rejected** for all the involved variables at their levels, rejecting the null hypothesis for the first differences. **The price series behave as non stationary variables.**

<http://www.success-h2020.eu/>

Seabream Results

In order to better understand the relations across price series, Granger causality test is performed for all pair wise combinations

Granger Causality					
Causes					
	Greece	Turkey	Spain	Wholesale	Retail
Greece	4.4699***	0.0043	1.2293	1.6074	2.6746
Turkey	1.782	39.697***	3.1864*	4.2965**	0.073437
Spain	1.334	0.14895	3.9735**	0.3817	0.000233
Wholesale	1.6456	1.7791	3.9019**	19.838	0.22145
Retail	2.129	1.9666	1.3453	0.52356	418.78

- Retail prices appear to be independent from all other price series included in the system.

Seabream Results

Johansen and weak exogeneity tests:

Rank	Eigenvalue	Trace Test	Lmax test
0	0.36351	107.980***	42.016***
1	0.28831	65.969***	31.631***
2	0.19608	34.337*	20.298
3	0.097826	14.040	9.5741
4	0.046883	4.4657**	4.4657**
Weak exogeneity test			
Greece	Turkey	Spain	Wholesale
16.303***	2.157	6.909**	4.624

- The maximum rank order reported by the Johansen test **1** . Since the variables were found to be non-stationary for the selected number of lags and model specifications, **further tests are performed using two cointegrating vectors.**
- Under these conditions, the weak exogeneity test points **Greek imports and Spanish ex-farm prices as endogenous**, being all other variables exogenous.

<http://www.success-h2020.eu/>

Seabream Results

The first sub-model analyzes the concurrency across imports and domestic ex-farm prices

Model 1: (**Horizontal integration**) Johansen and weak exogeneity tests

Rank	Eigenvalue	Trace test	Lmax test
0	0.42053	81.903***	51.291***
1	0.21511	30.612**	22.768**
2	0.08005	7.8439	7.8439
Weak exogeneity test			
	Greece	Turkey	Spain
	22.432***	0.7084	9.9407***

Granger Causality			
Causes			
	Greece	Turkey	Spain
Greece	5.0668**	0.039889	1.518
Turkey	3.0746*	47.431***	5.5194**
Spain	3.5772*	0.014053	11.902**

- Both weak exogeneity and Granger causality tests confirm endogeneity for the prices of the domestic production and the imports from Greece. Turkish import prices are a cause of variation for Greek imports and Spanish ex-farm prices.

Seabream Results

The second sub-model includes wholesale prices in the relation across domestic production and imports from Turkey as the price leading country

Model 2: (Vertical integration) Johansen and weak exogeneity tests

Rank	Eigenvalue	Trace test	Lmax test
0	0.26826	60.081***	29.359
1	0.22017	30.722***	23.376
2	0.075174	7.3461	7.3461
Weak exogeneity test			
	Turkey	Spain	Wholesale
	1.80959	11.7827***	7.90486**

Granger Causality			
Causes			
	Turkey	Spain	Wholesale
Turkey	44.901***	4.7205**	4.7017**
Spain	0.054164	9.9678***	0.0015768
Wholesale	0.54239	2.6633*	31.193***

- The price of imports from Turkey is the only exogenous variable in the model. Besides a low significant causal effect from wholesale on domestic ex-farm prices, the main effects in both endogenous variables comes from the imports incoming from Turkey.

Market integration /Horizontal price integration:

- ❑ As was expected, the Spanish seabream market is delimited, and competitive.
- ❑ International competition led by Turkish imports are a cause of variation for Spanish ex-farm prices, but also for Greek imports price.

Price transmission /Vertical price integration:

- ❑ Retail price are independent of the model. Changes along the value chain do not arrive to the retail level.
- ❑ Farmers' prices are also adjusted to the price paid by wholesalers, which in turn is influenced by the prices of Turkish competition.
- ❑ In this sense, there is some degree of price transmission. There is price transmission forward, from the Turkey imports to wholesalers, and backward price transmission from wholesalers to domestic producers.



Price integration in the Italian seabream value chain

Ignacio Llorente, José M. Fernández Polanco, José L. Fernández Sánchez, Maria D. Odriozola, Elisa Baraibar-Diez, and Ladislao Luna Sotorrio

University of Cantabria (UC) – Spain Faculty of Economics and Business Administration
Avda. de los Castros s/n 39005 Santander (Spain)



"This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 635188".

Seabream Results

- The **Augmented Dickey-Fuller (ADF)** test (Dickey & Fuller, 1979; 1981) is used to test the time series properties of the data (non-stationarity) (lags 6).

	Constant		Linear trend		Quadratic trend	
	Levels	1st diff.	Levels	1st diff.	Levels	1st diff.
Domestic	-1.910	-4.262***	-2.706	-4.444***	-2.834	-4.347***
Imports	-1.278	-2.946**	-0.332	-3.147*	-0.770	-3.589*
Retail	-1.060	-5.626***	-3.402*	-5.496***	-3.109	-5.412***

*** 99% CL; ** 95% CL; * 90% CL

- **Unit root can not be rejected for all the involved variables at their levels, rejecting the null hypothesis for the first differences.** However, confidence levels for models with trend decrease in the cases of imports and retail making put in question non stationarity of the series for models of this class.

Johansen and weak exogeneity tests:

Rank	Eigenvalue	Trace Test	Lmax test
0	0.78511	107.24***	56.892***
1	0.69839	50.351***	44.349***
2	0.14973	6.0017	6.0017
Weak exogeneity test			
	Domestic	Imports	Retail
	13.1162***	34.874***	15.1384***

The maximum non rejected **rank order in the Johansen test was 1**. Since the variables were found to be non-stationary for the selected number of lags and model specifications, **further tests are performed using two cointegrating vectors**. The weak exogeneity test points that the three variables work as endogenous in the system.

In contrast, the Granger causality test performed on the basis of a three variable VAR system results only significant for the **causal link connecting domestic prices as an effect of retail prices**.

Granger Causality			
Causes			
	Domestic	Imports	Retail
Domestic	0.625	1.634	0.922
Imports	0.967	3.806*	1.551
Retail	3.456*	2.418	0.548

Results suggest no price transmission in the value chain of seabream in Italy. However, the limitation in the sample size and contradictory tests recommend to be conservative in the conclusions.

<http://www.success-h2020.eu/>

Seabream Conclusions

- ❑ **The work is still under development**
- ❑ **Discussion with other partners and stakeholders in this market**
- ❑ **Improve the interpretation of results and overcome data limitations**

<http://www.success-h2020.eu/>



Thank you!

<http://www.success-h2020.eu/>

Acknowledgements: This paper is part of the SUCCESS project which has received funding from the European Union's H2020 program under grant agreement No 635188.



"This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 635188".