

## THE MEDITERRANEAN'S GOLD: WHICH COMMERCIAL PROSPECTS FOR THE THUNNUS THYNNUS IN ITALY?

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### ABSTRACT

By taking into consideration the relevant role, in the international trade of Bluefin Tuna (*Thunnus thynnus*), played by Italy, aim of this work is assess the change in the Italian competitive advantage in the international market over the last decade (2008/2017), as a consequence of the Total Allowable Catch system together with size limits set by the International Commission for the Conservation of Atlantic Tunas (ICCAT). Investigating the main changes occurred in the Italian international trade balance, by focusing the attention on the relations with the main commercial partners operating in this industry, is of relevant importance to make available updated data to policy makers, managers and scholars in order to reflect on alternative solutions to increase profits in the international trade. By applying the Relative Trade Advantage Index, results show that Italy in the last decade, although maintained an overall profitable position in the international market, has been affected by drastic changes at system level, mainly caused by the ICCAT regulations aimed at reducing the *Thunnus thynnus* stock overfishing. Measures that led the country to modify commercial partners relations and also internal production business patterns, such as a fragmentation of the *Thunnus thynnus* supply chain related to the export line. Results suggest to both policy makers and stakeholders to activate alternative solutions to improve the trade volume (in money terms) of this sector, in so doing better exploiting the great potential of product, respecting at the same time the Bluefin Tuna sustainability programs.

*Keywords:* Bluefin Tuna; international trade; Relative Trade Advantage Index; ICCAT; sustainable capture.

### INTRODUCTION

Talking about the economic role played by the Atlantic Bluefin tuna or *Thunnus thynnus* (Linnaeus, 1758) entails the recalling of relevant historical traits characterizing this important marine species. Indeed, it is possible to find traces of the *Thunnus thynnus* in the past works of Latin and Greek scientists as well as philosophers. The main references were linked to the surprising biological

properties of this marine species, with particular reference on the *Thunnus thynnus'* size, able to exceed the length of 3 meters and a weight of around 900 kg. However, works also underlined the longevity of the species, with a life span of more than 35 years, as well as motility speed so great to guarantee the completion of wide migration routes, from the North of the Atlantic Ocean to the Mediterranean Sea. Since the Greek Empire, all these characteristics have been widely praised, adding also the economic relevance for commercialization scopes as well as nutritional ones. At this regards, some authors, like Eliano, Ateneo and Plinio the Old, eulogized the nutritional value of the *Thunnus thynnus*. While, in 400 A.C., the Greek historian Erodoto pointed out the how the *Thunnus thynnus* was the most remunerative marine species. There is trace of Greek and Roman works, belonging respectively to Aristotele (300 A.C.) and Pliny the Elder, in latin *Gaius Plinius Secundus* (90 A.C.), where the *Thunnus thynnus* fishing practices are widely described, underlying the migration routes some of them achieving sea waters located over the Hercules Columns, this last known as the extreme limit of the known world. Passing down over the centuries, the economic relevance of the *Thunnus thynnus* remains and also grown (Porch, 2005). While, most of the properties already outlined in the works of past philosophers and historians found scientific and nutritional confirmations.

The economic relevance of the *Thunnus thynnus* is mainly linked to the high nutritional properties of its fleshes, these last able to be consumed both immediately after the capture, thus crude, or after a cooking passage, then transformed. This characteristic represents the main strength point of the *Thunnus thynnus*, encompassing the economic potential intrinsically included in such marine species. Apart from nutritional concerns, it is important to specify that the increase in the Atlantic bluefin tuna was mainly driven by voracious Japanese demand, this last pushed on by the spread of sushi-sashimi consumption rates, a dish based on raw fish consumed in bars and restaurants. As a direct consequence, as already pointed out in 2006 by Spagnolo (2006), in less than 6 years (1997-2002), Japan's imports from the Mediterranean rose from zero to 70% of total imports (Spagnolo, 2006). A percentage that further increased since 2015, severely impacting the overall Atlantic bluefin tuna fishing sector. From a fishing practices side, overfishing of the largest scale, however, has occurred inside the Mediterranean Sea, the overfishing of this marine species has been almost completely attributable to the activity of purse seine fishing fleets, fuelled by the ever-increasing demand for live fish for fattening in Mediterranean tuna farms (COC/PA2, 2013; WWF, 2008). The direct consequence of the economic and nutritional value of the *Thunnus thynnus* can be seen in the biodiversity impact caused by the overfishing practices recorded worldwide during years (Fromentin & Ravier, 2005).

By taking into consideration the relevant role, in the international trade of Bluefin Tuna, played by Italy, third only to Spain and France, aim of this work is assess the change in the Italian competitive advantage in the international market over the last few year and as a consequence also of the total

allowable catch system promoted by the International Commission for the Conservation of Atlantic Tunas (ICCAT). Investigating the main changes occurred in the Italian international trade balance, by focusing the attention on the relations with the main commercial partners operating in this business sector, the present work intends to provide updated data which could be used by policy makers and scholars in better manage such data in order to reflect on the multiple ways to manage the Atlantic Bluefin tuna by considering both economic and habitat impacts.

The need of a such assessment is based on the necessity to evaluate how worldwide policies, mainly aimed arrest biodiversity lost affecting the BFT, can affect the economic performance of a country. In that case Italy has been identified as one of the main important actor in the fishing and commercialization of *Thunnus thynnus*, for both its geographical location and historical domain role in the Mediterranean players. For the economic analysis, the Relative Trade Advantage Index (RTA) (Vollrach, 1991) has been performed, by using money values of export and import rates in Italy in a time period ten years long (2008/2017).

The paper is structured as follows: the first paragraph presents an overview of the main political tools that in the last years addressed the management of BFT protection; after that, a presentation of the RTA index is released. The section results comment the main findings belonging to the application of the RTA in the Italian economic context. The discussion paragraph provides structured links between our findings and previous scholars results and suggestions. Finally, in the conclusions, specific implications are discussed.

## THE ROLE OF THE ATLANTIC BLUEFIN TUNA IN BOTH BIODIVERSITY AND ECONOMIC TERMS

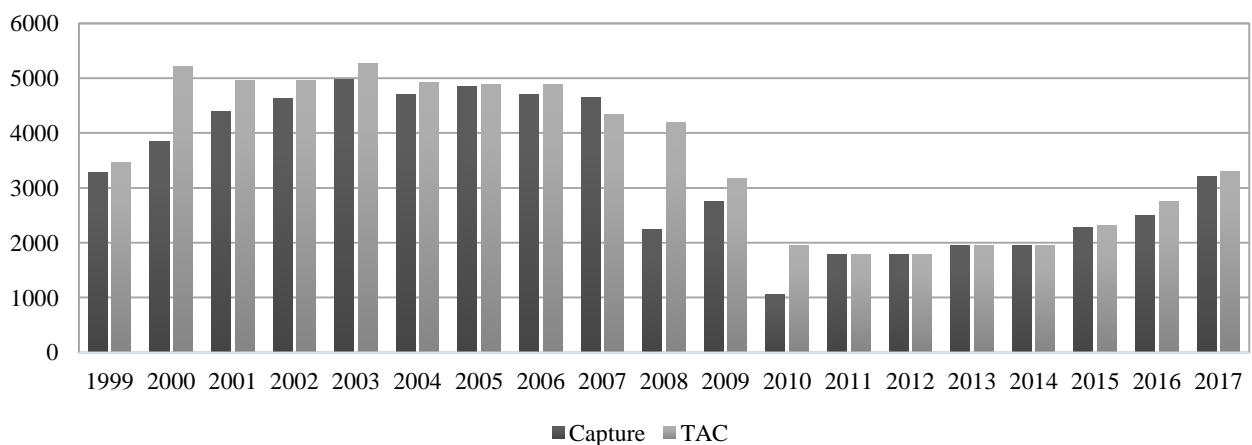
BFT is considered a “culture-specific” product because most of the world’s consumption occurs in Japan with over 45 countries competing to supply this market (Buentello et al., 2016; Hefferman, 2014). The Mediterranean region is one of the main relevant area for the catches and a major exporter of BFT to Japan (Di Natale et al., 2006). Increasing BFT catches have led to rapid stock declines over years. Collecting the environmental and green NGOs claims about the extinction threats of the Atlantic Bluefin Tuna, in 1966, the Food and Agriculture Organisation (FAO) convened a conference to manage the Mediterranean and other Atlantic tuna fisheries. Seventeen States agreed to the Convention, establishing the International Commission for the Conservation of Atlantic Tunas (ICCAT). Since 1966, membership has increased to 48 Contracting Party Countries (CPCs). Of these, 16 CPCs received an allocation of the BTF-E quota in 2013 (with the EU operating as a bloc), representing the major actors in the BTF-E fishing industry. To tackle with this specific challenge, ICCAT set total allowable catch (TAC), allocating shares of the annual TAC to its Contracting Parties, starting its controls and

the issuing of targeted regulations to limit the overfishing practices responsible of the main negative impacts affecting *Thunnus thynnus* overall stocks. The accession of the EU to the ICCAT, which took place in 1997, has also determined for Italy the obligation to adopt annual fishing quotas. Although in principle the ICCAT system of TAC could be seen as a good instrument to fight against the overfishing of BTF, several authors pointed out the weaknesses of a such system, lacking of structured and well-functioning control system on quota respect (Sumaila and Huang, 2012). Authors, in particular, underlines that the reason why ICCAT cannot succeed in combating IUU fishing is also for the lack of an effective detection and penalty system.

The competitive advantage of Italy in the world BFT market, measured during the period 2004/2009, was intercepted by Crescimanno and Galati (2012), underlying the overall positive advantage of Italy above all by taking into consideration the wide export shares towards Japan that in 2007 achieved the 79%, only followed by a lower rate from Spain and Malta, respectively of 10,6% and 3,3%. Giving the predominance of the Japan destination market, authors suggested for the Italian economy a differentiation strategy, trying to focus the attention on new destination markets, like USA and other Mediterranean countries. For sure, the decision of Italy to mainly exporting in Japan was driven by profit factors, giving the high money quotation of the BFT in the Asian country.

Nevertheless, since the end of the '90, Italy has had to respect specific yearly capture quotas, as set by the ICCAT, today the country continues to be one of the main actors in the fishing and commercialization of *Thunnus thynnus* in the Mediterranean area (Figure 1).

**Figure 1. Italian captures of Atlantic Bluefin Tuna and ICCAT total allowable catches**



Source: Our elaboration of FAO data and EU regulations.

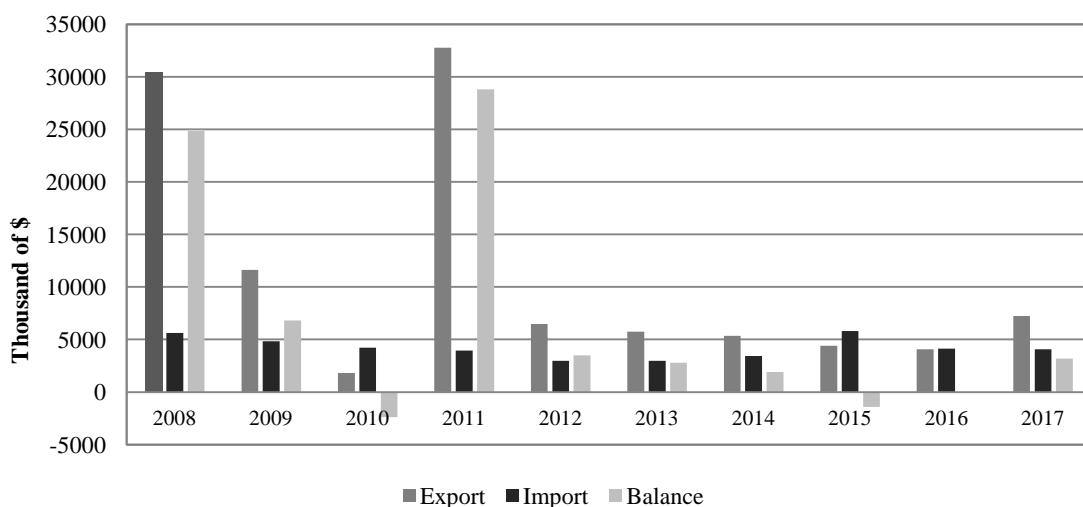
In Italy the TAC system has led to structural changes affecting both vessels and the labour market operating in this business sector (Maringelli et al., 2016). In particular, Italy, differently from the other

countries, is the only country in the Mediterranean that decided to share the quota among the fishing vessels (BMTI, 2019).

This means that, once the TAC is reached, the capture activity is suspended. After the introduction of TAC, as other countries involved in the ICCAT system, experimented substantial economic impact, above all in the amount of captures allowed. Indeed, Mediterranean producers, among them also Italian ones, pointed out how the first TAC, at the end of the '90, were set according to the last year, a year during which captures were lower than usual, so underestimating the potential of the Mediterranean vessels.

The Italian export of Atlantic Bluefin tuna reached in 2017 a value of 7.2 millions of dollars in the face of 4.06 millions of dollars of imports, showing a positive balance of trade. The trade trends in the period 2008/2017 shows that exports were reduced to a greater extent (-7.6%) compared to import (-2.8%) (Figure 2).

**Figure 2 - Italy's trade balance: import and export shares of *Thunnus thynnus* (2008/2017)**



Source: Our elaboration on UNComtrade data.

## METHOD AND DATA

According to Pitts and Lagnevik (1998), the competitiveness of an industry is the "ability to profitably gain and maintain marketshare in domestic and/or in foreign markets", a general definition that can be adapted to represent our case study. In order to assess the Italian competitive performance for the *Thunnus thynnus* on the international market, taking into account bilateral trade flows and market quotas, the present study employs specific indicators based on the principle of comparative advantage, widely used in economic literature (Traill, Da Silva, 1996; Frohberg, Hartmann, 1997; Havrila, Gunawardana, 2003; Fertö, Hubbard, 2003; Bavororà, 2003; Banterle, Carraresi, op.cit.; Hambalkovà, 2006). Amongst the indicators most commonly used for measuring

comparative advantage there is the *Revealed Comparative Advantage* (RCA) (Balassa, 1965) which shows the advantage held by a State in exporting a single product or group of products in relation to its total trade. Alternative specification of revealed comparative advantage commonly known in the literature and which is derived from a modified version of Balassa's index, is the *Relative Trade Advantage* (RTA) developed by Vollrath (Vollrath, 1991). The Vollrath's index, that accounts for exports and imports simultaneously, differs from the RCA for the elimination of the double-counting of country and product. Vollrath, in addition, proposes a new version of the index (RC) in which the *Relative Export Advantage* (RXA) and *Relative Import Advantage* (RMP) are expressed in logarithmic form, but this of limited use where trade flux is limited or nil (Havrla, Gunawardana, op.cit.).

To perform the competitiveness analysis of the Italian *Thunnus thynnus*, we have analyzed trade exchanges on the basis of the data on export and import money flows extracted from the UNComtrade database (UNComtrade, 2019) by considering a time span of 10 years (2008 – 2017).

In order to outline the structure and geography of trade in *Thunnus thynnus*, firstly the quota of the market was established for exports (*Export market share*, EMS) and for imports (*Import market share*, IMS), respectively expressed as:

$$EMS = 100(X_{ij}|X_{iw}) \quad [1]$$

$$IMS = 100(M_{ij}|M_{iw}) \quad [2]$$

In the formula,  $X$  and  $M$  stand for exports and imports. The indices  $j$  and  $w$  relate to the region, whilst  $i$  is the product. Market shares are expressed as values from 0 to 100; thus, a value of zero indicates that the exports (or imports) of a given product  $i$  from a given country  $j$  are nil; whilst a value of 100 indicates that the entirety of exportation (or importation) of product  $i$  is carried out by country  $j$ .

In this paper, the RTA index of Vollrath (1991) is used to capture Italy's comparative advantage with respect to the individual world partners and the trade intensity ties between the partners. Establishing the RTA allows us, lastly, to measure Italy's competitiveness in the international market for Atlantic bluefin tuna. The RXA [3] expresses the export share for product  $i$  of a given country in the market  $j$  compared to the share held for other products; the index has a higher (or lower) unit value if the country's has an advantage (or disadvantage) in its competitive position for exporting product  $i$ . In the formula,  $X$  stands for exports and  $M$  stands for imports. The indices  $i$  and  $n$  relate to categories of products, whilst  $j$  and  $r$  relate to region.

$$RXA = \left( \frac{X_{ij}/X_{ir \neq j}}{\bar{X}_{nj}/\bar{X}_{nr \neq j}} \right) \quad [3]$$

There is a similar index for imports, the RMP [4], which expresses the import share for product  $i$  of a given country in the market  $j$  compared to the same share held for the remaining products; this indicator is greater (or less) than 1 if the country in question has an advantage (or disadvantage) in its competitive position for importing product  $i$ .

$$RMP = \left( \frac{M_{ij}/M_{ir \neq j}}{M_{nj}/M_{nr \neq j}} \right) \quad [4]$$

The RTA, obtained from the difference between the RXA and RMP, shows positive (or negative) values if the country in question has an advantage (or disadvantage) in its competitive position for trading in product  $i$  (Frohberg, Hartmann, op.cit).

$$RTA = RXA - RMP \quad - \quad [5]$$

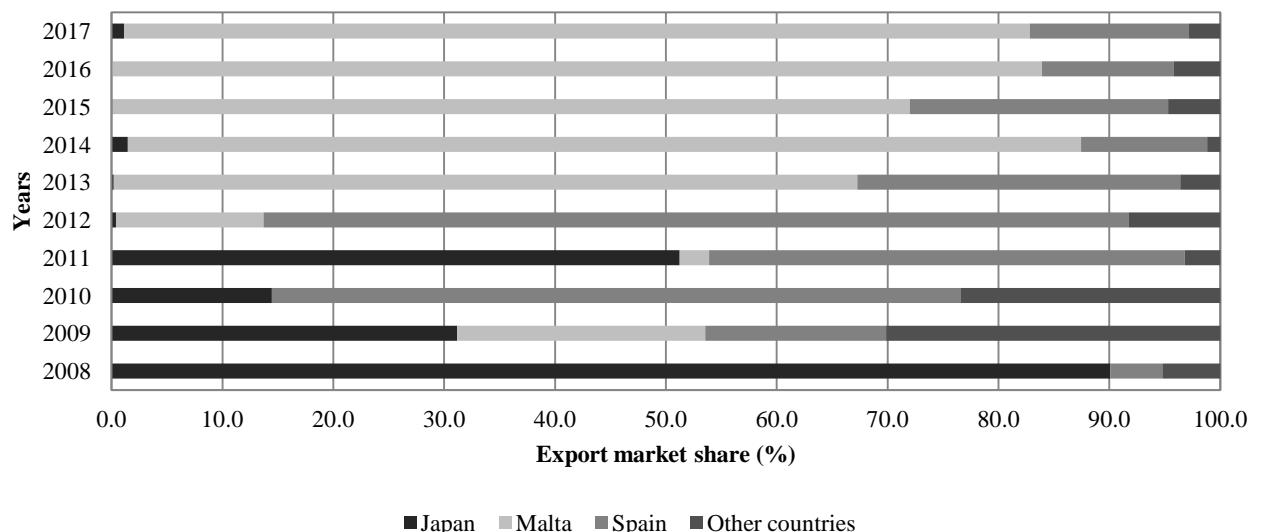
## RESULTS

During the last decade, 2008/2017, the international trade as well as the main Italian commercial partners have been affected by deep changes. Figure 3 shows the main changes, in terms of economic volume, occurred in the trade relations with the main historical Italian's partners.

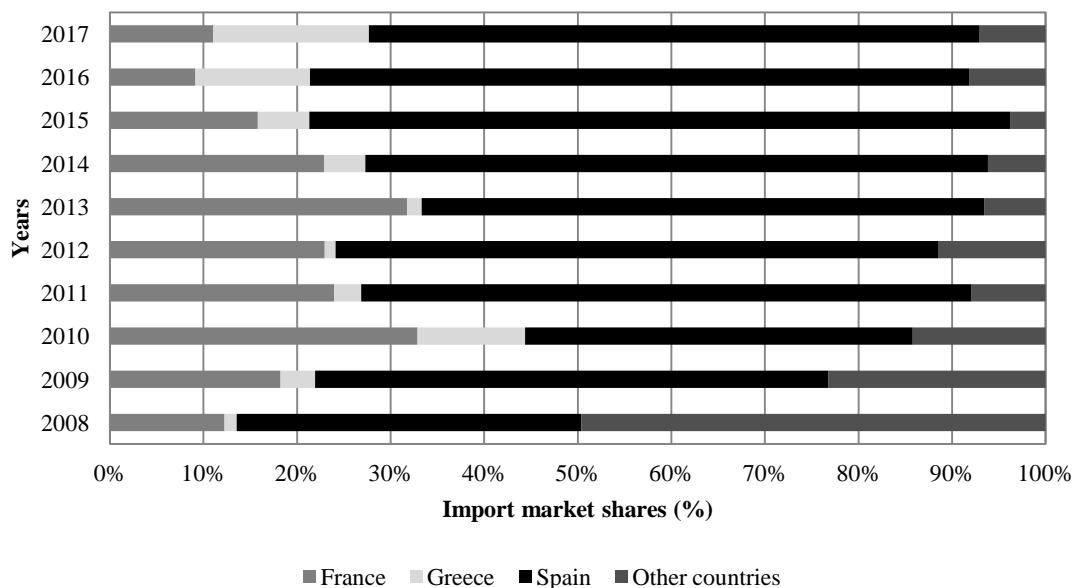
The main change occurred in this last decade regard the trade relations with Japan, which passed from more than 90% in 2008 to a 1% in 2017. The Japan commercial centrality then passed to Malta, toward which Italy increase the export shares from the 22% on 2009 to an average of 80% above all since the 2014. While Spain, the third historical Italian trade partner for the *Thunnus thynnus* has remained quite stable, with different shares recorded during the last decade, and concluding the 2017 with an export share of 14,3%.

A different scenario is the one recorded from the import side, where the historical Italian partners quietly remain stable, without relevant variation (Figure 4).

**Figure 3 – Export market share (EMS) of Italy**



Source: Our elaboration on UNComtrade data.

**Figure 4 – Import market share (IMS) of Italy**

Source: Our elaboration on UNComtrade data.

Indeed, as Figure 4 describes, the trade patterns recorded in the last decade, confirms a stable path as regard the *Thunnus thynnus* import shares from the most relevant Italian suppliers, respectively: Spain, France and Greece.

The main results achieved thanks to the employment of the RTA index, as before explained, allowed us to estimate the competitive advantage of Italy towards the world market. Table 1 reports the achieved results.

**Table 1. Italian Relative Trade Advantage (RTA) Index towards main trade partner countries (2008/2017)**

Relative Trade Advantage index										
Partner/Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Croatia	-3,28	-1,16	-4,02	-0,73	-0,76	-1,05	-0,40	-0,97	-4,02	-2,62
France	-1,22	-1,11	-2,98	-3,68	-3,99	-6,99	-5,61	-3,60	-1,96	-2,34
Greece	-0,22	-0,60	-1,95	-0,45	0,80	-0,25	-0,75	-1,07	-2,77	-3,99
Japan	1835,77	222,09	122,34	1092,76	1,95	0,53	4,40	-3,53	0,15	5,77
Malta	-0,62	1,52	-24,24	-1,54	-7,37	44,66	148,88	61,05	103,71	78,26
Portugal	-0,36	0,50	1,42	-1,41	-0,21	-0,58	-0,71	-0,52	-0,28	-0,25
Spain	-3,41	-6,56	0,01	-8,09	1,91	-6,46	-10,42	-13,87	-11,69	-9,06

The calculation of the RTA for Italy has been performed in a time period 10 years long, including the decade 2008/2017, so as to intercept the changes occurred in the Italian position as a consequence, above all, of the quotas introduction, according to the ICCAT regulations. In 2017, a positive value of

the index is, as expected, recorded as regard the relation with Malta (78,26), a data confirmed by Figure 3 where, indeed, differently from the first year of the decade, the main Italian export shares were towards Malta (more than 80%). The competitive disadvantage with Japan widely increased during the decade, by leaving space to a new relevant important trade relation, the one with Malta. To that, we add that a worsening of the Italian competitive advantage has been however recorded above all with Spain and Greece, where the negative values of the index grown during years following an increasing path, differently from the negative value recorded with France where the competitive disadvantage occurred through unstable paths.

Apart from a lesser positive value, the one recorded with Japan, a relation recently changed, all the other main partners, such as Spain, Greece, France lead the index to negative values, as a direct effect of the fact that Italy is more and more dependent on their imports of *Thunnus thynnus* (as showed in Figure 4).

## DISCUSSIONS AND CONCLUSIONS

The analysis carried out highlighted a deep change of the reference competitive scenario. By taking into consideration the results of Crescimanno and Galati (2012), which highlighted a relevant growth of the Italian competitive advantage for the commercialization of *Thunnus thynnus* above all towards Japan, our findings updated such data. Indeed, compared to the time period, 2004/2009, analyzed by the above-mentioned authors, although Italy according to the TAC limits, continues to record a competitive advantage in this industry, its competitive positioning in the world market has changed. If on the one hand, Italy gained a greater profit in the Maltese market, where live tuna is sold, on the other hand, the most important economic value is for Malta selling in Japan of BFT for the final consumption, where according to the last Japanese auctions an exemplar of BFT, with a weight of 278 kg, has been sold for 3.1 thousand of dollars (The Guardian, 2019). Indeed, the Italian BFT sector differently from the first decade of the 2000, now is suffering a depreciation represented by the huge captures carried out by Italian fleets in the Mediterranean Sea which are after sold to Malta, where BFT are fattening, and finally sell to Japan with a net competitive advantage for the Maltese economy. What happened after the introduction of the TAC but also size and weight limits set, which affect the Italian export shares from Japan to Malta, was mainly due to the national economic industry system not well prepared from bureaucratic and climate variability sides to the mass fattening systems necessary to suitably farm BFT according to the Japanese standards. However, forced changes in trade partners for international relations, together with changes also at the economic system level, at the country level, where in order to respect TAC quotas, producers change their vessel operations. To that, it is also worth to mention the illicit market strictly linked to the TAC limits that call for a more

stringent control from regulators. At this regard, it is relevant to in-depth investigate the BFT black market, a phenomenon that recently led the European Union to carry out severe investigations, as the a recent Europol operation, called Operation Tarantelo, conducted with the Spanish Guardia Civil and with support of French, Italian, Maltese and Portuguese authorities, which led to discover huge irregularities relating to BFT fishing in the Mediterranean Sea (EUROPOOL, 2018).

Nevertheless, the biodiversity threats are still present, and the ICCAT control system should be improved above all adding cooperation models among countries and in particular vessels, it is worth to mention that the stock has started to recover recently and, as a result, stakeholders have raised catch quotas by 50% for the period 2017–2020 (Failletaz et al., 2019). Today, indeed, as reported in the recent EU Council Regulation 2019/124, the quotas for Italy have been set at: 2018 with 3.894,13 tonnes; 2019 with 4.308,59 tonnes; and, 2020 with 4.756,7 5tonnes (Council Regulation (EU) 2019/124). By analyzing the Italian case and the partial loss of economic value related to the export, today almost totally addressed to Malta, it is time to reflect on the need to change business strategy so as to close the entire BFT supply chain and achieve a greater economic return in Italy.

The future of the BFT industry is not anyway free of other threats, indeed, also in this sector climate change is affecting the migration routes of BFT (Failletaz et al., 2019) as well as other aspects linked to the overall supply chain. The climatic variability becomes then a factor that, together with other political, judicial and business aspects before discussed, should be integrated in the current planning efforts. Our results, following the ones of Buentello et al. (2016) more and more pointed out that quota systems and the banning of international tuna trade are not enough to achieve management of tuna stocks for sustainability; it is now time to activate proactive strategies rather than just reactive approaches, involving several relevant stakeholders, form international tuna markets, fishing fleets, to tuna farmers as well as regulatory agencies and environmentalists.

Concluding, the main challenge to effectively cope with the extinction threat of the BFT cannot be managed only through quotas systems, giving that the economic value of this production sector is highly profitable, as Japan growing demand confirm. Concrete actions to really preserve this marine species should involve also a political commitment from all the main countries involved in such market, from demand to supply side actors, as previously suggested by Heffernan (2014). As for Italy, policymakers should reflect on how avoid the loss of competitive advantage in this highly profitable industry, trying to make available targeted investments and support for local companies engaged in such business sector, with the final aim to sustain the export line of the Italian BFT supply chain so as to increase profits, limiting delocalization into other more bureaucratic free countries, like Malta.

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