Competitiveness of Italian small pelagics in international trade

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Jel code: Q17, F14, Q22

Abstract

Export competitiveness is an important factor to ensure economic sustainability of sectors subject to stagnant demand and strong competition in the domestic market, as Italian fisheries. Actually, Italy is a major player in international trade of small pelagic species, and it is the world's leading country in the export of fresh anchovies. However, both the Italian net trade balance and the export-to-import terms of trade are unfavourable.

The objective of this study is to analyse Italy's international trade of small pelagics to point out the main weaknesses of the sector and suggest possible improvement strategies for the involved stakeholders, i.e. public policy makers and private firms.

As a first step, the dynamics and composition of import and export flows is examined with regard to the world market, as well as with other EU Countries, highlighting the distinctive features of the coastal regions on the Adriatic sea.

As a second step, the competitive position of Italian exports is assessed with respect to other three important producing countries in the Mediterranean Region, namely Spain, France and Morocco, calculating their Relative Export Advantage.

Finally, a Constant Market Share analysis is conducted specifically on anchovies exports towards Spain, that is by far the most important destination market, with over 40% of total anchovy export value. The CMSA has been used for the specific study case of the anchovy trade towards Spain

***Keywords**: small pelagics; competitiveness; international trade; revealed comparative advantage; market shares.*

Résumé

La compétitivité des exportations est un facteur important pour assurer la viabilité économique des secteurs qui subissent une stagnation de la demande et une forte compétition sur le marché national comme, par exemple, le secteur des pêches en Italie. En effet, l'Italie est l'un des principaux acteurs dans le commerce international des petits pélagiques et le premier exportateur d'anchois frais à l'échelle mondiale. Cependant, en Italie, la balance commerciale nette ainsi que le rapport exportations/importations ne sont pas favorables.

L'objectif de cette étude est d'analyser le commerce italien de petits pélagiques à l'échelle internationale pour mettre en évidence les faiblesses principales de ce secteur et suggérer les éventuelles stratégies d'amélioration que pourraient adopter les acteurs publics et les entreprises privées.

En premier lieu, on examinera la dynamique et la composition des importations et des exportations sur le marché mondial et dans les autres pays de l'UE, en mettant l'accent sur les traits distinctifs des régions côtières de la mer Adriatique.

En deuxième lieu, sera évaluée la position compétitive des exportations italiennes par rapport aux trois autres producteurs importants en Méditerranée à savoir, l'Espagne, la France et le Maroc, en calculant leur Avantage Compétitif des Exportations.

Enfin, sera présentée l'analyse de la part de marché constante concernant, spécifiquement, les exportations d'anchois vers l'Espagne qui représente sans aucun doute le principal marché de destination, avec plus de 40% de la valeur totale des exportations d'anchois.

Mots-clés: Petits pélagiques, compétitivité, commerce international, avantage compétitif révélé, parts de marché.

1. Introduction

Italian fishery has a long tradition in the exploitation of small pelagic species, as they constitute an important resource for both domestic consumption and export markets. The most common small pelagic species in the Mediterranean Basin are: *Engraulis encrasicholus* (anchovy), *Sardina pilchardus* (sardine), *Scomber scombrus* (mackerel), *Scomber colias* (Spanish mackerel), *Sprattus sprattus* (brisling or sprats), *Sardinella aurita* (round sardinella), *Belone belone* (garfish or needle fish), *Trachurus trachurus* (horse mackerel). Actually, anchovies and sardines are the two most important fish species caught in Italy, accounting for about 70% of the total catch (FAO, 2011). In Italy, more than 54,000 tons of anchovies and 15,000 tons of sardines were caught on average in the latest years, corresponding to about 24% and 7% of total seafood catches (Mulazzani et al., 2012).

Along with such large volumes, a common feature of most small pelagic species is their low economic value, as compared to other fishery products. In fact, small pelagics account for less than 9% of total fishery products value, with an average unit value of 1.38 €/kg as opposed to about 5 €/kg (our calculations based on Irepa-Mipaaf data).

Italy is a major player in international trade of small pelagic species, and Italian trade flows (the sum of imports and exports) were close to 85,000 tons and 214 million euro on average in the latest two years. In particular, Italy is the world's leading country in the export of fresh anchovies, with about 20 million euro export value, 45% of overall world trade flows (FAO, 2011).

The coastal regions on the Adriatic[1] sea play a determinant role in both production and trade of small pelagics, as they contribute to 68% of total catches and about 80% of exports. More in detail, Adriatic regions are determinant in production and trade of anchovies, providing 76% of national catches and 90% of the related exports (Mulazzani and Camanzi, 2011).

Overall, Italy's foreign net trade balance of small pelagics has been steadily negative over the last ten years; a surplus is detected only for fresh and frozen anchovies and sardines (Figure 1 and Figure 2). However, if we consider the EU-27, which is Italy's most important market (about 97% of total exports and 71% of total imports), the trade balance is slightly positive (2.4 million euro on average in 2009-2010).

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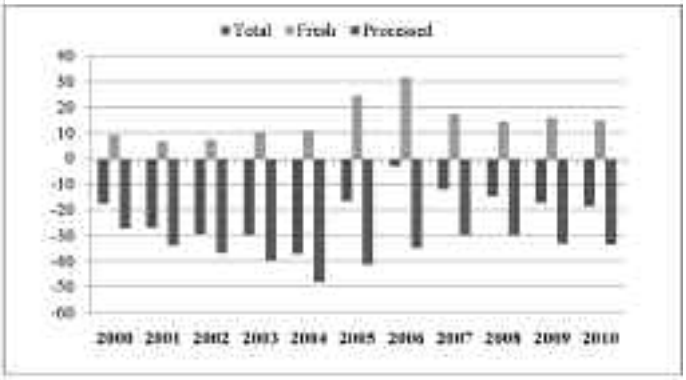
[1] Seven Italian regions, out of twenty, have coasts on the Adriatic Sea: Friuli-Venezia-Giulia, Veneto, Emilia-Romagna, Marche, Abruzzo, Molise and Puglia.

By comparing values and volumes of Italian trade flows, we notice that unit values of exports are lower than those of imports. That is because Italy exports large quantities of fresh products with low value added, while importing considerable quantities of more expensive processed products.

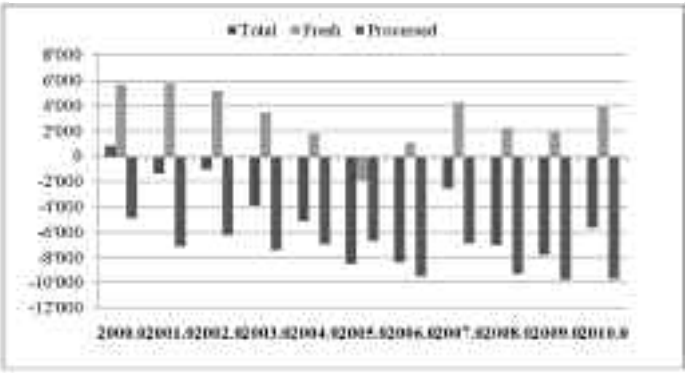
Given the importance of small pelagic species for Italian fisheries, the objective of this study is to analyse Italy's international trade in this sector. The dynamics and composition of import and export flows is examined with regard to the world market, but specific attention is also given to trade with other EU Countries and the role of Adriatic regions.

Figure 1 - *Italy's trade balance for anchovies per preservation state (mln €).*



Fresh: fresh and frozen.
Processed: semi-processed and processed.
Total: fresh and processed.
Source: Istat-Coeweb.

Figure 2 - *Italy's trade balance for sardines per preservation state (mln €).*



Fresh: fresh and frozen.
Processed: semi-processed and processed.
Total: fresh and processed.
Source: Istat-Coeweb.

Analytical indices frequently applied in the economic literature are used to outline the main features and the main trends of Italy's international trade in terms of supply structure (sector specialisation and product differentiation) and with respect to the external macroeconomic environment (competitiveness). Such indicators will be used to assess the international trade performance of Italy in the small pelagic sector, so as to identify the main strengths and weaknesses and to suggest possible improvement strategies for the involved stakeholders, i.e. public policy makers and private firms.

2. Data and methodology

The study targets the Italian international trade flows of small pelagic fishery products, focusing on the main species and main preservation states imported and exported. The main species considered are anchovies, sardines and mackerels, while the preservation states of interest are classified as "fresh", "semi-processed" and "processed" (see Table 8 in the annex).

As far as the geographical scope of the study is concerned, trade and competitiveness analysis is carried out primarily considering Italy as a whole with respect to its main trade partners and competitors: both EU Member States and extra EU Countries. Within this larger picture, some insights are then provided on the distinctive features showed by the Adriatic regions.

2.1. Data

Data were collected from official national and international info providers, to allow the calculation of indicators comparable across different geographical areas. Information concerning fishery production was gathered from the Italian Institute for Economic Research in Fishery and Aquaculture (Irepa)[2] and from FAO; data on the supply of processed goods was collected from the Prodcom database of the Italian Institute for Statistics (Istat) and data on import and export was taken from the Coeweb trade database of Istat and from the Comext database of Eurostat. The set of data used to carry out the study consists in the most up-to-date eleven years time series (2001-2010), and structural analysis was conducted with reference to average data calculated on the basis of the latest two years available.

In order to provide a comprehensive analysis the data were harmonized and results are provided per each species of interest for four commodity groups, based on the following preservation states: "fresh", "frozen", "semi-processed"[3] and "processed". The main difficulties arose from the identification of different species in the Coeweb database, where the items are classified according to the Combined Nomenclature (CN). As an example, we notice that in the CN8 codes detail anchovies and sardines are clearly differentiated both in fresh and frozen product categories, while *Aurita Sardinella* data are mixed with *Sardinops*; on the opposite, the various species of mackerels are presented in a single category. The aggregation of various species in a single category group is particularly binding for processed products (as in the case of the products groups of the CN8 codes 16041390 – "Sardinella, brisling or sprats, prepared or preserved" and 16042050 – "Sardines, bonito, mackerel of the species Scomber scombrus and Scomber japonicus, prepared or preserved"). For details see Table 8 in the annex.

[2] The institute also provides technical assistance to the Ministry for Food, Agriculture and Forestry Policies (Mipaaf).

2.2. International trade and competitiveness analysis

Trade among nations is traditionally explained as arising from the specialization of nations in particular industries, resulting from differences in productivity, such as in Ricardo's theory, or endowments, such as in Hecksher-Ohlin theory (Bernatonyte and Normantiene, 2009). More in detail, according to the modern theory of international trade of Hecksher and Ohlin, the main causes and the regulator of International trade are the differences in the relative prices of the commodities between the countries. The differences in the prices of goods arise from: (i) difference in climatic conditions and technical know-how, (ii) difference in the allocation of resources for the production of goods, (iii) variation in the demand for and supply of commodities (as well as the demand for and the supply of the required factors).

Such specialization can be assessed by means of *trade indicators*, aiming at giving insights into the main features and dynamics of a sector trade flows with reference to a single Region over a given time period, or at comparing different Regions at the same time (Camanzi et al., 2003). Trade indicators used in this study are primarily intended as a tool to analyse the external trade performance of Italy in the small pelagic sector, so as to identify the main strengths and weaknesses and to suggest possible improvement strategies for the involved stakeholders, i.e. public policy makers and private firms. Thus, we will assess primarily the export performance of Italy as a whole, providing also some insights into the features of the Adriatic Regions. As far as the foreign markets are concerned, the analysis will consider the other EU-27 Member States and a selection of the most important extra EU competitors.

Once the structure and the main features of the foreign trade have been analysed, trade competitiveness can be assessed. The concept of international competitiveness is often used in analyzing countries' macroeconomic performance. It compares, for a country and its trading partners, a number of salient economic features that can help explain international trade trends (Durand, 1987).

According to the OECD[4], competitiveness is a measure of a country's advantage or disadvantage in selling its products in international markets. As far as the economic literature is concerned, there are diverse definitions of competitiveness, according to the various dimensions of the concept. In any case, competitiveness provides a relative measure and it is generally associated with the ability to supply the goods and services sought by buyers, earning at least the opportunity cost of return on resources employed (Freebairn, 1986; Frohberg and Hartmann, 1997).

Analysis of competitiveness may differ with regard to the spatial dimension of the analysis, comparing enterprises, regions within a country, countries, etc. Further, competitiveness analysis can focus on potential future performance or past trends: potential of competitiveness can be, for example, examined with accounting method, comparing production costs and gross margins (Frohberg and Hartmann, 1997). Due to the objectives of the study, in this paper we adopted indicators measuring ex-post performance of competitiveness.

A multitude of different indicators derived from real world post-trade observation have been developed. However, it is important to underline that various methodological problems are involved in constructing such indicators. In particular, the construction of indicators hinges on what aspect of competition is under study. Thus, various measures of import, export or overall competitiveness can be identified (Durand et al., 1992).

When using competitiveness indicators it is important to recognise that any particular indicator may be relevant for only one aspect of trade performance and to provide benchmarks between producers located in different countries. Thus, the measurement of a country (or region) competitiveness will be affected both by the location and the structure of the markets for which it is calculated. In practice there are three options that can be adopted depending on the purposes of the analysis, which may be confined to a country's export markets, to its home market or both. Once this choice has been made, it is necessary to select the countries to which it is wished to measure competition (Durand et al., 1992).

2.2.1. Trade indicators

The first indicator considered is the *"trade dependence"* (TD) index, also termed the "*trade openness"* (TO) index; it is one of the most widely used trade statistics. The TD is defined as the value of total trade (imports plus exports) as a percentage of domestic production, and it provides a measure of the importance of international trade in the economy or the sector considered; it can give an indication of the degree to which it is open to trade. The TD index is therefore defined as follows:

$$TD_{ij} = [(X_{ij}+M_{ij}) / Yij] \quad (1)$$

Where:
X is export value,
M is import value
Y is domestic production value
i is a country or a region
j is a commodity.

The TD can take values between 0 and +∞; a high index value is often interpreted as indicating a more open economy although the index is biased by other factors, including economic size and trade restrictions (like tariffs and nontariff barriers).

The second indicator is the "*export propensity*" (XP) index, defined as the ratio of exports to domestic production. Using the same notation as in (1) the indicator is defined as:

[3] This group basically includes anchovy-derived commodities used as input in the preparation of further processed food products.
[4] OECD glossary of statistical terms.

$$XP_{ij} = (X_{ij} / Y_{ij}) \quad (2)$$

The XP index shows the overall degree of reliance of domestic producers on foreign markets. It is similar to the TD index, but may provide a better indicator of vulnerability to certain types of external shocks (e.g., falls in export prices or changes in exchange rates). In some cases it may be considered as a policy target, although it will tend to be negatively correlated with the economic size. The ratio is expressed as a percentage and it ranges from zero (with no exports) to 100% (with all domestic production exported). However, it has to be noticed that it can take values greater than 100% due to re-exports.

A further indicator, often used to complement information provided by the XP index, is the "*Intra-Industry Specialization"* (IIT) index. In modern economies we detect more and more frequently the occurrence of re-exports and we observe that different types of the same good are traded. This is due to intra-industry specialisation between countries: product differentiation is horizontal in the case of a good with more than one variety and vertical when trade is made up of goods that have been subject to processing (semi-processed and finished goods). The analysis of intra-industry specialisation can rely on the index developed by Grubel and Lloyd which measures the level of product overlay between imports and exports (Grubel and Lloyd, 1975):

$$IIT_{ij} = [1-|X_{ij}+M_{ij}| / (X_{ij}+M_{ij})] \quad (3)$$

The index can vary between 0% and 100% with higher values indicating greater overlay of import and export flows for the sector considered, thus highlighting increasing levels of intra-industry specialisation.

2.2.2. Competitiveness indicators

As a first step in the assessment of competitiveness in international trade, it is useful to refer to *unit values* (UV). Unit values in any period measure, for individual commodity classes in that period, the total value of shipments divided by the corresponding total quantity (IMF, 2009). It has to be noticed that unit value indices work well for the aggregation of identical, homogeneous items, but are biased for the aggregation of different, heterogeneous goods. In fact, unit values may change over time as a result of a change in the mix of the products sold at different prices, even if the prices do not change. However, there are significant advantages from the use of unit value indices due to be their coverage and their relatively low resource cost, as they are recorded by the customs authorities. Actually, unit values provide comparable indicators for a reasonably large number of countries, and they are the most frequently used (Durand and Giorno, 1987). Moreover, unit values provide an indicator of price changes and allow for the calculation of the terms of trade.

The *terms of trade* (TT) is the ratio of export and import prices. Therefore, it measures the value of a unit of exports in terms of the number of imports it can buy, or the purchasing power of a country 's exports. It can be calculated with the following general notation:

$$TT_{ij} = (PX_{ij} / PM_{ij}) \quad (4)$$

Otherwise, using unit values instead of prices:

$$TT_{ij} = (UVX_{ij} / UVM_{ij}) \quad (5)$$

The terms of trade will be favourable to a country when the export prices are high relatively to import prices. This is because the products of one unit of domestic resources will exchange against the product of more than one unit of foreign exchange. If, on the other hand, the prices of its imports rise relatively to the prices of its exports, the terms of trade will be unfavourable to the country. It is the desire of every country that it should earn the maximum of income out of international exchange by taking permanent favourable terms of trade. In order to secure maximum gain, the country will try to increase the volume and value of exports and reduce the volume of imports and buy it also from the cheapest market.

Further insights into the study of competitiveness in international trade can be sought calculating *revealed comparative advantage indicators*. Liesner (1958) was the first to use post-trade data in order to quantify comparative advantage, but the concept was refined by Balassa (1965). In this paper we have considered two indices proposed by Vollrath (1991), namely the Relative Export Advantage (RXA) and the Relative Trade Advantage (RCA).

The RXA measures a country's exports of a commodity relative to a set of commodity exports and to the corresponding export performance of a set of countries. It is calculated as:

$$RXA_{ij} = (X_{ij} / X_{ik}) / (X_{wj} / X_{wk}) \quad (6)$$

Where:
X is the export value;
i is a country,
j is a commodity;
w refers to the world except country *i*,
k is a set of commodities except commodity *j*.

The RXA is equivalent to the Balassa index: the only difference is that country *i* and commodity *j* are excluded from the total *w* and *k*. Values above unity suggest that the country has a competitive advantage in the considered product.

The second index is the relative trade advantage (RCA) which is calculated as:

$$RCA_{ij} = (RXA_{ij} - RMA_{ij}) \quad (7)$$

where:

$$RMA_{ij} = (M_{ij} / M_{ik}) / (M_{wj} / M_{wk}) \quad (8)$$

RMA is the relative import advantage, calculated following the same structure of RXA.

These indices are criticized by some authors (Pitts et al.,

1995) since they cannot be compared across countries, as the size of a country affects the value. In our empirical experience, we have seen that results for Italian competitiveness are very similar using RXA and RCA; however, comparison using RCA is very difficult when there are countries (like Morocco) with extremely low import. For this reason we will show only RXA results.

RXA index will be calculated for sardines and anchovies, using the distinction between fresh/frozen products and processed/semi processed products. Total fresh fish and processed fish product exports will be used as term of reference; total world exports will represent the geographical reference. Furthermore, RXA will be explicitly calculated for a set of Mediterranean country: France, Spain and Morocco. The analysis has been realized using FAO yearly data, from 1990 to 2008.

As third step in competitiveness assessment, we will carry out a Constant Market Share Analysis. In fact, Constant Market Share Analysis (CMSA) can be also included between the techniques using ex-post trade observations to measure competitiveness. CMSA allows analyzing the changes of the export market shares (of a reference country in a reference market) between two temporal thresholds subdividing it in several terms.

Various alternative methods have been developed by several authors since the very first applications of the CMSA. A classic formulation is that proposed by Leamber and Stern (1970), successively improved by Fagerberg and Sollie (1985). The last one will be used in this study, because it is assumed to be more rigorous and able to provide an explanation of the residual effect (Mastrostefano, 1998; Benedetto, 1992; Mulazzani and Malorgio, 2009). The method will be used focusing on the Spanish anchovy market as a special case study. Anchovy trade will be broken down using the six NC8 products (preservation forms) available in EUROSTAT.

Using the Fagerberg and Sollie formulation, the variation of the Italian export market share (ΔS) is decomposed in three terms:

$$\Delta S = \Delta S_a + \Delta S_b + \Delta S_{ab} \qquad (9)$$

with:

$$\Delta S_a = \sum_j (a_{jt} - a_{j0}) b_{j0}$$

$$\Delta S_b = \sum_j (b_{jt} - b_{j0}) a_{j0}$$

$$\Delta S_{ab} = \sum_j (a_{jt} - a_{j0})(b_{jt} - b_{j0})$$

where *a* is the Italian export share in the Spanish market, and *b* is the relative weight of the specific NC8 product in the world import of Spain (considering as total the sum of all six anchovies preservation forms); subscript *i* refers to the six NC8 products (preservation forms) used to breakdown the anchovy trade, *t* and *0* refer to the final and initial year used as temporal thresholds.

ΔS_a is generally called "*Market Share Effect*", and measures the ability of the exporting country (Italy) to make each of its products enter into the reference market (Spain). ΔS_b is the "*Commodity Composition Effect*": this term, by considering the initial export market share of the exporting country and the weight change of each product in the importing market, measures how much the total export market share should change just due to a change in the composition of imports of the reference market. Finally, ΔS_{ab}, the so called "*Residual Effect*", provides a measurement of the country capacity to adjust the product composition of its exports to the changes intervened in the structure of the reference market, gaining quotas for products with faster growing demand.

The analysis will be carried out dividing the reference period (1999-2010) into two sub-periods, the first one (1999-2006) corresponding to the expansion of Italian export of anchovies to Spain, and the second one (2006-2010) corresponding to a period of contraction. Eurostat data will be used.

3. Results

3.1. Trade flows analysis

The following Table 1 displays Italy's foreign trade flows value, both total and with the EU-27. Overall, we notice that the aggregate net trade balance of small pelagics is considerably negative (-64.6 million euro), mostly due to net imports of processed products. However, with regards to the intra-EU flows, the net trade balance is slightly positive (2.4 million euro). In fact, the EU-27 market accounts for the great majority (about 70%) of the world Italian exports, but only 36% of total imports.

The contribution of the Adriatic regions to the national foreign exchanges is significant, as they provide about 80% of the total volume of exports and 50% of imports. Furthermore, they determine almost the totality of anchovy trade, with beyond 90% of national exports and imports. More in detail, 70% of Italian exports and 40% of imports come from the Northern Adriatic regions (Friuli-Venezia-Giulia, Veneto and Emilia-Romagna).

Fresh products are the only commodity group with a positive trade balance, mostly thanks to the large quantities of anchovies exported, while we observe that Italy is a net importer of Mackerels from other EU Member States. The less traded commodities are frozen and semi-processed products. Exchanges of the former group take place mostly within the EU-27 and consist mainly of sardine exports and mackerel imports. Among semi-processed products we register considerable imports of anchovies that are used by the processing industry as an ingredient for food preparations, even though exports are appreciable as well. Both semi-processed and processed products imports originate from extra-EU countries, and they include either anchovies, mackerels and sardines purchases.

According to these data, we observe that the trade flows structure of the main species considered differ significantly. As for mackerel, the less abundant species in the Mediterranean Basin, Italy is a net importer (exports are negligible) of each of the commodity groups considered.

On the contrary, anchovies and sardines are intensely traded, both as exports (generally as fresh products) and imports (as semi-processed and processed commodities).

These results can be usefully complemented with an analysis of Italy's main trade partners (Table 2). These data show a remarkable geographical concentration of Italian small pelagics trade flows. Overall, the largest share of import value comes from Morocco (30%), Spain (16%) and Croatia (14%), while the most relevant export market is Spain (42% of the value of all exports), followed by other EU-27 Member States, Albania (7%), Tunisia, Australia and USA (4% each).

Table 1 - *Value of Italian small pelagics trade flows (,000 euro, average 2009-2010).*

	World			UE-27		
	import	export	balance	import	export	balance
Fresh products	**19,101**	**34,370**	**15,268**	**13,576**	**33,262**	**19,685**
Anchovies	4,972	19,543	14,571	1,758	19,265	17,506
Sardines	3,509	5,494	1,986	1,203	5,458	4,255
Mackerels	10,548	1,759	-8,788	10,543	1,001	-9,542
Others	73	7,573	7,500	72	7,538	7,466
Frozen products	**6,461**	**4,029**	**-2,431**	**5,340**	**3,693**	**-1,647**
Anchovies	118	662	544	27	396	369
Sardines	840	2,871	2,031	522	2,851	2,329
Mackerels	5,315	479	-4,836	4,767	429	-4,339
Others	188	17	-171	24	17	-7
Semi-processed products	**22,048**	**9,039**	**-13,009**	**4,475**	**2,595**	**-1,879**
Anchovies	21,326	9,035	-12,291	3,766	2,593	-1,173
Mackerels	721	3	-718	708	2	-706
Processed products	**91,497**	**27,033**	**-64,464**	**26,160**	**12,435**	**-13,725**
Anchovies	43,630	22,487	-21,143	5,102	9,157	4,054
Sardines	12,458	2,793	-9,665	6,646	1,968	-4,678
Mackerels	33,381	686	-32,694	14,295	626	-13,669
Others	2,028	1,067	-961	116	683	568
Total small pelagics	**139,108**	**74,471**	**-64,636**	**49,551**	**51,985**	**2,434**

Source: Istat-Coeweb.

As it was already noticed, the majority of fresh products exchanges take place within the EU-27 market, with the only important exception of Croatia that is Italy's first supplier of sardines and anchovies, accounting for 65-66% of total imports, followed by France and Spain (11% and 10%). Spain and France are the main suppliers of mackerels as well (52% and 30% respectively), together with Denmark (13%). Spain is also by far the main destination for exports of anchovies (86%), sardines (63%) and other products (76%), followed by Germany and France (6%).

Similar features are detected for frozen products that are imported mostly from Spain (sardine and mackerel), Netherlands (mackerel) and Croatia (anchovy and sardine) and exported to Spain (sardine and mackerel), France (sardine) and Germany (anchovy).

The trade of semi-processed and processed products shows quite different patterns. Semi-processed products, including mostly dried, salted or wet salted anchovies, are imported from Croatia (65%) and exported to Tunisia (38%), Albania (21%) and again Spain (16%). Morocco is the main supplier of processed products (39% of small pelagics imports), followed by Albania and Tunisia (mostly for anchovy) and Spain and Germany (for mackerel and other species). Exports are spread across various EU countries (41%), but also Asia and Albania (about 15% of processed anchovies export) and Australia (14% of sardines).

Albania, Morocco, and Tunisia have particularly intense trade relations of processed products with the Adriatic regions. This phenomenon can be explained by the proximity of these countries and the low labour cost of the processing industry located there. The direction and amount of exchanges registered suggests that semi-processed products (mostly anchovies) may be exported to these countries, where they are further processed, to be eventually imported as final food products.

Table 3 displays the results of the trade indicators of small pelagics trade flows referred to both Italy as a whole and to the Adriatic regions as an aggregate. For each species we calculated the indicators with respect to three commodity groups: total, fresh and processed products. However, since Prodcom doesn't provide data on processed goods supply for the Adriatic regions, the trade dependence and export propensity indicators could not be calculated for this area.

The trade dependence (TD) index provides a measure of the importance of international trade for the Italian small pelagic sector, and each of the sub-sectors defined by the various species considered. The elaborations confirm and quantify the structural features outlined in the qualitative description of the flows above. With a TD index of 1,110.4%, mackerels are the species more exposed to international trade (as compared to national catches), particularly due to trade of processed products (743.9%). The TD value for sardines is quite lower than for mackerels, but it is still relevant (218.7%) and it is equally attributable to fresh and processed products. In spite of the large volumes of trade, anchovies show the lowest TD values, due to the great amount of domestic catches. In fact, TD for fresh anchovies is a bare 30.9%, while for processed anchovies it rises up to 148.7%. As far as the Adriatic regions are concerned, we find very high TD indexes for sardines (218.7% total and 99.4% fresh) and mackerels (793.1% total and 362.3% fresh).

The export propensity (XP) index shows the overall degree of reliance of domestic producers on foreign markets and provides hints on the sector vulnerability to certain types of external shocks, such as falls in export prices. The highest values of the index for Italy as a whole are those calculated for Sardines, both total (87.3%) and fresh (65.4%) products, followed by total anchovies (63.2%) and mackerels (61.5%). The case of sardines traded by the Adriatic regions is particularly interesting as the XP indexes are much higher than the others, and they even exceed the theoretic 100% limit. In fact, the values calculated (241.5% for total products and 223.9% for fresh products) show that the exports are more than twice the domestic production, thus implying that part of the products imported from foreign countries are afterwards re-exported abroad.

Table 2 - *Italy's main partners in small pelagics trade (value, average 2009-2010).*

	Import			Export		
Fresh products	**Spain 35%**	**Croatia 29%**	**France 23%**	**Spain 76%**	**Germany 6%**	**France 6%**
Anchovies	Croatia 65%	France 11%	Spain 10%	Spain 86%	Germany 3%	Greece 4%
Sardines	Croatia 66%	France 17%	Spain 10%	Spain 63%	France 28%	Netherlands 2%
Mackerels	Spain 52%	France 30%	Denmark 13%	Tunisia 33%	Romania 10%	France 15%
Others	ns	ns	ns	Spain 76%	Germany 15%	Netherlands 7%
Frozen products	**Spain 42%**	**Netherlands 33%**	**Croatia 6%**	**Spain 54%**	**France 19%**	**Germany 8%**
Anchovies	Croatia 31%	Spain 19%	Argentina 20%	Germany 27%	Spain 14%	Morocco 29%
Sardines	Spain 55%	Croatia 35%	Greece 5%	Spain 67%	France 25%	Germany 4%
Mackerels	Spain 42%	Netherlands 40%	USA 7%	Spain 39%	Albania 4%	Greece 5%
Others	ns	ns	ns	ns	ns	ns
Semi-processed products	**Croatia 64%**	**Spain 16%**	**Argentina 4%**	**Spain 16%**	**Tunisia 38%**	**Albania 21%**
Anchovies	Croatia 65%	Spain 16%	Argentina 4%	Spain 28%	Tunisia 38%	Albania 21%
Mackerels	ns	ns	ns	ns	ns	ns
Processed products	**Morocco 39%**	**Albania 29%**	**Tunisia 17%**	**UE27 41%**	**Albania 14%**	**ASIA 15%**
Anchovies	Morocco 39%	Albania 29%	Tunisia 17%	UE27 41%	Albania 14%	ASIA 15%
Sardines	Morocco 42%	Spain 14%	Germany 16%	Austria 40%	Australia 14%	Germany 17%
Mackerels	Morocco 42%	Germany 14%	Spain 14%	Austria 58%	France 5%	Slovenia 9%
Others	ns	ns	ns	ns	ns	ns
Total small pelagics	**EU 36%** (Spain 16%)	**Morocco 30%** Albania 9%	**Croatia 14%** Tunisia 7%	**EU 70%** (Spain 42%)	**Abania 7%** Tunisia 4%	**Australia 4%** USA 4%

ns: not significant.
Source: Istat-Coeweb.

The third indicator is the intra-industry specialization ratio (IIT), used to assess the amount of product overlays between imports and exports, due to either vertical or horizontal product differentiation. The highest values of the index are found for anchovies (85%) and sardines (79.8%), indicating that contemporary but opposite trade flows of similar products take place with a significant intensity. It is interesting to notice that imports and exports of similar commodities are more intense for processed anchovies and fresh sardines. Further, anchovies and sardines have a much higher IIT with respect to the Adriatic regions rather than to Italy as a whole, in particular total anchovies show an IIT value very close to 100% (the threshold meaning full overlay of imports and exports).

Generally, when high levels of IIT are observed, four explanations are possible. As a first case, we can consider that goods of different quality or varieties could be included in the same commodity group for statistical reasons. In this case trade flows data would actually hide exchanges of different products between Countries. However, given the relative homogeneity of the commodity groups considered, we think this is only a marginal issue in the present study.

Secondly, the traded goods classified in the same commodity group could have undergone different processing stages, so that a country could import them as inputs and then export them as final products. According to the information gathered, this is probably what happens in Italy that exports a large part of the abundant catches and imports processed products (specially in the case of anchovies and sardines).

A third explanation could refer to diverse supply-demand conditions. Since small pelagic supply follows biological cycles and fresh products cannot be preserved for long periods, export would occur when catches are abundant, while imports are required when domestic demand is high, like in summer when the season is closed and lots of tourists visit coastal resorts.

Finally, we have to consider the case of transits and re-exports. In fact, Croatia is a major exporter of small pelagics, while Spain is a major importer. Even if the statistics should not register such flows respectively as Italy's imports and exports, we must consider that many Italian traders may be involved in these exchanges.

3.2. Competitiveness analysis

3.2.1. Terms of Trade

In order to provide a first general assessment of Italian trade flows competitiveness, we calculated the unit values (UV) and terms of trade (TT) for the main small pelagic species, per each preservation state (see Table 4). The total TT is quite a raw indicator, since it refers to an aggregate of heterogeneous commodities; however, it is interesting to notice that it has quite low values for both total trade (66%) and EU-27 trade (61%). This means that generally the price obtained for exports is 34% lower than the price paid for imports (39% with regard to intra-EU trade).

This general result is consistent with the structure of Italian trade flows that consist mostly of exports of fresh commodities at low prices and imports of

Table 3 - *Small pelagics trade indicators: Italy and Adriatic regions (value, average 2009-2010).*

		TD		XP		IIS	
		Italy	**Adriatic Regions**	**Italy**	**Adriatic Regions**	**Italy**	**Adriatic Regions**
Anchovies	total	148.7%	118.8%	63.2%	59.3%	85.0%	99.8%
	fresh	30.9%	41.0%	24.7%	33.8%	40.2%	35.2%
	processed	129.3%	n.a.	42.2%	n.a.	65.3%	65.6%
Sardines	total	218.7%	428.7%	87.3%	241.5%	79.8%	87.3%
	fresh	99.4%	297.9%	65.4%	223.9%	68.4%	49.7%
	processed	96.2%	n.a.	17.6%	n.a.	36.6%	27.0%
Mackerels	total	1,110.4%	793.1%	61.5%	45.4%	11.1%	11.4%
	fresh	380.0%	362.3%	47.0%	37.0%	24.7%	20.4%
	processed	743.9%	n.a.	14.7%	n.a.	4.0%	3.9%

TD: Trade Dependence index.
XP: Export Propensity index.
IIS: Intra-Industry Specialization index.
Fresh: fresh and frozen. Processed: semi-processed and processed. Total: fresh and processed.
na: not available.
Source: Irepa-Mipaaf, Istat-Coeweb.

processed products at higher prices. Actually, the TT for fresh products is lower than 100% (and therefore unfavourable), while the frozen (except the group "others"), semi-processed and processed products (particularly sardines) have advantageous TT values. This is also due to the different partners of Italy in the trade of each type of product, since the main suppliers are low-income countries, such as Morocco, Albania and Tunisia, while the main destinations are high-income countries, such as the EU, USA and Australia.

The case of anchovies is particularly interesting, as they are by far the most traded species. Semi-processed anchovies show very low unit values, except those traded within the EU-27. In fact, these commodities are purchased mostly from Croatia and presumably used as inputs by the processing industry. Processed anchovies have higher prices, especially those traded between European countries. The price difference is particularly relevant if we compare prepared or preserved anchovies (CN8 code 16041600) imports from Tunisia or Morocco (5.12 €/kg and 5.51 €/kg) with exports to USA (7.13 €/kg), France (8.45 €/kg), United Kingdom (9.13 €/kg) or to some Asian countries, where exports are sold at prices greater than 10 €/kg.

Further interesting considerations can be drawn by observing the unit values and terms of trade of the Adriatic regions, both as a whole and divided in northern and southern regions (Table 5). Total small pelagics UV and TT calculated for the Adriatic regions are similar to the Italian one, with appreciably more favourable values referred to the EU market. However, the most important issue to be highlighted relates to the differences showed by the southern Adriatic regions as compared to the northern ones, and to Italy as a whole. In particular, we acknowledge that the most favourable terms of trade of all the

Table 4 - *Italy's small pelagic Unit Values and Terms of Trade (average 2009-2010).*

	World			EU-27		
	UVM (€/kg)	UVX (€/kg)	TT (%)	UVM (€/kg)	UVX (€/kg)	TT (%)
Total small pelagics	**2.99**	**1.96**	**66%**	**2.75**	**1.66**	**61%**
Fresh products	**1.46**	**1.33**	**91%**	**1.80**	**1.33**	**74%**
Anchovies	1.63	1.41	87%	2.84	1.41	50%
Sardines	0.90	1.07	119%	1.41	1.06	75%
Mackerels	1.74	1.72	98%	1.74	2.61	150%
Others	1.60	1.30	81%	1.61	1.30	81%
Frozen products	**1.13**	**0.90**	**80%**	**1.15**	**0.89**	**78%**
Anchovies	1.16	1.47	126%	1.74	1.76	101%
Sardines	0.76	0.79	104%	0.71	0.79	112%
Mackerels	1.20	1.30	108%	1.22	1.39	114%
Others	1.90	1.28	67%	1.66	1.28	77%
Semi-processed products	**2.82**	**2.89**	**102%**	**6.19**	**5.04**	**81%**
Anchovies	2.76	2.89	104%	5.91	5.04	85%
Mackerels	8.21	7.36	90%	8.28	5.63	68%
Processed products	**4.58**	**6.01**	**131%**	**5.13**	**7.48**	**146%**
Anchovies	5.45	6.03	111%	6.54	8.62	132%
Sardines	3.21	5.43	169%	3.78	4.89	129%
Mackerels	4.43	6.21	140%	5.65	6.13	108%
Others	3.56	7.27	204%	3.26	7.19	221%

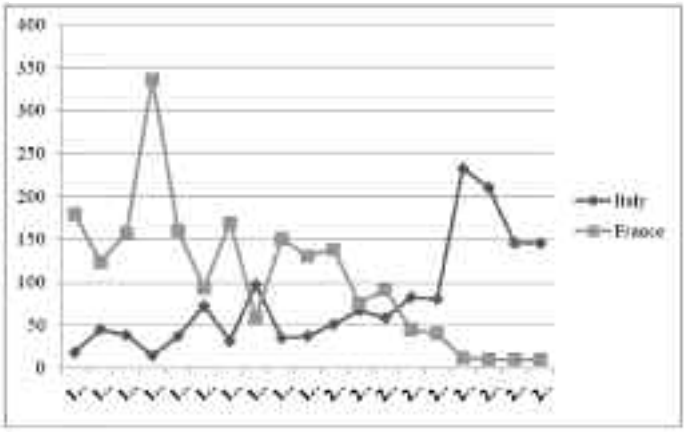
UVM: unit values of imports.
UVX: unit values of exports.
TT: Terms of Trade (UVX/UVM).
Source: Istat-Coeweb.

Table 5 - *Adriatic regions' small pelagic Unit Values and Terms of Trade (average 2009-2010).*

		World			EU-27		
		UVM (€/kg)	UVX (€/kg)	TT (%)	UVM (€/kg)	UVX (€/kg)	TT (%)
Total Adriatic regions	**Total small pelagics**	**2.67**	**1.72**	**64%**	**2.17**	**1.59**	**73%**
	Fresh and frozen products	1.34	1.38	103%	1.55	1.38	89%
	Semi-processed products	2.27	2.52	111%	1.79	3.73	208%
	Processed products	4.84	4.32	89%	4.69	7.60	162%
Northern Adriatic regions	**Total small pelagics**	**2.70**	**1.61**	**60%**	**2.23**	**1.45**	**65%**
	Fresh and frozen products	1.24	1.24	100%	1.47	1.24	84%
	Semi-processed products	2.27	2.51	111%	1.79	3.73	208%
	Processed products	4.85	4.13	85%	4.75	7.62	160%
Southern Adriatic regions	**Total small pelagics**	**2.47**	**2.57**	**104%**	**1.90**	**2.55**	**134%**
	Fresh and frozen products	1.86	2.33	125%	1.87	2.37	127%
	Semi-processed products	na	4.78	na	na	3.01	na
	Processed products	4.79	7.63	159%	2.77	7.47	270%

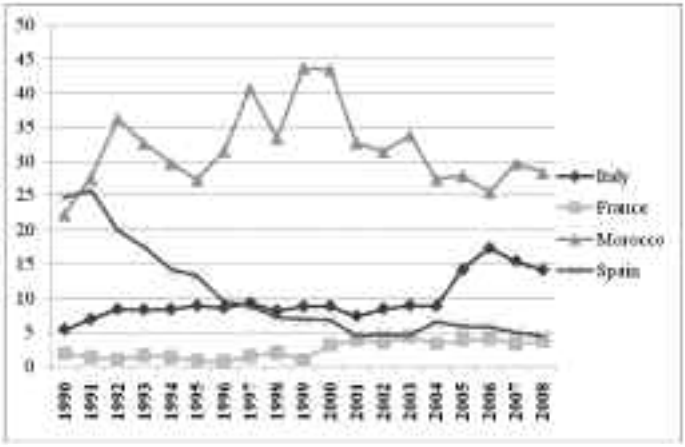
UVM: unit values of imports.
UVX: unit values of exports.
TT: Terms of Trade (UVX/UVM).
Northern Adriatic regions: Friuli-Venezia-Giulia, Veneto and Emilia-Romagna.
Southern Adriatic regions: Marche, Abruzzo, Molise and Puglia.
Source: Istat-Coeweb.

Figure 3 - *RXA index for fresh anchovies.*



Source: FAO.

Figure 4 - *RXA index for processed anchovies.*



Source: FAO.

commodity groups considered are obtained thanks to the remarkably higher unit values for exports. In this case, it is likely that higher prices are due to higher product quality. In fact, fish caught in the southern Adriatic have distinctive characteristics, because of biological cycles, climatic conditions, etc. Moreover, in these regions specific fishing gears are used (i.e. purse-seine, trawl) that contribute to preserving fish integrity and quality.

3.2.2. Revealed comparative advantage

RXA has been calculated for anchovies and sardines for the 1990-2008 time period[5], considering two groups of commodities: fresh/frozen products and processed/semi processed products. Italian performance has been compared to the results of other three Mediterranean countries, important producers of small pelagic fish, specifically France, Spain and Morocco.

As far as fresh sardines are concerned, Italy had an outstanding comparative advantage in 1991 (RXA index = 177), when Adriatic sardine landings were approximately 10 times higher than now. Successively, the comparative advantage has rapidly decreased (with RXA values around 10), slightly higher than France (around 6) and Spain (around 5), but clearly lower than Morocco (with an RXA index increased from 7, in the nineties, to 40 in 2008). Comparative advantage for processed sardines has remained practically unchanged for the three EU countries in the last years (below the unit), while for Morocco the RXA index is extremely high (between 170 and 300).

Very interesting is the analysis of the anchovy trade. It should be stressed that world trade of fresh anchovy is essentially concentrated between Mediterranean countries. Historically, main exporters are France and Italy, while Spain is the main importer. Figure 3 clearly shows that Italian and French comparative advantages are inversely correlated, and that Italy has been improving its position in the latest 20 years (although comparative advantage has begun to decrease since 2005). Several Mediterranean countries compete in the export of processed anchovies. Figure 4 indicates that Italian relative competitiveness has been increasing, and is higher than French and Spanish competitiveness. On the other hand, Morocco is still the most competitive country for this product.

Table 6 - *Italy's anchovy exports towards Spain: CMSA results (1996-2006).*

Preservation state	Relative weight (b)		Italian market share (a)		Market share variation terms			
	1999	2006	1999	2006	ΔS_a	ΔS_b	ΔS_{ab}	Tot ΔS
Fresh	62.2%	62.1%	18.2%	68.7%	31.4%	0.0%	-0.1%	31.4%
Frozen	5.1%	3.1%	2.8%	11.0%	0.4%	-0.1%	-0.2%	0.2%
Dried	5.2%	3.2%	0.0%	31.6%	1.6%	0.0%	-0.6%	1.0%
Salted	24.6%	16.8%	0.4%	7.1%	1.7%	0.0%	-0.5%	1.1%
Processed (whole or in pieces)	2.0%	5.6%	0.8%	13.8%	0.3%	0.0%	0.5%	0.8%
Processed (excl. whole or in pieces)	0.9%	9.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Total					**35.4%**	**-0.1%**	**-0.9%**	**34.4%**

Source: Eurostat.

Table 7 - *Italy's anchovy exports towards Spain: CMSA results (2006-2011).*

Preservation state	Relative weight (b)		Italian market share (a)		Market share variation terms			
	1999	2006	1999	2006	ΔS_a	ΔS_b	ΔS_{ab}	Tot ΔS
Fresh	62.2%	62.1%	18.2%	68.7%	31.4%	0.0%	-0.1%	31.4%
Frozen	5.1%	3.1%	2.8%	11.0%	0.4%	-0.1%	-0.2%	0.2%
Dried	5.2%	3.2%	0.0%	31.6%	1.6%	0.0%	-0.6%	1.0%
Salted	24.6%	16.8%	0.4%	7.1%	1.7%	0.0%	-0.5%	1.1%
Processed (whole or in pieces)	2.0%	5.6%	0.8%	13.8%	0.3%	0.0%	0.5%	0.8%
Processed (excl. whole or in pieces)	0.9%	9.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Total					**35.4%**	**-0.1%**	**-0.9%**	**34.4%**

Source: Eurostat.

3.2.3. Constant Market Share Analysis

The CMSA has been used for the specific case study of the anchovy trade towards Spain. Anchovy was chosen because it largely represents the main Italian species exported. Spain is the largest world importer of anchovies and the main Italian partner. The Spanish market now accounts for 86% of the EU market (excluding Italy) for fresh/frozen anchovies, 78% for semi-processed anchovies and 30% for processed anchovies.

Spanish imports of processed anchovies, that were extremely low at the end of the nineties, are now rapidly growing, more than in other EU countries. The value of processed anchovies represented only 3% of total import of anchovies in 1999; in 2010 it represented 38% (see Table 6 and Table 7).

Italian export of anchovies toward Spain has been strongly conditioned by catches of Spain and France. It is noteworthy that landings of these two countries have been decreasing in the last decade, as far as both countries had to close the fishing activity in the Gulf of Biscay from 2005 to 2010. In this period, Spanish import of processed anchovies rapidly increased; on the other hand, total import of fresh products had a marginal growth, but Italian anchovies could substitute the French product.

We have conducted the CMSA for two successive periods, 1999-2006 and 2006-2010. The first period culminates with the maximum export of Italian fresh anchovies to Spain (24,600 tons; 45,000 thousands of euro); 2006 was also the year with the highest unit value of Italian anchovies 1.83 €/kg. Successively, both flows and unit value have decreased (in 2010: 16,200 tons; 21,800 thousands of euro; 1.35 €/kg). It should be noted that in the last four years, unit value of Italian product has been lower than mean unit value of both EU and extra-EU countries.

For the period 1999-2006, the Italian market share has registered +34.4 percentage points. CMSA clearly shows that this is essentially a Market Share Effect (+35.4%), due to fresh products (+31.4%); however, the Market Share Effect is positive also for the other 5 presentation forms, contributing overall with +4%. It is thus clear that in this period Italy was able to take advantage of the French crisis, especially for fresh products.

The analysis of the period 2006-2011 is more interesting. Overall, Italy has lost 20.8 percentage points. This is both due to the Market Share Effect (-10%) and to the Commodity Composition Effect (-12.9%), meaning that Spanish demand has decreased (as percentage share) for the presentation forms where Italian products were dominant (e.g. fresh anchovies) and vice versa. Almost all specific terms look negative. The contribution of fresh product is the most evident (-19.4% overall), because Italy has lost quotas

[5] The most up-to-date data available from FAO.

(-8.5%) and because this presentation form is losing importance into the Spanish market (-13.6%)[6]. Other terms would seem less important, but the lack of positive effects is also an alarming evidence of poor Italian competitiveness. The two presentation forms showing stronger growth into the Spanish market are processed – whole or in pieces (+7.3 percentage points), and processed – excl. whole or in pieces (+16.3%). Unfortunately, we have to notice that for the first category Italy has halved its market share (from 13.8% to 6.3%), while for the second category Italian market share has remained at 0%.

4. Conclusions and recommendations

The international trade analysis pointed out a structural dependency from foreign markets, both to satisfy the domestic demand, as well as to place the abundant domestic supply. As opposed to a satisfactory performance of fresh product exports (almost exclusively anchovies), we notice that the trade balance deficit is due to the conspicuous imports of semi-processed and processed products. Moreover, we registered a relevant geographic concentration of import and export flows, as well as a scarce unit value of most products and a slow but progressive loss of market shares on international markets.

Spain is by far the main destination of Italian and Adriatic exports, receiving almost 80% of fresh products exported (mainly anchovies). However, the Spanish demand for fresh products is decreasing and Italy is progressively losing its markets shares, while unit export values to Spain are the lowest among our competitors, both European and non European (such as Morocco). The competitiveness analysis also highlighted that Italian exports of anchovies toward Spain have been strongly conditioned by catches of Spain and France. Thus, the recent resumption of anchovy fishing activity in the Bay of Biscay, after a suspension of five years, represents a further concrete threat for the Italian exports in the near future.

According to our results, more favourable perspectives are detected for processed products. Unfortunately, we have to notice that in this category Italian market shares are decreasing as well. As a matter of fact, in spite of the quite large number and relevant turnover of processing firms located in the Adriatic regions, the Italian fishery looks unable to take proper advantage of such opportunity. The main problems, besides the absence of commercial strategies, are due to the insufficient attitude and capacity to concentrate supply as well as to the lack of coordination among the different stages of the supply chain. At the same time we must also recall some structural issues related to the high labour cost and the complexity to introduce specific technological innovations, because of the intrinsic characteristics of the product considered.

According to the results of the analysis, in order to attain an effective product exploitation, our recommendation is that policy makers and private actors should both commit themselves to concentrate and differentiate the domestic production as well as to obtain access to new foreign markets.

[6] Just as a mathematical consequence, the residual effect looks positive, because it is considered less severe losing quotas for a product that is losing weight in the reference market.

On the one hand, producers must be able to supply large production quantities, with high quality standards; given the high fragmentation of the sector, both horizontal integration (among producers) and vertical coordination (along the supply chain) strategies are required. On the other hand, public institutions are required to provide an effective institutional marketing support (product promotion and communication), in order to facilitate market access and to further develop market shares in foreign countries.

References

Balassa B. (1965). Trade liberalization and "revealed" comparative advantage. *The Manchester School of Economic and Social Studies*, Vol. 33, pp.99-123.

Benedetto G., (1992). La "constant-market-shares analysis": una "survey" della letteratura critica ed applicativa. *Rivista di Politica Economica* 4:45.

Bernatonyte D., Normantiene A. (2009). Estimation of trade specialization: the case of the Baltic States. *Inzinerine Ekonomika-Engineering Economics* (2) 7-17

Camanzi L., Malorgio G., Regazzi D., (2003). Agri-food Turkish trade: structure, competitiveness and relations with the EU, *New Medit* N.2, Edizioni Dedalo, Bari, ISSN 1594-5685, pp. 25-36.

Durand, M., Giorno, C. (1987). Indicators of international competitiveness: conceptual aspects and evaluation, *OECD Economic Studies* No 9, Autumn 1987.

Durand, M., J. Simon and C. Webb (1992). OECD's Indicators of International Trade and Competitiveness", *OECD Economics Department Working Papers*, No. 120, OECD Publishing. http://dx.doi.org/10.1787/708306180711

Fagerberg J,. Sollie B. (1985). The method of Constant Market share Analysis revisited, discussion paper n. 9, Central Bureau of Statistics, Oslo.

FAO (2011). Fishery Statistical Collections, GFCM (Mediterranean and Black Sea) Capture Production Dataset. Available from: http://www.fao.org/fishery/statistics/gfcm-capture-production/en

Freebairn, J. (1986). Implications of Wages and Industrial Policies on Competitiveness of Agricultural Export Industries, Paper presented at the Australian Agricultural Economics Society Policy Forum, Canberra

Frohberg K., Hartmann M. (1997). Comparing measures of competitiveness. Institute of agricultural development in Central and Eastern Europe, Discussion Paper No.2

Grubel, H.G., Lloyd, P.J. (1975). Intra-industry trade, The Macmillan Press Ltd. London.

IMF (2009). *Export and Import Price Index Manual: Theory and Practice*, IMF Multimedia Services, ISBN 978-1-58906-780-6 available from http://www.imf.org/external/ pubs/cat/longres.cfm?sk=19587.0

Leamer E.F., Stern R.M., (1970). *Quantitative international economics*. Aldine Publishing Company, Chicago.

Liesner H.H. (1958). The European Common Market and British Industry. *The Economic Journal*, Vol. 68, pp. 302-316.

Mastrostefano M. (1988). Qualche nota in margine alla con-

stant share analysis: sviluppi teorici e applicazioni empiriche. In De Benedictis M., De Filippis F. (eds), *Struttura degli scambi agroalimentari e politica agraria*. Milano, Italy: Franco Angeli Libri.

Mulazzani L., Malorgio G. (2009). Market dynamics and commercial flows in the Mediterranean area: Triangular effects among the EU, the MPCs and Italy in the fruit and vegetable sector. *New Medit* N.1, Edizioni Dedalo, Bari, ISSN 1594-5685.

Mulazzani L., Camanzi, L., (2011). Price-quantity relations and choice of the geographical market size in Italian fresh seafood products. *New Medit*, X (1) (2011), Edizioni Dedalo, Bari, ISSN 1594-5685, pp. 35–42

Mulazzani L., Camanzi L., Malorgio G. (2012). Price formation and geographic market integration: An empirical investigation of Adriatic small pelagic species, *Fisheries Research*, Vol. 119–120, May 2012, Pages 99-107, ISSN 0165-7836, 10.1016/j.fishres.2011.12.013, www.sciencedirect.com/science/article/pii/S0165783611003912

OECD, Glossary of statistical terms, in the OECD Economic Outlook: Sources and Methods, available from http://stats.oecd.org/glossary/

Pitts, E., Viaene, J., Traill, B., Gellynk, X. (1995). Measuring Food Industry Competitiveness. Structural Change in the European Food Industries, *Discussion Paper Series*, No. 7.

Vollrath, T.A. (1991). Theoretical Evaluation of Alternative Trade Intensity Measures of Revealed Comparative advantage. *Weltwirtschaftliches Archiv*, 127, 85-99.

Annex

Table 8 - CN8 codes aggregation per species and preservation state

Species	Preservation state	Cn8 codes	Description
Anchovy	Fresh	3026955	Anchovies (Engraulis spp.), fresh/chilled
	Frozen	3037965	Anchovies (Engraulis spp.), frozen
	Semi-processed	3055950	Anchovies (Engraulis spp.), dried, whether or not salted, but not smoked
		3056300	Anchovies (Engraulis spp.), wet salted
	Processed	16041600	Anchovies, prepared or preserved, whole or in pieces
		16042040	Anchovies, prepared or preserved (excl. whole/pieces)
Mackerel	Fresh	3026400	Mackerel (Scomber scombrus, Scomber australasicus, Scomber japonicus), fresh/chilled
	Frozen	3037430	Mackerel of the species Scomber scombrus and Scomber japonicus, frozen
		3037490	Mackerel of the species Scomber australasicus, frozen
		3042951	Mackerel of the species Scomber australasicus, frozen fillets
		3042953	Mackerel of the species Scomber scombrus, Scomber japonicus and fish of the species Orcynopsis unicolor, frozen fillets
	Semi-processed	3054930	Mackerel (Scomber scombrus, Scomber japonicus, Scomber australasicus), smoked, incl. Fillets
	Processed	16041511	Mackerel of the species Scomber scombrus and Scomber japonicus, fillets, prepared or preserved
		16041519	Mackerel of the species Scomber scombrus and Scomber japonicus, excl. fillets, prepared or preserved
		16041590	Mackerel of the species Scomber australasicus, prepared or preserved, whole or in pieces
Sardine	Fresh	3026110	Sardines of the species Sardina pilchardus, fresh/chilled
		3026130	Sardines of the genus Sardinops, sardinella (Sardinella spp.), fresh/chilled
	Frozen	3037110	Sardines of the species Sardina pilchardus, frozen
		3037130	Sardines of the genus Sardinops and sardinella (Sardinella spp.), frozen
	Processed	16041311	Sardines, prepared or preserved, whole or in pieces, in olive oil
		16041319	Sardines, prepared or preserved, whole or in pieces, not in olive oil
Other	Fresh	3026180	Brisling or sprats (Sprattus sprattus), fresh or chilled
	Frozen	3037180	Brisling or sprats (Sprattus sprattus), frozen
	Processed	16041390	Sardinella, brisling or sprats, prepared or preserved
		16042050	Sardines, bonito, mackerel of the species Scomber scombrus and Scomber japonicus…, prepared or preserved

Source: Istat-Coeweb