Market dynamics of the Mediterranean bass & bream industry

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MedAid Project task 6.2

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MedAid working package 6 is focused on analyzing different areas of economics of the seabream and seabass industry to be used as input data for the development of the strategic business plan for Mediterranean bass & bream industry.

The working package covers analysis of productivity, market dynamics, price analysis, the role of mass media and consumers' awareness and efficiency of proposed improvements.

Task 6.2 is focused on analyzing market dynamics, which involves market equilibrium, price dynamics and transmission.







Task 6.2 is concerned on the analysis of market dynamics, whether supply and demand dynamics converge and how the price is transferred downstream and upstream along the value chain.

The analysis is performed at different levels which involve long and short term, international and national markets and disaggregated by value chain levels and grocery categories in the countries when this information is available.







Results presented at IIFET 2018, Seattle, USA.

Captures the most significant factors affecting demand and supply and studies the evolution of the functions along time.

Tests for the conditions of price stability and explores the effects of international trade.







Data used for the long term dynamics models were collected from FAO and World Bank databases.

FAO data provided quantities and value of the species of interest and production inputs such as fish meal and fish oil. A proxy of import an export prices for each item in every country can be estimated from these figures.

Prices at the domestic markets were estimated by computing the weighted average between import and export price in every country. It is assumed that this proxy could have limitations in countries with low volumes of imports or exports, resulting in potential biases which should be reconsidered at the light of results and evidences from previous research at the national level

Income, interest and exchange rates were collected from the World Bank development indicators.



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GA No. 727315





The demand system covers price, income and substitution effects. Substitution is tested across the two species of interest.

The demand function is represented in a two equation system in order to avoid multicollinearity issues across the two prices.

$$Demand = a_{11} \times Price_1^{b_{11}} \times Income^{b_{12}} \times \varepsilon_1$$

 $Price_1 = a_{21} \times Price_2^{b_{21}} \times \varepsilon_2$





IIFET 2018 Seattle USA



The supply system covers then effects of price on quantities produced plus the impact of changes in capital and operational costs. Labour costs with the minimum required sample size in aquaculture are not available for all the countries included in the analysis.

The supply function is also represented in a two equation system. The first equation describes the effects of market price on supply quantities. The second equation analyses transmission of producers' costs to market price. The system in Turkey also includes exchange rates.

$$Supply = a_{11} \times Price^{b_{11}} \times \varepsilon_1$$

 $Price = a_{21} \times Feed^{b_{21}} \times Capital^{b_{22}} \times \varepsilon_2$



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GA No. 727315



Results: Seabream demand

Country	Parameters	R ²
Spain	Eq ₁ : $P_1 = -2.09$: $I = 2.89$ Eq ₂ : $P_2 = -0.126$	Eq ₁ : 90.1 Eq ₂ : 4.33
Italy	Eq ₁ : $P_1 = -2.99 : I = 2.09$ Eq ₂ : $P_2 = 0.77$	Eq ₁ : 73.2 Eq ₂ : 79.8
Germany	Eq ₁ : $P_1 = -3.52 : I = 4.19$ Eq ₂ : $P_2 = 4.17$	Eq ₁ : 79.9 Eq ₂ : 47.4
France	Eq ₁ : P ₁ = 1.37 : I = 2.59 Eq ₂ : P ₂ = -0.24	Eq ₁ : 66.3 Eq ₂ : 3.99
Portugal	Eq ₁ : P ₁ = 2.00 : I = 6.11 Eq ₂ : P ₂ = 0.65	Eq ₁ : 54.3 Eq ₂ : 37.5
UK	Eq ₁ : P ₁ = -0.28 : I = 6.11 Eq ₂ : P ₂ = -0.75	Eq ₁ : 75.2 Eq ₂ : 29.7
Greece	Eq ₁ : $P_1 = -1.26$: $I = -0.12$ Eq ₂ : $P_2 = 0.83$	Eq ₁ : 15.0 Eq ₂ : 71.8
Turkey	Eq ₁ : $P_1 = -1.24$: $I = 1.59$ Eq ₂ : $P_2 = 0.44$	Eq ₁ : 87.4 Eq ₂ : 8.02
	Sig < 0.01 Sig < 0.05	



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Results: Seabream supply

Country	Parameters	R ²
Spain	Eq ₁ : P = -0.77 Eq ₂ : F = 0.38 : K = 0.40	Eq ₁ : 4.42 Eq ₂ : 2.14
Italy	Eq ₁ : P = -2.05 Eq ₂ : F = -0.002 : K = 0.001	Eq ₁ : 0.50 Eq ₂ : 0.00
France	Eq ₁ : P = 3.91 Eq ₂ : F = 0.22 : K = -0.10	Eq ₁ : 52.9 Eq ₂ : 51.2
Portugal	Eq ₁ : P = -0.41 Eq ₂ : F = 0.22 : K = 0.17	Eq ₁ : 4.44 Eq ₂ : 11.6
Greece	Eq ₁ : P = 0.47 Eq ₂ : F = 0.51 : K = 0.003	Eq ₁ : 4.82 Eq ₂ : 36.7
Turkey	Eq ₁ : P = 2.60 Eq ₂ : F = 0.27 : K = 0.07	Eq ₁ : 30.7 Eq ₂ : 51.8









Results: Seabass demand

Country	Parameters	R ²
Spain	Eq ₁ : P ₁ = 1.95 : I = 3.40 Eq ₂ : P ₂ = -0.44	Eq ₁ : 66.8 Eq ₂ : 0.34
Italy	Eq ₁ : P ₁ = -2.28 : I = 2.24 Eq ₂ : P ₂ = 1.06	Eq ₁ : 89.0 Eq ₂ : 79.8
Germany	Eq ₁ : P ₁ = -0.34 : I = 5.49 Eq ₂ : P ₂ = 1.19	Eq ₁ : 43.8 Eq ₂ : 47.4
France	Eq ₁ : P ₁ = -4.73 : I = 3.74 Eq ₂ : P ₂ = -0.24	Eq ₁ : 52.3 Eq ₂ : 3.92
Portugal	Eq ₁ : $P_1 = -1.57$: $I = 4.92$ Eq ₂ : $P_2 = 0.72$	Eq ₁ : 71.5 Eq ₂ : 37.5
UK	Eq ₁ : $P_1 = -4.09$: $I = 6.05$ Eq ₂ : $P_2 = -0.44$	Eq ₁ : 91.4 Eq ₂ : 29.7
Greece	Eq ₁ : P ₁ = -1.30 : I = -0.19 Eq ₂ : P ₂ = 0.87	Eq ₁ : 17.7 Eq ₂ : 71.8
Turkey	Eq ₁ : $P_1 = -0.59$: $I = 1.40$ Eq ₂ : $P_2 = 0.40$	Eq ₁ : 91.7 Eq ₂ : 8.02
	Sig < 0.01 Sig < 0.05	



Horizon 2020 GA No. 727315



Results: Seabass supply

Country	Parameters	R ²
Spain	Eq ₁ : P = 3.96 Eq ₂ : F = 0.59 : K = -0.24	Eq ₁ : 53.1 Eq ₂ : 55.7
Italy	Eq ₁ : P = -1.83 Eq ₂ : F = -0.20 : K = -0.09	Eq ₁ : 71.5 Eq ₂ : 6.36
France	Eq ₁ : P = -2.09 Eq ₂ : F = 0.20 : K = 0.28	Eq ₁ : 30.6 Eq ₂ : 10.9
Portugal	Eq ₁ : P = 0.87 Eq ₂ : F = 0.29 : K = -0.10	Eq ₁ : 6.55 Eq ₂ : 25.4
Greece	Eq ₁ : P = 0.60 Eq ₂ : F = 0.50 : K = -0.006	Eq ₁ : 11.6 Eq ₂ : 46.8
Turkey	Eq ₁ : P = -1.47 Eq ₂ : F = 0.50 : K = -0.36	Eq ₁ : 2.44 Eq ₂ : 67.8









- With the exception of few countries less dependent on imports, mainly Atlantic, in the case of seabream, in general terms demand for both species can be considered price and income elastic.
- Seabass and seabream appear as superior goods in all cases, with increasing consumption as consumers' disposable income grows.
- Substitution across the two species was found to be significant in all cases excepting in France and Spain, where the market for each species appear to be differentiated.



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- Beyond the exception of Turkey in the case of seabream and Spain in seabass, supply of both species was found to be inelastic in the rest of the producing countries.
- The ability of transferring the production costs to the market price is similar in both species and only significant in Greece and Turkey, as exporter countries, and in Spain, as importer country.
- In general, feed cost is the most relevant factor affecting the price of production, and also the main inefficiency of producers. However, it is somehow difficult to overcome since fish meal and fish oil will remain being the main components of feed.







- With the above conditions of supply and demand, adjustment is not likely to be achieved when only national industries and markets are taken into consideration. Despite of a couple countries in each species, almost all cases rejected the equivalence across demand and supply elasticities.
- The cases in which the test condition is not rejected are assumed to respond to particular market characteristics. Lower consumption levels and dependency on external trade, along with potential higher differentiation and consumer's preferences may be potential causes of the higher probabilities of achieving equilibrium
- It is assumed that international trade may help the national markets to stabilize and increase the likelihood of market adjustment. (To be tested in a very near future).



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Presented at Aquaculture 2019, New Orleans, USA

Analyses price elasticities and substitution across species and countries of origin.

Focuses on countries with regular imports from Greece and Turkey.

Studies the impact of trade from Turkey on the flows from Greece.







- Data on quantities and prices of imports and exports by species and countries is available in the EU External Trade database (ComExt).
 Data is disaggregated monthly. Turkish data were provided by FAO-FIAM.
- Import countries: Italy, Spain, Germany, UK.
- Export countries: Greece, Turkey.
- All series were found to be non-stationary (ADF test).
- Cointegration models are used to test for causal connections across prices (substitution) and their relation with quantities (elasticity).



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GA No. 727315



Substitution across countries and species

• Cointegration across prices of the different species and countries is tested in every market.

Italy

Rank	Eigenvalue	Trace test	Lmax test		
0	0.22574	94.708***	41.959***		
1	0.18239	52.749***	33.025***		
2	0.066224	19.724	11.237		
3	0.050435	8.4872	8.4872		
Weak exogeneity test					
Seabream GR	Seabass GR	Seabream TK	Seabass TK		
27.9588***	28.4435***	0.860712	0.416444		

Seabass substitutes seabream

Turkey substitutes Greece in every species



Horizon 2020 GA No. 727315



•Cointegration across prices of the different species and countries is tested in every market.

To Spain

Horizon 2020

GA No. 727315

Rank	Eigenvalue	Trace test	Lmax test		
0	0.37368	62.148***	32.752***		
1	0.23051	29.396	18.341		
2	0.12186	11.054	9.0968		
3	0.027576	1.9574	1.9574		
Weak exogeneity test					
Seabream GR	Seabass GR	Seabream TK	Seabass TK		
11.6019***	0.0554012	0.832963	2.4624		

The price of Greek seabream is caused by the prices of seabass and the prices of Turkey.





• Studies the relation across quantities imported and exported and the price of the species and their substitutes. Includes price elasticity and substitution across species and countries.

•Since Turkey entered in a market previously dominated by Greece, the models test the effects of price dynamics on the evolution of quantities imported and exported from Greece.

•The analysis is undertaken for the two major markets, Italy and Spain.







Elasticity of demand (imports)

Seabream imports in Italy

Rank	Eigenva	lue	Trace test		Lmax test
0	0.33051		103.25***		66.205***
1	0.17498		37.047***		31.738***
2	0.031666		5.3094		5.3094
Weak exogeneity test					
Seabream GR Q Seab		ream GR P		Seabream TK P	
26.3668***		42.	.8988***		4.07719

Quantities of seabream imported from Greece are dependent on Greek and Turkish seabream price.

Greek price is dependent on Turkish price.



Horizon 2020 GA No. 727315





Elasticity of supply (exports)

Seabream exports to Italy

Rank	Eigenvalu	e	Trace test		Lmax test	
0	0.34013		45.996***		29.516***	
1	0.13521		16.481		10.314	
2	0.083184		6.1663		6.1663	
Weak exogeneity test						
Seabream GR Q		Seabream GR P			Seabream TK P	
14.7043***		0.1	18179		0.421426	

Quantities of seabream exported from Greece to Italy are dependent on Greek and Turkish seabream price.

No linkages across Greek and Turkish price.



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Summary and conclusions

- Substitution across species and countries of origin is confirmed. Seabream substitutes seabass and Turkey substitutes Greece.
- Importers' demand is elastic for both species. Quantities are fixed according to price and substitution effects
- Exporters' supply is also elastic. However, price and substitution effects differ across species and destination countries.







- Results are consistent with those from the long term equilibrium model in what regards to demand. In both cases demand elasticity and substitution effects are confirmed. Further analyses on the demand side found that the EU market for seabream and seabass is integrated.
- Exporters' supply was found to be also elastic and affected by substitution. However, producers' supply was found to be inelastic.
 Differences of elasticities at the supply levels suggest issues of imperfect price transmission along supply levels and potential bargain power.
- In order to solve the later question price transmission along the value chain, from farm to exports and to the retail level in the destination markets is under analysis.







Thanks for your attention



Seabream mosaic in Ostia Antica, Italy, Ca. 1,800 years. Picture: José Fernández Polanco



Horizon 2020 GA No. 727315

