

# An application of the export-sophistication concept to the “made in Italy” agri-food sector

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**AN APPLICATION OF THE EXPORT-SOPHISTICATION CONCEPT  
TO THE “MADE IN ITALY” AGRI-FOOD SECTOR**

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**Abstract**

The paper assesses the performance of the so-called agri-food *Made in Italy* exports in recent years. The concept of export *sophistication* and the related indicators, recently proposed in literature (Lall *et al.*, 2006; Hausmann *et al.*, 2007; Minondo, 2007), are used here, together with traditional trade indicators such as normalised trade balances, Balassa’s revealed competitive advantage index and exports flow dynamics, to analyse the specialisation and potential competitiveness of this specific component of Italian agri-food exports on international markets

Results show that overall Made in Italy agri-food exports are in good health and that their level of sophistication is actually an important element of the capacity to be competitive on the international markets. Nonetheless, there are also some elements highlighting potential weaknesses with respect to products that have a low and decreasing sophistication score and for which Italy increases its international specialisation, thus, indicating the need to face an intensification in price competition as opposed to competition on attributes that increases products value.

JEL: Q17

Keywords: agrifood trade, international competitiveness, Prody index, competitive advantage

# AN APPLICATION OF THE EXPORT-SOPHISTICATION CONCEPT TO THE “MADE IN ITALY” AGRI-FOOD SECTOR

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## 1. Introduction

Italy is a net importer country of agri-food products due to its structural lack of natural resources. Nevertheless, over time, the country has specialized in transforming a wide variety of raw materials into food and has developed a high quality and world-wide reputed food industry. The expression *Made in Italy*, referred to food as well as to other products that are typical of the Country, represents the core of Italian exports on international markets and, more generally, contributes to built the so called concept of *Italian Style*. In the case of agri-food sector, the Made in Italy exports help to limit the negative balance, hence, giving a contribution to make the burden of agri-food imports more sustainable and increasing efficiency.

The performance of the agri-food Made in Italy exports in the world markets have varied over time: during the eighties and the beginning of the nineties exports suffered from inadequate quality (Carbone, 1994). In the mid-nineties they gained larger market quotas thanks to a generous exchange rate policy. However, in the last 10-15 years, the whole Italian agri-food sector made a significant effort to improve quality and the strategy proved to be successful in terms of exports growth (Inea, 2009). Many contributions offer short run analyses on the international performance of the agri-food Made in Italy sector. However, there is a lack of in-depth analyses that look at a medium-long term perspective. This paper aims at filling this gap, focusing on the performance of the agri-food Made in Italy over the last decade.

The agri-food Made in Italy exports refer here only to processed products<sup>1</sup> selected from the Comtrade data bank, first aggregating the original HS6 items (over 700) of the agri-food sector into 95 products and then selecting from these 26 items according their reputation as “typical” Italian food products. The result is the list of products presented in the tables and figures presented hereafter.

This paper focuses on the sophistication concept in order to analyse the specialisation and the performance of the agri-food Made in Italy exports in the decade between 1996-97 and 2006-07. Sophistication is defined as the content of a good in terms of technology, design, quality, branding, scale economies and any other factors affecting its value (Lall *et al.*, 2006), thus, sophistication can be indirectly measured by the per-capita GDPs of exporting countries, through the Prody index (Lall *et al.*, 2006; Hausmann *et al.*, 2007). Prody is defined as the weighted average of the per-capita GDPs of the countries exporting a product, where the weights reflect the revealed comparative advantage of each country in that product. This index produces a ranking that shows the relative position of goods in terms of sophistication. The ranking offers a synthetic description of the market segment where a product is competing and, hence, its capability to make returns to inputs and especially labour. Following Minondo (2007), in this work we test the use of a modified version of the index aimed at explicitly taking into account different quality levels within each product category. This allows us to split the 26 categories included within the Made in Italy agri-food exports into 52 categories, according to different levels of unit values of exports for each exporting country that can be considered a proxy of the quality of products (low and high quality).

The use of the concept of sophistication and of its indicators to analyse the Italian overall trade performance is not new: for example, Di Maio and Tamagni (2008) analysed the entire bundle of Italian exports using Prody and Expy indicators as a mean to understand the causes of the peculiar Italian trade specialization. However, it has never been applied to a specific sector, as we do in this paper. With regard to this, agri-food “Made in Italy” exports seem an interesting case for which many of the attributes related to sophistication play a crucial role in world competitive arena.

The paper is organized as follows. Section 2 offers a synthetic view of the major trends in the Italian agri-food Made in Italy exports during the last decade. Section 3 presents the main

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<sup>1</sup> Some fresh products are also very important in the composition of agri-food Made In Italy exports, such as fruits and vegetables, but in this analysis they have been dropped given its focuses on the sophistication features that apply more specifically to processed food exports.

methodological issues referred to the sophistication indexes and the way the Prody index has been calculated here. In the second part of the section we present the results obtained and offer some comments. Some concluding remarks are included in Section 4 where a synthetic view of the exports performance of the major items of the Made in Italy in the last decade is depicted.

## 2. The “agri-food Made in Italy” sector: some evidences

The 26 products classified as the agri-food Made in Italy represent overall about 63% of Italian agri-food export in value. Wine is by far the most important item, with a share of about 25% if we add wine < 2lt<sup>2</sup> (19.9%), sparkling wines (2.6%) and wine > 2lt (2.2%). With far smaller quotas there are other items very much typical of the Italian food tradition: pasta (7.5%), peeled tomatoes (6.9%) and virgin olive oil (6.3%). The complete composition of the aggregate is shown in Table 1. Despite the marginal role that the country plays in the international agri-food trade (with a share of about 4%), these products represent in many cases significant shares of world exports, confirming the leading position and the potential for reputation that they signify. As it stems out from Table 1, for many of these products Italian exports cover 20% and more of the world exports. This group of products could be regarded as the core of the agri-food Made in Italy from a world perspective. In other cases, even if Italian exports shares are very small, single products are very significant and enjoy high reputation<sup>3</sup>.

**Table 1 –Shares of Agri-food Made in Italy exports (% of values)**

	Items quotas on total Mil		Italy /World by Items	
	1996-07	2006-07	2006-07	var 96-97/06-07
Fresh cheeses	0.8	2.4	13.7	6.8
Grated cheeses	0.8	0.9	20.0	-0.8
Herb cheeses	0.9	0.7	22.4	0.7
Other cheeses	6.1	5.4	7.3	0.2
Pr. coffee	2.5	4.0	22.0	2.5
Pr. rice	3.8	2.3	4.4	-7.3
Virgin olive oil	5.0	6.3	25.6	1.9
Non verg. Olive oil	3.5	2.2	32.8	-12.7
Mixed olive oil	0.5	0.5	28.4	-4.2
Meat cuts	2.0	2.2	10.9	2.6
Chocolate Pr.	4.5	4.9	8.1	1.4
Fresh pasta	3.2	3.4	24.8	-5.5
Pasta	9.6	7.4	62.2	0.6
Confectionery	3.7	2.9	3.0	-1.6
Bakery	4.6	5.3	9.7	-0.9
Peeled tomatoes	8.1	6.9	44.5	1.0
Prepared Veget.	2.5	2.7	3.6	-0.3
Prep. fruit	4.1	2.4	4.4	-4.6
Fruit juices	3.5	2.9	4.8	-1.5
Sauces etc.	3.1	4.6	6.1	1.4
Ice creams	1.2	1.3	11.7	1.8
Water	1.3	2.6	5.8	1.4
Sparkling wine	2.5	2.6	10.1	-1.2
Wine < 2 lt	16.7	19.9	20.1	1.5
Wine > 2 lt	3.9	2.1	17.6	-7.1
Vermouth	1.6	1.4	57.2	7.8
Total Made in Italy (over tot. AF)	57.8	62.8	11.8	-1.1
Total Agri Food	100.0	100.0	4.0	-0.3

Source: our elaboration on WB data

Table 1 also shows the dynamics of the Italian export shares. It is worth underlining that, while both the total agri-food Italian exports and the Made in Italy as an aggregate, slightly reduce their world quotas during the decade 1996-97/2006-07 (from 4.3% to 4% and from 11.8 to 10.7, respectively),

<sup>2</sup> Wine is classified according to the size of the bottles in which it is marketed. Wine<2lt means wine marketed in bottles smaller than two liters, while Wine>2lt wine marketed in bottles larger than two liters.

<sup>3</sup> This is, for example, the case for “prosciutto” within the aggregate “meat cuts”, and for some specific mineral water brands, that are world wide appreciated and exported even if the 6 digit exports statistics tell us that the whole Italian mineral waters represent 5.8% of mineral water world exports.

many of the Made in Italy exports performed much better, increasing their quotas. This is the case for pasta, vermouth, peeled tomatoes, virgin olive oil, wine < 2lt, coffee, ice creams, fresh cheese, meat cuts, mineral water and chocolate products.

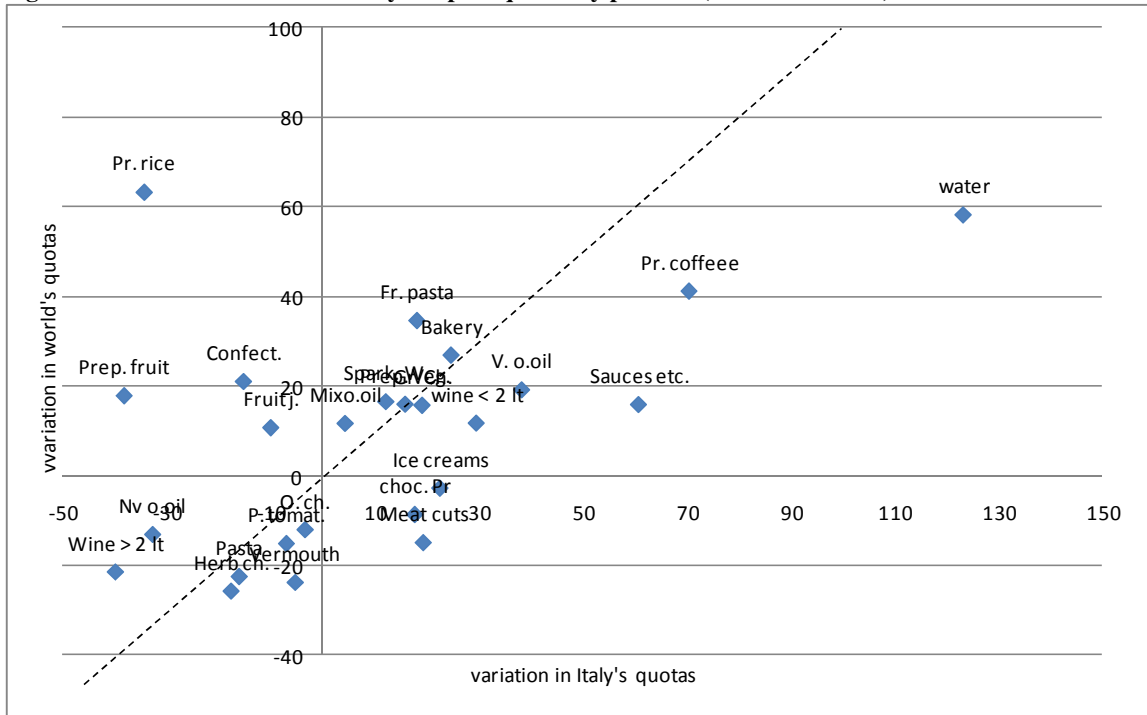
However, other products, such as non-virgin olive oil and mixed olive oil and also different wine categories, significantly reduced their quotas, showing that Italy is losing competitiveness for these products (as it will also be confirmed by other indicators that will be reviewed later on).

A different perspective to look at the dynamics of the Made in Italy agri-food exports in the recent years is through the changes in the value of export flows. During the last decade the value of the exports of the whole aggregate has almost doubled (+96.1%), while, in the same time span, the exports of the remaining agri-food items have increased at a lower rate, of about 59%. Even when compared to the total Italian exports, the dynamics of the Made in Italy show a higher growth rate, as the former increased of about 70% during the same period.

Among the 26 Made in Italy products, the rank shows a wide variability: from +8% of wine > 2lt to +478% of fresh cheese. The majority of them have grown at a rate between +50% and +150%, while none has faced a reduction.

Figure 1 shows the trends of the quotas for each product within the Made in Italy aggregate over the total Agri-food exports both for the World and for Italy. Above the X axis the graph displays those products for which world markets are expanding (world export quotas are increasing), while below X axis it shows those in decline. On the right side of Y axe there are products where Italian exports are expanding above the average, while on the other side there are the ones with shrinking quotas. Moreover, above the dashed line there are those products for which Italy's quotas are increasing more than world's quotas – or in other words, for which Italy is increasing its revealed competitive advantage (RCA); bottom right, there are those products for which Italian RCA is decreasing. It is worthwhile to highlight that for the products lying in the bottom part of the first quadrant Italy faces the best opportunities with increasing RCA in a dynamic world market (i.e. sparkling water, processed coffee, sauces etc., virgin olive oil, ice creams, wine in bottles <2lt). The opposite results hold in the second quadrant, where the opportunities of a dynamic world market seems not to be kept by Italy with its core exports (i.e. processed rice, fruit juices, fruit preparations, confectionery). Looking at the normalised trade balance (NB) of the 26 Made in Italy items, they can be organised into three very well distinct groups (figure 2). The first group accounts for 10 products with a NB near to 100%. These can be considered the core of the Made in Italy, the traditional food that embodies the reputation of the Italian way of eating around the world: pasta, peeled tomatoes, grated cheese, quality wine, coffee. Eleven more products, with NB between 25% and 60%, form a second group where each item is less strictly defined and hence where the linkage with the Italian traditions is less characteristic and varieties from other countries can be found more easily. Among these there are, for example, ice creams, sparkling wines, fruit juices, bakery items; chocolate and chocolate products, preserved pork meat and wine in big bottles. Finally, a small group of five items is characterised by negative NB, among these virgin olive oil, vegetables preparations, fresh cheese, confectionery.

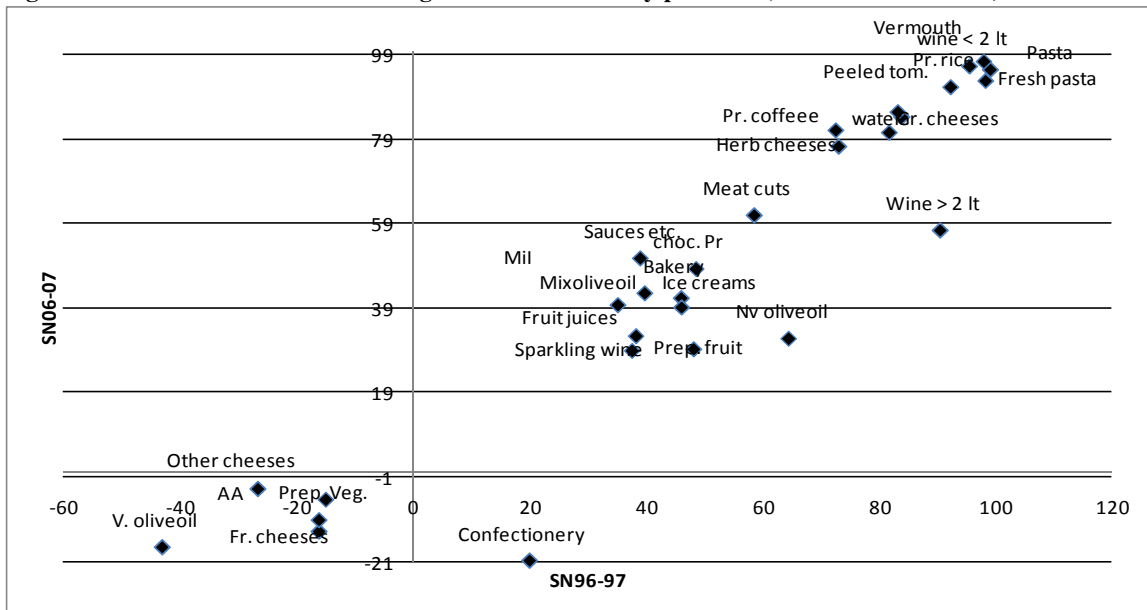
**Figure 1- Trends in world's and Italy's export quotas by product (1996-97/2006-07)**



Source: our elaboration on WB data

The decade under study hasn't brought relevant changes in the NB for the majority of the Made in Italy products. Few exceptions that is worth recalling are the following: virgin olive oil, prepared vegetables, other cheeses and sauces; all these faced a remarkable improvement of the NB. On the other hand, the NB of prepared fruit, non virgin olive oil and wine > 2lt have significantly worsened, while confectionery is the only case for which the NB shift from positive in 1996-97 to negative in the next decade. The causes behind these dynamics are to be found on a product-specific basis as it is clearly shown by the huge differences in the export growth rates. For example, it is interesting to notice that mineral water increase by five times its exports while the NB worsen. Similarly, exports of ice creams and those of sparkling wine almost double, but, nonetheless, their NB sharply worsen due to a greater increase in imports. On the contrary, the trend of rice exports is flat while the NB does hold its position, while a flat trend in exports for processed fruit is associated with a collapse in the NB due to a different dynamics of imports relative to exports.

**Figure 2 – Normalised Balance of the agri-food Made in Italy products (1996-97 and 2006-07)**



Source: our elaboration on WB data

### 3. A sophistication measure of the agri-food Made in Italy

#### 3.1 The Prody index: methodological issues

As mentioned in the introduction, sophistication is used as a synthetic concept to describe specific attributes of a good that improve its value, such as technology, scale economies, labour skills, design, brand, packaging and all the intrinsic quality attributes..

The idea is that the presence of such attributes increase product value and hence increase the capability to remunerate inputs, so that countries specialised in those productions tend to have higher per capita (Lall *et al.*, 2007; Hausmann *et al.*, 2007). If this is true, per capita GDP of can be used as a measure of sophistication. Turning that into an index, the sophistication of a given exported item is the result of the sum of the per capita GDP of the countries exporting that item, each of them weighted with the trade specialisation of each country in that item. This index, called Prody and here measured in 2005 US dollars at PPP, can be calculated in slightly different ways; here we followed Hausmann *et al.* (2007) and propose this version of the index:

$$PRODY = \sum_{i=1}^N s_{i,j} GDP_{pcj} \quad (1)$$

where  $s_{i,j}$  is the weighting factor of the per capita GDP of each country  $j$  exporting the  $i$  product and it is given by:

$$s_{i,j} = \frac{RCA_{i,j}}{\sum_j RCA_{i,j}} \quad (2)$$

Rca (*Revealed Comparative Advantage*) is the Balassa index and is given by:

$$RCA_{i,j} = \frac{\frac{X_{i,j}}{X_j}}{\frac{X_{i,w}}{X_w}} \quad (3)$$

where  $X_{i,j}$  is the amount of the agri-food product  $i$  exported by the country  $j$ ;  $X_j$  is the total agri-food exports of the country  $j$ ;  $X_{i,w}$  is the total world exports of the agri-food product  $i$ ;  $X_w$  is the total agri-food world exports.

The Prody index associated to an exported good offers a synthetic measure of its level of sophistication. At the same time, the index gives also an idea of the kind of countries exporting a specific good, so that it gives indirectly information about the nature of competition that the good in question has to deal with on the international markets (Lall *et al.*, 2007). Clearly, this index does not catch all the possible factors influencing the exporting performance of a good, that can depend, among other things, also on otherlocalisation factors such as natural resources availability, transport cost, trade barriers or public incentives. This is particularly true for the agri-food sector, for which the localisation factors and the natural comparative advantages are crucial in explaining the dynamics of export goods (Carbone *et al.*, 2009)<sup>4</sup>. As a consequence, it is necessary to use this types of indexes together with other indicators, in order to be able to catch all the most important factors influencing the export dynamics and their evolution in time. However, the results are particularly interesting, especially when the sophistication concept is applied to a high value added, relatively high technological, component of the set of agri-food exports such as the Made in Italy<sup>5</sup>.

<sup>4</sup> The agri-food Made in Italy includes, by definition, only processed goods, so the localisation factors are still very important, but no so crucial as in the case of primary products.

<sup>5</sup> According to some authors, countries specialised in exporting goods with high sophistication are more growth oriented (Hausmann *et al.*, 2007). This is because their ability to export goods that are exported by richer countries put them in the condition to compete on higher level markets, that, in turn, remunerate better the production inputs. This creates also spill-over effects from pioneer firms to followers, and the benefits created are socialised and shared in the overall society (Hausmann and Rodrick, 2003; Rodrick, 2006). However, this relationship between sophistication and growth is

As mentioned in the introduction, following the methodology suggested by Minondo (2007), we used a modified version of Prody where instead of simple product categories we used product varieties differing in quality levels. Each one of the 26 products was, then, divided into two according to the export unit value of the exporting countries. The median (50% of the observations) of the exports unit values for each exporting country was utilised to divide exports into “high quality” (unit value above the median) and “low quality” products (unit value below the median)<sup>6</sup>.

$$PRODY_{kq} = \sum_j \frac{\frac{x_{j,kq}}{X_j}}{\sum_j \left( \frac{x_{j,kq}}{X_j} \right)} Y_j \quad (4)$$

Where  $x_{j,kq}$  denotes country  $j$  exports of commodity  $k$ 's  $q$  variety, where  $q$  can be low or high.  $X_j$  denotes  $j$  country's total exports and  $Y_j$  is the country GDP per capita. The numerator of the weight aggregates the shares of commodity  $k$ 's  $q$  variety in country  $j$  total exports.

Particularly interesting is the dynamic dimension of the analysis. Indeed, the evolution of the Prody index reflects changes in the sophistication level of the products. Given the construction of the index, its time variation includes two different effects. Firstly, the index for a specific item can change according to the changes of the per capita GDP of the countries exporting that item. Moreover, changes in the Prody values reflect de-localisation processes due to changes in the specialisation of a country's export sets and/or due to changes in the set of exporting countries with new exporters joining the market or others leaving it. With specific regards to the first point, we propose an original and very simple way to catch the two distinct effects by calculating the index for 2006-07 using also the values of per capita GDP at 1996-97. In this way we are able to isolate a “GDP effect” by subtracting from the full Prody variation, the variation calculated at constant GDP. The residue is a component of the index variation that reflects changes in the countries specialisation pattern that we called “GEO effect”<sup>7</sup>.

### 3.2 The Prody index for the Made in Italy agri-food sector

Given the methodological issues discussed in the previous section, we present here the results for the application of the Prody index to the Made in Italy agri-food sector. In previous studies on the agri-food sector (Carbone *et al.*, 2009), it has been highlighted how Italy is included in the group of countries for which the trade specialisation is deeply connected to high sophistication products and how this tendency has been increasing by time. In the next pages our aim is to focus on this matter, analysing more in details both the quality of the made in Italy products and the dynamics of their Prody index.

In table 2 the 26 items identified as the agri-food Made in Italy products are featured, ranked according to the values of the 2006/07 Prody index. It is worth noting that for 7 out of the 26 products considered, Italian exports turned out to be “low quality” products on the base of their average unit values that are below the world median (i.e. vermouth, prepared vegetables, peeled tomatoes and paste, wine > 2lt, fruit juices, pasta and prepared fruit). Among the “low quality” products, it is significant the presence of a couple of very specific products of the agri-food Made in Italy (pasta, peeled tomatoes and tomato paste) together with other products, mainly within the processed fruit and vegetable sector, whose range is probably quite wide and less “country

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still under discussion (Kamakura, 2007; Minondo, 2007) and besides, it is even more debatable in the case of sector-based sophistication as in the case of the work presented in this paper.

<sup>6</sup> The index we built – differently from the one by Minondo – is based on two quality levels instead than three. The reason is that dealing with agri-food products implies smaller absolute value for prices and a smaller variation spectrum, and consequently it was useless to split them into three levels that revealed very narrowly defined. It is worth saying that, coherently with the expectations formulated by Minondo, Our data show a higher Prody for the group of countries exporting the higher quality (with only exception of sparkling wines that have a very small low quality exporting group of countries among which US and other high-medium GDP countries).

<sup>7</sup> To our knowledge, there are not attempts in the same direction in the literature. However, Lebre, De Freitas and Salvado (2009) are working somehow in the same directions when they calculate the sophistication index associated to a country (called Expy) with current and constant Prody.



specific”. For all the others, the unit value of the Italian products is above the median value, so they are considered “high quality” products. It is also worth underlying that, compared to 1996/97, only 2 products change the levels of quality: “fruit juices” shifts from “high quality” to low, while “sparkling wine” shifts from low to high.

Looking at the Prody index in 2006/07, it is clear that the range of values is quite wide, going from 33.513 (US \$ 2005, PPP) for herbal cheeses to 9.536 for prepared fruit. The ranking attained seems to confirm the general hypothesis on which the sophistication measure is built, as well as the results obtained by previous works. First of all, it is worth comparing the Prody index referred to the whole basket of 95 agri-food items that spans from 32095 to 4368, with the ranking of the Made in Italy items, this indicates that the latter are mostly located in the medium-upper part of the ranking<sup>8</sup>. Secondly, it is worth noticing that the ranking of the Made in Italy has at the top of the spectrum many cheese categories and other products for which packaging, brand, technology and other features included in the sophistication concept are clearly present and intense (i.e. bakery, ice creams meat cuts, confectionery and chocolate products). On the other end of the spectrum, at the bottom of the range, there are less processed products (i.e. wine, olive oil, fruits and vegetables, pasta).

Compared to the years 1996/97, the Prody index increases for all the products, with the only exceptions of fresh cheeses and processed rice (Table 1 and Figure 5).

**Table 2 – Ranking of the Prody index for the agri-food Made in Italy products**

products	PRODY 96/97	PRODY GDPcorr 06/07	PRODY GDPcost 06/07	total variation	GDPeffect	GEO effect
Herbal cheeses	27,992	33,513	28,169	5,521	5,345	177
Grated cheeses	18,723	32,278	26,436	13,555	5,842	7,714
Other cheeses	26,466	29,668	23,436	3,202	6,232	-3,030
Bakery products	25,771	28,187	22,550	2,416	5,636	-3,220
Ice creams	24,797	26,667	21,190	1,870	5,477	-3,607
Meat cuts	21,530	26,288	19,943	4,757	6,344	-1,587
Confectionery products	18,043	25,791	19,567	7,747	6,224	1,523
Fresh cheeses	26,079	25,693	18,877	-386	6,816	-7,202
Chocolate and choc. products	21,843	25,009	19,682	3,166	5,328	-2,161
Fresh pasta	18,332	24,892	19,500	6,559	5,392	1,167
Virgin olive oil	21,927	24,622	21,569	2,695	3,053	-358
Wine < 2 lt	18,770	23,237	18,937	4,467	4,300	167
Non-virgin olive oil	19,837	20,897	16,790	1,059	4,107	-3,048
Vermouth lq	18,641	20,157	16,116	1,517	4,041	-2,525
Processed coffeee	17,676	20,012	14,872	2,336	5,140	-2,803
Mineral water	18,939	19,989	15,270	1,050	4,719	-3,669
Processed rice	21,766	19,950	15,856	-1,816	4,095	-5,911
Mixed olive oil	4,732	19,522	15,645	14,790	3,877	10,913
Sauces and other condiments	13,184	17,556	13,787	4,373	3,769	603
Prepared vegetables lq	10,093	15,622	12,110	5,529	3,512	2,017
Peeled tomatoes and paste lq	13,584	15,545	11,996	1,961	3,549	-1,588
Wine > 2 lt lq	10,424	14,878	11,765	4,454	3,113	1,341
Fruit juices lq	11,722	12,149	9,841	427	2,308	-1,881
Pasta lq	9,933	11,711	9,510	1,778	2,201	-423
Sparkling wine	9,575	10,581	8,069	1,005	2,512	-1,507
Prepared fruit lq	7,141	9,536	7,066	2,394	2,470	-75

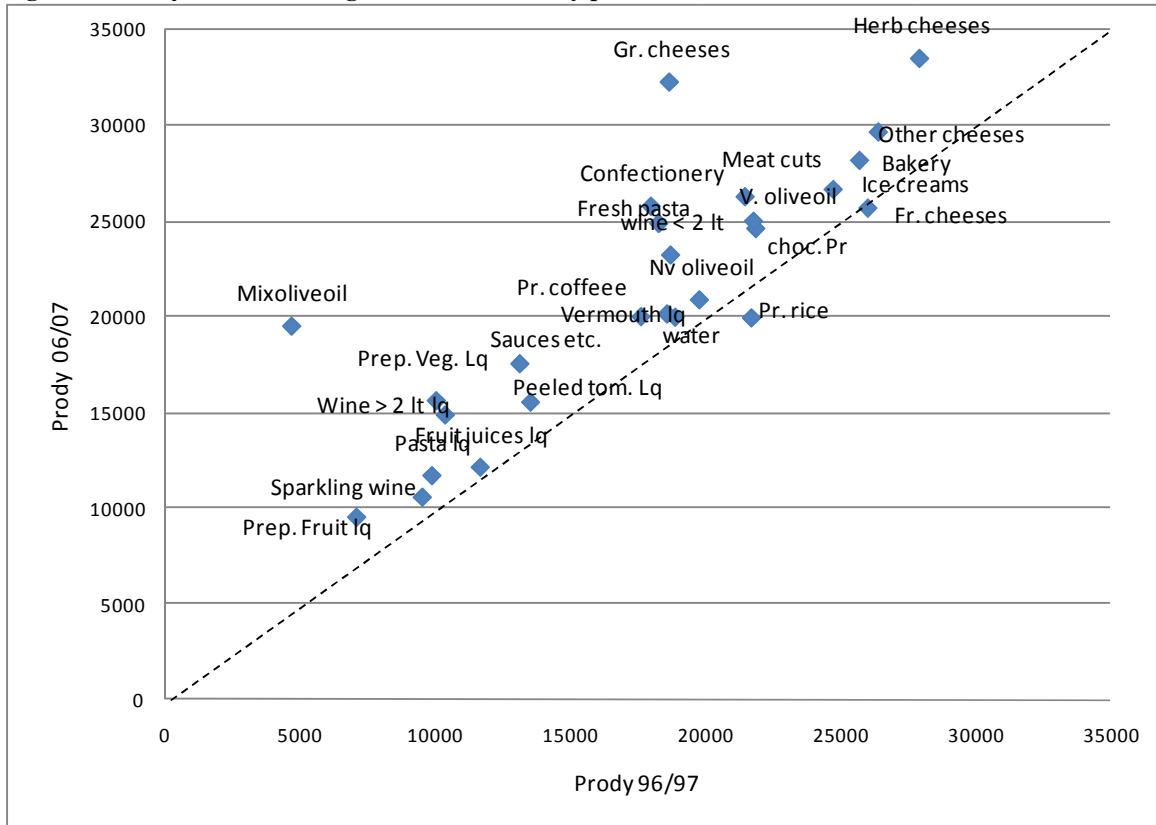
Source: our elaboration on WB and UN data

Looking at Figure 5 it is possible to roughly identify four different behaviours among Made in Italy products with respect to sophistication and its trend:

<sup>8</sup> The values cited are reported in Carbone et al. (2009) and refer to a Prody ranking that does not take into account of quality levels of exports; hence, the comparison is not accurate but still useful as a rough indication on how Made in Italy items are ranked with respect to the others agri-food exports.

- One large group is at the above-right of the graph, with products with a high and moderately increasing level of sophistication;
- one more large group include products with lower level of sophistication but again the index face a positive trend;
- a smaller group of products start the decade with different sophistication levels but; these have in common a high rate of increase;
- finally, there are the two products whose prody index decrease (they lie below the dashed line), namely fresh cheese and processed rice.

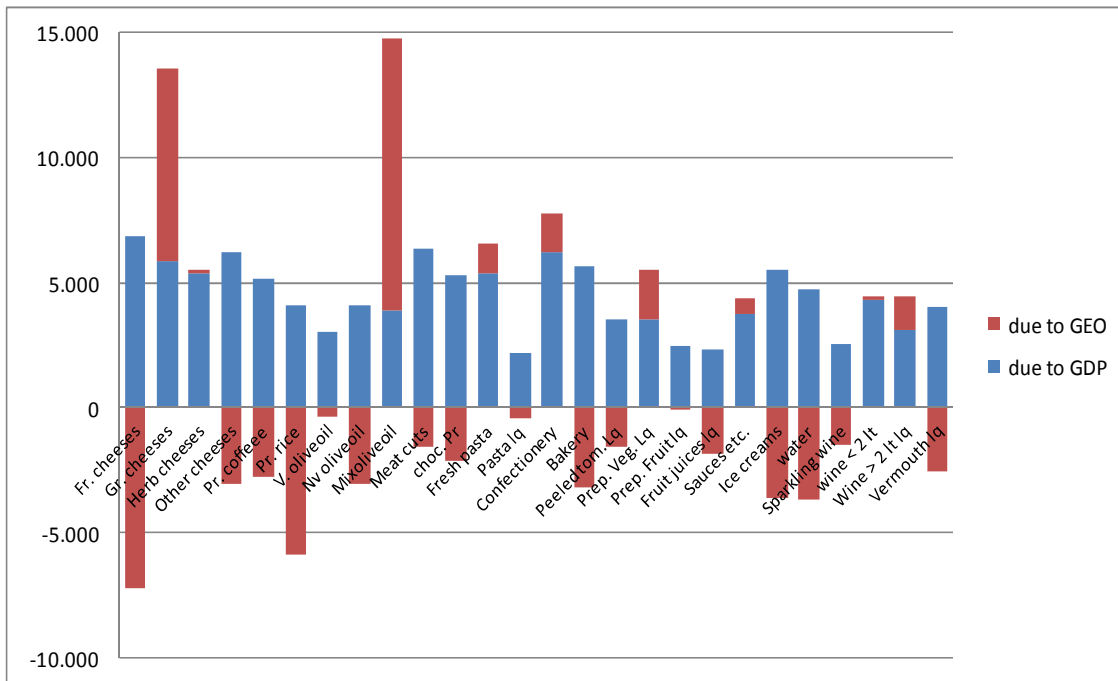
**Figure 3 – Prody index for the agri-food Made in Italy products (1996-97 and 2006/07)**



Source: our elaboration on WB and UN data

The third column of table 2 shows the Prody values calculated at constant per capita GDP (1996-97), while the last two columns report respectively the GDP effect and the GEO effect (see also Figure 4). The decomposition shows that the variation of the sophistication level includes always a positive and significant “prosperity component”, while the market localization has moved in different directions. In some cases giving a positive contribution to the sophistication growth, in some other pushing to its reduction. The dimension of this effect is also varying a lot from case to case and it is not possible to find any relation to the direction of the movement and any specificity either of the product or of the production process.

**Figure 4 – Prody index and its components. Variations 1996-97/2006-07**



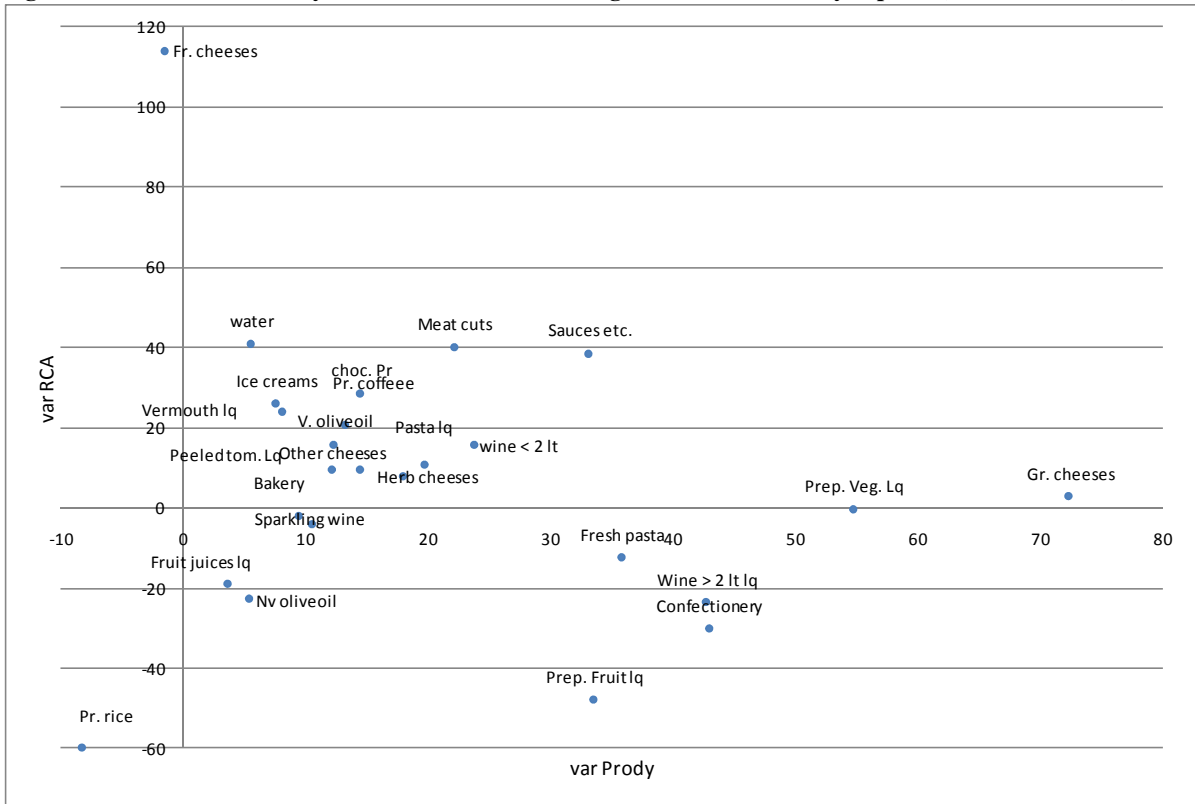
Source: our elaboration on WB and UN data

In figure 5 the growth rate of the Prody is compared with the growth rate of the Balassa index (RCA). This graph helps to understand how the sophistication of the Made in Italy products and the Italian specialisation move together. Also in this figure the Prody index at constant values has been used.

In the first quadrant of the graph (top right), a positive variation of the sophistication is associated to a growth in the Italian specialisation: this is the case for a restricted number of products, namely grated cheeses, prepared vegetables, sauces and other condiments, pasta and wine < 2lt. Of these, it is worth remembering that pasta and prepared vegetables are “low quality” products. This area highlights a synergetic combination of growth in sophistication of the products and growth of the Italian specialisation. In the second quadrant (bottom right) the growth in sophistication is associated to a decrease in the Italian specialisation. This is the case for wine > 2lt and confectionary products: for them the growth of the sophistication is not matched by an increase of the Italian specialisation (loss of competitiveness for Italy).

In the third quadrant both the indicators displays negative values: a decrease of sophistication is accompanied by a loss of specialisation. This is an interesting case of de-specialisation due to the incoming of lower income countries in the export of the goods associated: sparkling wine, fruit juices (low quality for Italy), non-virgin olive oil, processed coffee. To some extent the situation featured in quadrant four is worse than that just described, because in the top-left area a loss of sophistication is associated to a growth in the specialisation. In other words, in this case Italy is specialising more in less sophisticated products, competing with lower income countries. The products displayed in this quadrant are six, and they are an “alarm bell” for Italian agri-food exports: mineral water, chocolate, vermouth, “other cheeses”, ice creams, bakery products.

**Figure 5 - Variations of Prody and RCA indices for the agri-food Made in Italy exports (1996-97/2006-07)**



Source: our elaboration on WB and UN data

#### 4. Conclusions

In this paper we discussed the use of a sophistication measure – the Prody index – in order to evaluate the performance of a specific component of the Italian agri-food export sector, the so-called “agri-food Made in Italy”. On the one hand, this component is particularly interesting to be investigated with the support of sophistication indices given that it is highly export-oriented and it includes only processed and high value added goods. On the other hand, focusing only on these products will neutralise the distortions that may arise by applying this type of indicators to the agri-food sector that is deeply dependent on natural resources and on localisation factors not caught by the sophistication concept (Carbone *et al.* 2009).

In the analysis we used two variants of the Prody index:

- Following Minondo (2007), we applied the index to exports categories that take into account quality.
- in order to to analyse more in details the sophistication dynamics, we calculated the Prody index for 2006-07 with the 1996-97 GDP value; in this way we managed to distinguish a “GDP effect” from a “country specialisation effect”.

Looking at the specific results for the agri-food Made in Italy, the analysis has shown that this specific component of the Italian agri-food exports is, overall, in good health and that its level of sophistication is actually an important element of the capacity to be competitive on the international markets. This is witnessed by the generally high values of the Prody index for most of the agri-food Made in Italy exports.

However, there are also some elements highlighting potential weaknesses.

First of all, for some products the level of sophistication is particularly low and for a few of them it is also decreasing over time. Moreover, some of the made in Italy products compete on the world markets with a quality level that is lower than the median level of all the exporters. Putting the two together, it seems that, for these items, Italy tends to compete more on price rather than on quality. This, in principle could not be a problem, but it is clearly a threat for the competitive performance of a country like Italy that cannot enjoy very low production cost due to a number of reasons among

which it is worth to briefly recall: i) climate; ii)lack of natural resources; iii)labor cost; iv)small production scale. Furthermore, as shown in the previous pages, following the hypothesis behind the sophistication concept, more sophisticated exports are better able to remunerate resources.

Finally, and this seems to be the most worrying result, for some products the decreasing values of the Prody index often goes along with an increase in the specialisation. In other words, this means that Italy is competing in markets where price competition is becoming more intense and opportunities of better remunerate resources depends highly on production cost levels.

Integrating the results obtained with the use of the traditional trade indicators (Section 2) and the one stemmed out from the sophistication analysis (Section 3), we can conclude that Italian agri-food exports are better competing in the international arena in the case of products that do have a strong national identity, a well settled reputation, and a higher quality level. Good examples are wine < 2lt, grated cheese, processed coffee, pasta, bakery products and mixed olive oil. On the contrary, products whose identity has a looser connection with the Italian food tradition, and those for which Italian exports has not always an adequate quality level, have shown a weaker position in the world competitive arena. Among these there are processed fruits and processed vegetables, fruits juices, wines in large bottles, rice and non-virgin olive oils.

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