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## A Note on Economic Impact of EFF on Sicilian Firms Performance

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**Abstract** The measure 2.3 of the European Fisheries Fund, in Sicily, claimed investments of fish firms in production capacity expansion and modernization of fish processing.

Have these investments been effective in supporting the competitiveness of these firms and have they influenced the economic sustainability of the regional seafood chain?

Proposed counterfactual analysis contributes to this assessment through comparison of business performance of funded and non-funded firms.

**Keywords** Counterfactual analysis · Data Envelopment Analysis · Business Performance · Fishery sector

### Riassunto

*All'interno del programma operativo Fondo Europeo per la Pesca (FEP 2007-2013), in Sicilia, l'UE ha sostenuto finanziariamente, con la misura 2.3 (Investimenti nei settori della trasformazione e commercializzazione), le imprese del settore della trasformazione dei prodotti ittici negli investimenti mirati ad ampliare la propria capacità produttiva ed ammodernare i propri impianti.*

*In che misura tali interventi sono stati efficaci nel sostenere la competitività del settore della trasformazione dei prodotti ittici e in che modo hanno inciso sulla sostenibilità economica della filiera ittica regionale?*

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*Lo studio proposto contribuisce a tale valutazione attraverso un'indagine esplorativa presso le imprese beneficiarie dei contributi pubblici e un'analisi della variazione delle loro performance aziendali.*

**Parole chiave** *Analisi Controfattuale, DEA, Business Performance, Settore Ittico*

## 1 Introduction

The EU Structural Funds are the most important source of funding for business support mechanisms in many European regions. The need for an evaluation of these mechanisms is widely recognized. Recently, the European Commission has asked for a more rigorous and in-depth analysis of the impact of these policies and it was urged the member countries to take a quantitative approach to its assessment (EC (2015)).

Several studies have been conducted on specific countries, regions or specific areas, for examples: Lima and Cardenete observe a positive relation between Structural Funds and their impact on economic growth of South of Spain Lima and Cardenete (2008) and Percoco analysed the impact of European funds in the area of the Italian Mezzogiorno Percoco (2005).

It's interesting to underline the recent approach of Dvouletý and Blažková (Dvoulet and Blakov (2018)) who applied counterfactual impact analysis based on firm-level data with the aim of investigating the effects of this support on the financial performance of the supported firms two years after the end of intervention. Results show a positive effect on the performance of supported firms measured by price-cost margin, value added per labour cost, growth of sales and growth of tangible assets. The use of counterfactual method for impact analysis has already been used for a long time and is considered among the most reliable (Martini (2009)).

This note aims to offer an empirical contribution to evaluate the impact of European structural funds on the Sicilian fish processing firms performance. The proposed impact evaluation is based on the method of counterfactual analysis in which the performances of the firms funded are compared to those not funded. The performances are measured with a composite indicator, named *Business Performance* (BP), obtained by applying a *Data Envelopment Analysis* linear programming model in a BOD framework.

## 2 Fish processing sector

The results of the 2017 EU fish processing sector analysis made by STECF (STECF (2017)) show that in 2015 the sector consisted of around 3,600 firms (fish processing as main activity), of which 57% were microfirms with less than 10 employees.

In general, 2015 data show a deterioration of the economic performance if compared to 2014 (e.g. GVA and net profit were respectively 14% and 21% lower than in 2014) even if the sector still remain profitable.

The Italian fish processing industry has been characterized, in 2015, by a total number of firms equal to 785 units, producing a turnover of about 2.8 billion €.

The Italian fish processing industry is characterized by two different typology of organization on the market: on one hand, there is a modern sector, made up of few large industrial firms, and, on the other hand, there is the traditional sector, highly atomized and formed mainly by micro, small and medium-sized firms, many of which are organized on a family basis. The 77% of firms is represented by microfirms, with less than 10 employees. In general, looking at the other dimensional classes, it can be strongly asserted that the Italian fish processing industry is dominated by small firms, as 97% of firms are represented by firms with less than 50 employees. As far as the geographical localisation, the large part of firms is located in the Southern Italy and in the islands (Sicily and Sardinia). Indeed, over 50% of firms are concentrated in four regions, such as: Sicily (23%), Calabria (11%), Campania and Veneto (9% each). Sicily is, by far, also the region with highest number of employees (20% of the national total).

### 3 Methodology and model: a firm performance index

For our goals we propose a composite indicator to synthesize the performance of firms using four indicators of performances, for each year in the time span 2006-2015, that is:

- ROA: return on assets, which measures the profitability on the invested capital, it measures the net income produced by total assets during a period by comparing net income to the average total assets;
- ROE: return on equity, which measures the return on equity;
- ROI: return on investment, which indicates the profitability and economic efficiency regardless the resources used, it expresses what makes the capital invested in that firms
- ROS: return on sales, it represents the profitability of sales index measured by the ratio between the operating result and net revenues on sales.

Data availability allow to calculate the composite indicator for the time span 2006-2015.

The use of four different indicators (ROA, ROE, ROI and ROS) requires an adequate representation of the position of each firm for the period of interest. So, the Performance Index (PI) is obtained by applying a Data Envelopment Analysis method with proportion restrictions on weights calculated in a Benefit-of-Doubt approach. In this way, we avoid subjective opinions by experts and we avoid the use of identical weights (as in the case of a simple arithmetic mean); on the contrary, weights are determined endogenously by optimizing the position of every firm on each of the four basic indicators. In particular, to exclude the possibility of zero values that eliminate the contribution of some dimensions, we add restrictions on the minimum weights.

In this way, the composite indicator for firm is compared with the benchmark composite indicator:

$$BP_{c,score} = \frac{\sum_{i=1}^m w_{i,c} y_{i,c}}{\sum_{i=1}^m w_{i,c} y_{i,best}} \quad (1)$$

where

$y_{i,best} \equiv$  *endogenous benchmark*

$BP_{c,score}$  is clearly between 0 (the worst performance among the firms under investigation) and 1 (the best performance).

The weighting problem can be handled for each firm separately with weights endogenously computed that, thus, can vary among firms and indicators. These weights may be chosen optimally, for example by ensuring the best combination of the four basic indicators to get a  $BP_j$  as high as possible with the benefit-of-the-doubt, that is

$$BP_{c,score}^* = \max \left( \frac{\sum_{i=1}^m w_{i,c} y_{i,c}}{\max_{y_{i,j}} \sum_{i=1}^m w_{i,c} y_{i,j}} \right) \quad (2)$$

In this way, firm  $c$  has always the highest possible score in relation to other firms under investigation. To avoid zero weights, we also add restrictions in terms of proportional share

$$inf_{i,j} \leq \left( w_{i,j} y_{i,j} / \sum_{i=1}^m w_{i,j} y_{i,j} \right) \leq sup_{i,j} \quad i = 1, \dots, m \quad j = 1, \dots, n \quad (3)$$

In our case, we assume a lower bound equal to 20% with an upper limit determined accordingly to 1.

## 4 Data

The data used in this analysis were obtained by crossing two different databases as show in Fig.1. On the one hand we used the data made available by the Department of Mediterranean Fisheries of the Sicilian region; in particular, we used data relating to three different calls issued by the Department about investments in processing and marketing (measure 2,3 of EFF).

The objectives of measure 2.3 of EFF were:

- To enhance the efficiency of operations of firms involved in processing and marketing of fish products;
- To enhance product quality and presentation;
- To improve public health and hygiene conditions over and above what is required by national and/or European legislation;
- To develop and market new products;

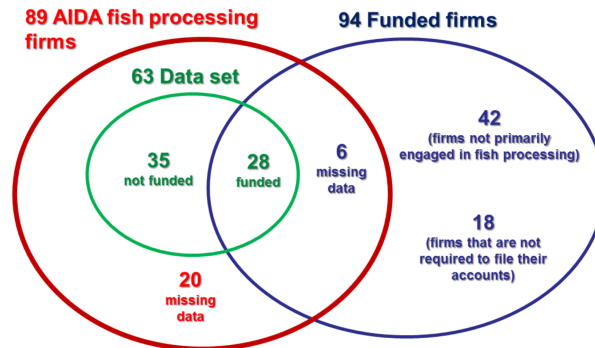


Fig. 1: Dataset scheme

- To improve the management and use of by-products and waste.

The calls have been issued in the years 2009, 2010 and 2011 and in each of them the Sicilian Department of Fisheries has supported investments to increase the production capacity and the modernization of fish-product processing; 94 Sicilian firms has been financed for a total of about 20 million euros of investments.

The data collected on the investments were subsequently linked to the data on the financial statements of the processing firms present in the AIDA database<sup>1</sup>. In particular, we extracted from the AIDA database the balance sheet data, from 2006 to 2015, of all Sicilian transformation firms which declare to mainly carry out fish processing activities (89 firms).

Starting from the 94 funded firms, we found that 42 of them were not primarily engaged in processing activities, they make marginal projects keeping their core business on different activities. In addition, other 18 firms has a legal form that do not require they filling their accounting sheets in an extended format and, therefore, it was not possible for these firms to calculate the index that it's necessary for our analysis.

Looking at the remaining firms (34), we conducted a survey to know the specific data relating to the investments made (type of investment, timing, implementation of investment (Fazio et al. (2016))).

Relating to 89 firms founded in AIDA for 26 of them, unfortunately the data are missing or incomplete and so we had excluded them in our analysis. The remaining 63 firms for which complete data were available are marked as follow: 28 have been financed by EFF while the remaining 35 firms did not made investment using EFF funds. So the data used in our analysis are related to the 63 firms for which we had a complete set of data; 28 of these represent the data of which we want to use to measure the effects of the EFF support for productive investments (treated) and 35 represent the reference data (untreated).

<sup>1</sup> Bureau van Dijk Electronic Publishing. Bureau van Dijk Electronic Publishing - Aida

To quantify the representativeness of this non probabilistic sample, we can state that the 63 firms in our dataset represent about 55% of the Sicilian processing firms, furthermore we check that the 28 treated firms account for about 61% of the total certified investment relating to the measure 2.3 in Sicily.

## 5 Preliminarys Results

To evaluate the contribution of funded investment to improving performance, one cannot but consider that projects have an average duration of 3 years but are completed on average over 4 years (65% of projects are completed in 5 years). This means that not all investments generated revenues in the year of subsidia. For this reason, the BP values of the funded firms are considered starting from the first year of the investment revenue.

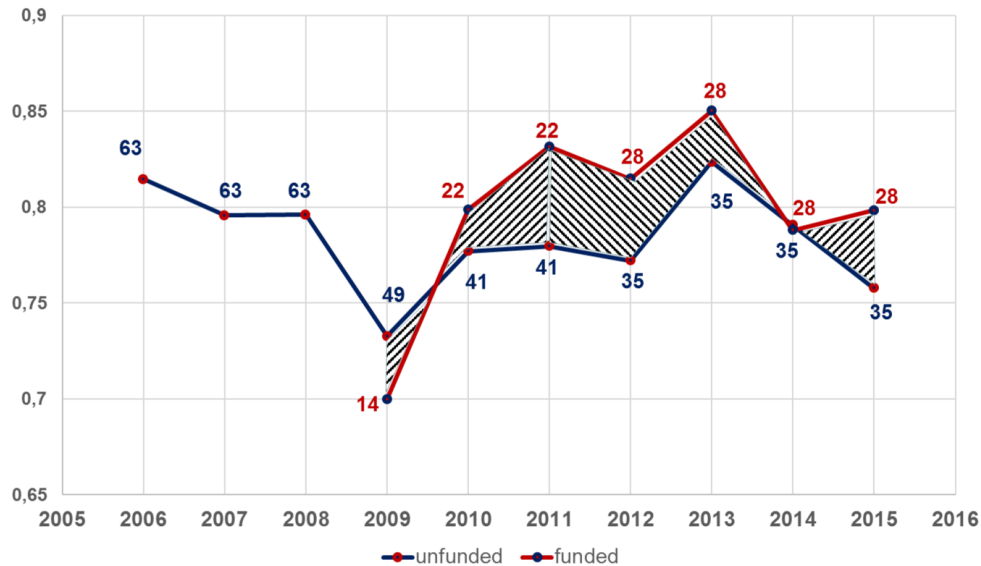


Fig. 2: BP average trends

Starting from the dataset of 63 firms, it is possible to trace the BP average trend, distinguishing that of the 28 firms funded by that of the 35 not-funded firms. In the graph (see Fig.2), the red line describes the BP average trend of the firms that are funded, starting from the 2009 first call (14 firms) up to that of 2011 (28 firms). The black line, on the other hand, describes the trend of BP related to not-funded firms since 2006 (63) up to 2015 (35 firms).

The average BP shows an improvement in the performance of the funded firms compared to that of non-funded ones.

Furthermore, the effects of two crises in the sector (in 2008 and 2014), observable both in the funded and in the non-funded firms, are less marked in the first ones.

It should be noted that, in the course of 2015, in Italy, the processing sector decrease the business performance; the Sicilian firms that have not been funded decrease their performance more than the sector. On the contrary, 2015 is a growing period for Sicilian funded firms, they start to perform more than the firms they did not invest. The first two call for proposals (2009

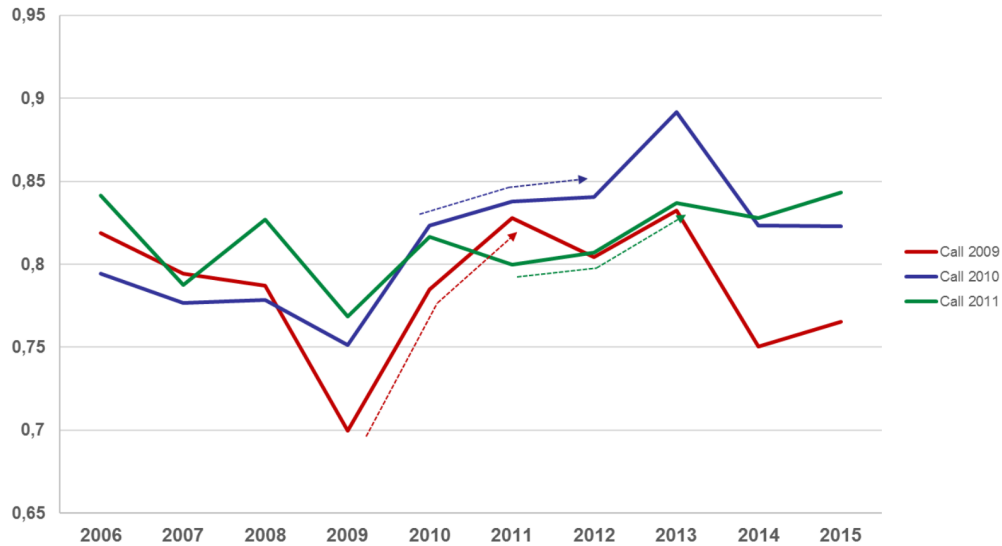


Fig. 3: Average BP index of the funded firms, for each call

and 2010) are those that generate more growth in relative terms of business performance (see 2009-2010, 2010-2011 periods). The differences are increasing. We think that the investments exploit positive economic trend after the 2008 crisis. By adding the impact of 2011 call for proposals (6 firms BP), BP's differences remain stable with some small downturn. The same trend can be observed in firms that do not participate in the initiatives<sup>2</sup>.

Fig.3 shows, in the 2006-2015 period, the average BP index of the funded firms, for each of the three calls (2009, 2010, 2011). The trend of three BPs curves shows a similar growth in income performance during the two years after the implementation of the investment. This result, in first approximation, allowed to the funded firms to consolidate a performance gap along the years.

Finally, Fig.4 shows the average gap between the performances (BP) of the funded firms compared to those not-funded. The values are reported in an abstract time axis, in which the time 0, for each funded firm, corresponds with the year in which the investment generated revenues.

$$sBP_i(t) = \overline{BP_i(t + t_i^*)} - \overline{BP_{unfunded}(t + t_i^*)} \quad (4)$$

<sup>2</sup> Similar trend was noted at the national one (BP estimates on 278 Italian firms).

where  $t_i^*$  = year when the investment of  $i^{\text{th}}$  firm generates sales.

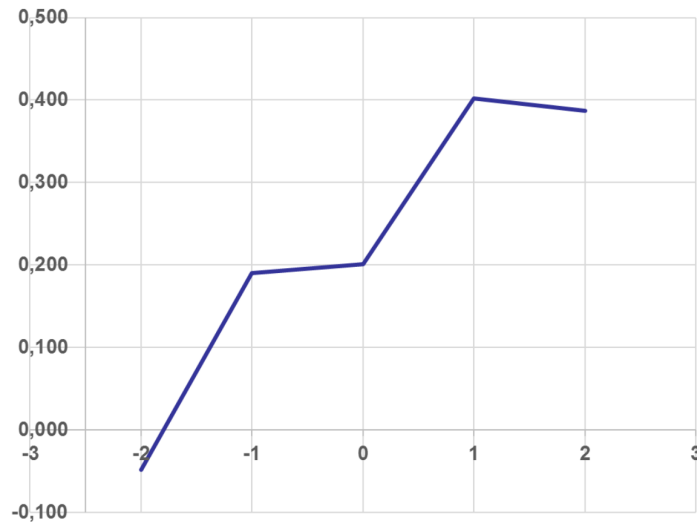


Fig. 4: Average gap between the BP of funded and non-funded firms

This BP index trend suggests that this gap increased after two years compared to the previous two years (from  $t = 0$  to  $t = -2$ ), although the second year shows a slight decline. Two years before ( $t = -2$ ) the gap was negative; this means that the BP of the non-funded firms initially was better than the one of the funded firms, this gap then became positive ( $t = -1$ ) and progressively increased ( $t = +1$ ).

## 6 Conclusion

The results of this empirical analysis, in spite of the fact that it concerns only the processing sector and covers a short time interval, allow to measure the effectiveness of public intervention on innovation in private sectors. The counterfactual analysis, in particular, can be a useful to show to interested firms the potential effects of public support to their investment initiatives. Moreover, the development of a composite indicator, such as the BP, can be useful since it simplifies the comparison between those firms that benefit from public funding and those that do not.

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