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Full Research Article

Italian agri-food exports in the international arena

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Abstract. The aim of the paper is to highlight the positioning of the so-called *Made in Italy* agro-food exports in foreign markets considering global world tendencies as well as country specific trends. Besides, we aim at disentangling the role of product quality from price competition as a driver of competitive advantages.
To these ends, the work combines two different methodologies, applied in three steps. First, we estimate the elasticities of Italian exports, with respect to world imports, Italian export prices and the competitors' prices. Second, an index of the sophistication of exports' flows that captures the role of quality in global competition is calculated. Third, the estimated elasticities are compared with the changes in the sophistication levels.
Results allow for product-specific trends to stem out from the overall picture. Exports' performance varies according to the type of product and to the degree of market completion. Although, the Made In Italy aggregate seems overall competitive, the analysis pinpoints some drawbacks in the positioning of some products in the world arena. Focus on wine and on olive oil, two major Italian exporting sectors, helps in understanding the potential of the joint methodology adopted.

Keywords. Exports' elasticities, exports' sophistication, Made in Italy, world demand

JEL Codes. Q17, F14

1. Introduction

World agri-food markets are increasingly competitive. Competitive strategies are based on a wide range of attributes that segment the market and smooth price competition. Nevertheless, given the emergence of new competitors with different production cost levels, price competition is altogether relevant and not only in world bulk markets.

The paper seeks at highlighting the position of the Italian agro-food exports in international markets given major global tendencies; trends related to the importing countries; as well as, those specific of Italy as an exporter. Besides, one more goal is to disentangle

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the role of product quality from that of price competition as drivers of the observed competitive advantages.

In order to meet these ends the paper suggests a three-step methodology that helps to combine information on the trends developing in the world markets with those related to a single exporter. First, we estimate the elasticities of exports to: i) world demand; ii) prices of exports; and iii) prices applied by main competitors. These highlight the capacity of exports to adjust to market trends and to react to competitive pressures. Second, the level of so-called "sophistication" (Lall *et al.*, 2006) of exports in the world markets is assessed. The "sophistication" concept, as expressed by the Prody index, encompasses all product's and process's quality attributes and is related to its capability to reward inputs, as well as to the kind of competition prevailing on the market for that very product. Last, the estimated long-run elasticities and the changes in the level of "sophistication" of each product over the observed time span are put together in a simple graphical analysis.

The analysis considers 30 export sectors of the Italian agro-food balance commonly referred to as the agro-food *Made in Italy*. The observed time span is the period 1996/97-2010/11.

It is important to underline that the level of aggregation chosen for the analysis is intermediate, and quite different from the usual trade analysis. In fact, on the one hand, trade analysis in applied industrial economics is usually based on more aggregated data and seeks at comparing performances across macro sectors. On the other hand, agribusiness marketing analysts look at trade focusing on a single product (or on small bunches of similar/substitute products), thus going deeper at the search for drivers of competitiveness. While these two approaches have both evident and well known advantages, it is the authors' opinion that the meso-level used for the present research is a useful complement to the previous ones because it allows for a sound comparison among many products within the same sector.

Our results show that the positioning of Italian exports greatly varies according to the type of product and to the degree of market completion. In some cases, Italian exports contrast increasing world competition by increasing quality levels (i.e. their sophistication content); this happens when producers are capable to enhance the quality and the origin of their products. In other cases, when quality cannot be increased and/or costs can be lowered via higher level of efficiency at firm or at chain level, price competition is chosen, by keeping average unit values at lower levels than those of the competitors. All considered, in many cases, in spite of a growing world competition, these products seem successful in defending, and sometimes even to increase, their world market shares.

The rest of the paper is organized as follows: section 2 presents some descriptive data on MiI exports; section 3 describes the methodology; section 4 presents the main results, including a couple of detailed examples on olive oil and wine: two Italian strategic exporting sectors. Section 5 concludes.

2. Agri-food Made in Italy exports: a short description

Moving from trade data available in the UN Comtrade databank at 6 digit level (HS-6), we aggregated the over 700 items referred to agri-food into 95 items from which we

selected the 30 ones included in the agri-food Made in Italy[1]. The trend - from 1996/97 to 2010/11, of the share of the agri-food Made in Italy is reported in Figure 1 where 5 biennial averages represent the whole time span

The aggregate includes a mix of fresh produce (vegetables, tomatoes, grapes and the cluster *apples*, *kiwis* and *pears*) and processed food (all the other items, as shown in Table 1). Actually, the specific features of MiI can stem both from the nature of the agricultural produce – this is especially the case for fresh vegetables and fruit – and/or from traditional processing techniques. MiI agri-food products are therefore connected to the Country, no matter if processed or not, or if made with imported raw material.

Table 1. Agri-food Made in Italy exports: shares and variations.

	shares on total Made in Italy	share var. (diff.)	export var.%	RCA	RCA var. %
	2010/2011	2010-11/1996-97	2010-11/1996-97	2010-11	2010-11/1996-97
wines < 2 lts	16,4	2,4	195,0	11,3	75,8
dry pasta	6,5	-1,3	108,3	20,8	12,5
sauces and other condiments	6,4	2,2	282,0	1,5	60,7
canned tomatoes	6,2	0,0	149,9	13,5	18,8
apples, kiwi and pears	5,5	-0,1	148,1	6,8	63,1
other cheese	5,3	0,3	168,1	5,0	110,9
bakery products	4,6	0,8	206,3	3,1	10,1
virgin olive oil	4,6	0,4	178,2	28,4	147,7
fresh vegetables	4,3	-1,2	97,6	2,1	-24,3
chocolate products	4,1	0,5	186,4	3,0	70,4
processed coffee	3,8	1,7	355,4	6,2	-45,4
grapes	2,9	-1,4	67,0	11,6	17,7
fresh pasta	2,8	0,2	171,4	8,1	0,9
sparkling wine	2,5	0,4	192,6	18,7	23,0
fruits juices	2,5	-0,5	108,4	2,5	5,4
confectionary products	2,2	-0,6	95,1	0,9	-30,2
prepared vegetables	2,1	0,0	152,5	1,2	13,5
processed rice	2,1	-1,1	66,0	2,2	-81,7
fresh cheese	2,0	1,4	678,9	9,0	244,4
meat cut	2,0	0,4	210,8	4,4	43,2
mineral water	1,9	0,9	354,2	3,1	78,6
prepared fruit	1,9	-1,6	37,8	1,7	-60,7
wines > 2 lts	1,8	-1,5	39,0	5,4	-24,8
ice creams	1,2	0,3	221,6	4,1	15,3
non-virgin olive oil	1,1	-1,9	-8,6	9,7	-47,7
fresh tomatoes	1,0	-0,2	116,8	1,2	-18,6
grated cheese	0,9	0,2	234,9	12,3	47,9
vermouth	0,8	-0,5	49,9	15,2	26,3
blue cheese	0,5	-0,2	74,0	9,6	73,3
mixed olive oil	0,3	-0,1	70,5	9,0	-37,8
Total Made in Italy	100,0	-	151,0	-	-
MiI on total agri-food exp.	71,2	67,9			

* variation of total Italian agri-food exports
Source: our elaborations on UN-Comtrade data.

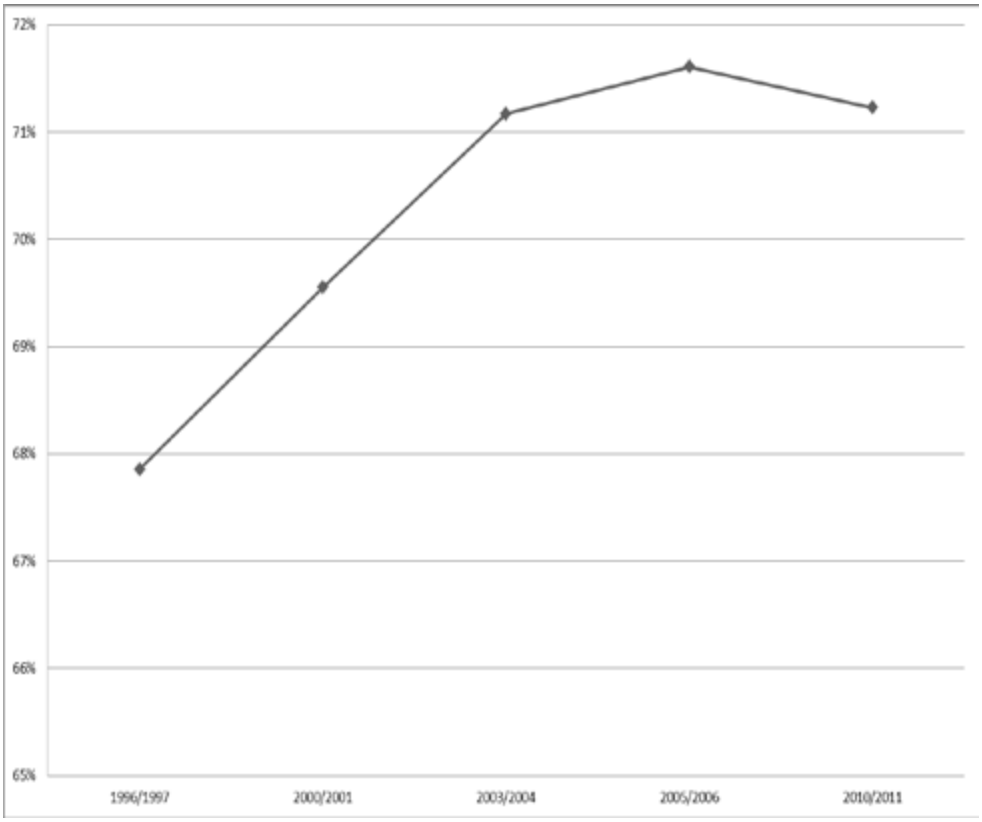
[1] Total exports are referred to 122 countries (world). Values are at current values in US Dollars.

The common feature of these products is in that they are well reputed abroad due to their Italian origin and recall the generally appreciated Italian diet and life-style. Their net trade balance is mostly positive even if there are few exceptions (one of the most noticeable is olive oil whose net trade balance is negative). Altogether, these products are the core of Italian exports as shown by the large share of the total agri-food exports they represent: 71% of the total in 2010/11, slightly increasing compared to 1996/97 (Table 1 and Figure 1).

In the observed period of time, bottled wine (i.e. wine in bottles with less than two litres, in tables and figures is: *wine< 2 lts*) shows by far the largest share of the export values (16.4% in 2010/11, 13.9% in 1996/97). In 2010/11 wines are followed, at a distance, by *dry pasta* (6.5%), *sauces and other condiments* (6.4%) and *canned tomatoes* (6.2%). Of these products, *sauces and other condiments* show the largest increase in the share, as they were featuring a value of 4.2% in 1996/97. Actually, all the other major items represent quite a stable share of the total export values over the period observed, as a result of export trends basically aligned and with a limited expansion over time, especially when compared to minor flows which are relatively more dynamic.

Looking at the fresh component of the agri-food Made in Italy exports, data show a sort of steadiness of the shares (as in the case of *apples*, *kiwifruits* and *pears*) if not a cer-

Figure 1. Trend of the share of the agri-food made in Italy on the total agri-food Italian exports.



tain degree of reduction (*fresh vegetables* and *grapes*), so that their position in the ranking of the 30 MiI products becomes relatively low.

Looking at the export dynamics, the variation of the export values at current prices are all positive, with the only exception of the *non-virgin olive oil*.

In the same Table 1 we considered also the Balassa index (also referred to as the Revealed Comparative Advantage – RCA). The index compares the share of a Country's export flow for a specific product (sector) with the share hold by the same product (sector) in world's total exports. The index formula is as follows:

$$RCAi,j = \frac{\frac{Xi,j}{Xj}}{\frac{Xi,w}{Xw}}$$

where $X_{i,j}$ is the exports of the item *i* of the country *j*; X_j the total agri-food exports of the country j; $X_{i,w}$ is the world exports of the good i and e X_w the world agri-food exports. The index is greater than 1 for all the agri-food made in Italy items, indicating specialisation of the country for these items (except *confectionery* products for which Italy does not show a revealed competitive advantage, with a value of Balassa index of 0.9). The range of values is wide as it spans from 1.2 for prepared vegetables to 28.4 for *virgin olive oil*. The lower values (around 1-2) are relative to *fresh* and *prepared vegetables* as well as *prepared fruits* and *fruit juices*; while for products such as *dry pasta*, *canned tomatoes*, *grated cheese*, *virgin olive oil*, grapes and *wine < 2 lts*, *sparkling wines* and *vermouth*, Italy shows higher level of revealed competitive advantage (index values above 10).

The variations of RCA show the trends in the specialization pattern of the country relative to world specialization. Index variations are mixed; with some products that show negative values while other facing a positive one, with varying intensity. Particularly high rates of increase in specialisation are recorded for many cheese categories, and for *virgin olive oil, chocolate products, sauces and other condiments, mineral water and wine < 2 lts*. On the contrary, for some products such specialisation significantly decreases by time: *fresh tomatoes* and *fresh vegetables*, *processed coffee* and *rice*, *non-virgin* and *mixed olive oils*, *confectionery products*, *prepared fruit* and *wine > 2 lts*. For all these products, Italy is de-specialising due to a wider presence of the old competitors or due to the entry of new ones on the international arena,.

Another interesting point is that overall the distance covered by the agri-food MiI exports has increased, with larger flows of exports going to further countries such as China, and Canada.

3. Methodology

Econometric analyses of export demand elasticities, specific both at country and at product level, have long tradition in economics, going back at least to Adler (1946) and Horner (1952). More recent examples include, among others, the estimates of short- and long-run elasticities of exports and imports for the G7 countries in Hooper *et al.* (2000)

and those of US import and export at the sector level by Mann and Pluck (2007).[2] A vast strand of literature has also focused on country level imports and exports of agricultural products, in particular commodities.[3] Overall, the estimates of export demand elasticities obtained in literature are quite heterogeneous, depending on the goods, the countries and the time periods under scrutiny. However, a common view in the most recent literature is the importance of conducting analyses at a narrow sector level, to reduce the impact of changes in product quality.

For this reason, our estimates are based on a detailed data set where Italian exports are represented by 95 food and agricultural products (30 of which are gathered in the so-called Made in Italy) sold to 48 among the largest trade partners[4]. The econometric specification follows Mann and Plück (2007), where the annual growth rate of each product exports on each customer country is a function of two distinct sets of variables, respectively catching the short and the long run reactions:

$$\begin{aligned}\Delta\ln(\text{export}_{ijt}) = \quad & \beta_0 + \beta_1\,\Delta\ln(\text{export}_{ijt-1}) + \beta_2\,\Delta\ln(\text{import}_{ijt}) + \beta_3\,\Delta\ln(\text{import}_{ijt-1}) + \\ & + \beta_4\,\Delta\ln(\text{AUVexp}_{ijt}) ++ \beta_5\,\ln(\Delta\text{AUVimp}_{ijt}) + \beta_6\,\ln(\text{export}_{ijt-1}) + \\ & + \beta_7\,\ln(\text{import}_{ijt-1}) + \beta_8\,\ln(\text{AUVexp}_{ijt-1}) + \beta_9\,\ln(\text{AUVimp}_{ijt-1}) + \\ & + \beta_{10}\,Y_t + \alpha_{ij} + \varepsilon_{ijt} \qquad (1)\end{aligned}$$

where:
ΔX is the annual variation of the generic variable X; $ln(export_{ijt})$ is the logarithm of the Italian exports of product i towards country j in year t; $ln(AUVexp_{ijt})$ is the logarithm of the Average Unit Values (AUV) of Italian exports of product i toward country j in year t; $ln(import_{ijt})$ is the logarithm of the total imports of the product i from the country j in year t; $ln(AUVimp_{ijt})$ is the logarithm of the AUV of the imports of product i from the country j in year t; Y_t is a dummy variable per each year t; α_{ij} is a dummy variable per each product i and country j; ε_{ijt} is a zero-mean error term.

The estimated coefficients can be interpreted as follows:

- β_1 measures the inertia of Italian exports;
- β_2 is the instant elasticity of Italian exports to the import demand;
- $\beta_2 + \beta_3$ is the short-run elasticity of Italian exports to the import demand;
- β_4 is the short-run elasticity of the Italian exports to the export AUV;
- β_5 is the short-run elasticity of the Italian exports to the import AUV;
- $-\beta_7/\beta_6$ is the lung-run elasticity of the Italian exports to the import demand;
- $-\beta_8/\beta_6$ is the long-run elasticity of the Italian exports to the export AUV;
- $-\beta_9/\beta_6$ is the long-run elasticity of the Italian exports to the import AUV.

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[2] See also Sawyer and Sprinkle (1996), for a survey of the previous literature.
[3] See for example Devadoss *et al.* (1988) and, more recently, Reimer *et al.* (2012).
[4] The selected countries, are: Albania, Arab Emirates, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong (SAR), Hungary, India, Ireland, Israel, Japan, Korea, Rep., Kuwait, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Russia, Saudi Arabia, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Tunisia, Turkey, Ukraine, United Kingdom, United States. In 2010-2011, these cover more than 90% of the agro-food made in Italy trade (De Filippis, 2012) and have been selected out of 122 trade partner Countries, based on the share of Italian foreign trade they cover, provided that yearly detailed data were available for the whole time span under analysis.

The model is estimated using the procedure first suggested by Arellano and Bond (1991) for dynamic panels, using the Stata routine of David Roodman (2009). Although Mann and Plück (2007) prefer to use a fixed effect estimator, we follow this more rigorous and efficient procedure that avoids introducing the bias caused by the presence of the time-invariant component in the error term that is by definition correlated with the lagged dependent variable. We use the two-steps, system estimator with orthogonal deviations. Moreover, our specification search suggests to use lags 5 to 7 of $\Delta\ln(\text{export}_{ijt-1})$ and of $ln(export_{ijt-1})$ used as instruments, that guarantees passing the Hansen test for overidentifying restrictions.[5]

In addition to estimating standard export demand functions, we looked at the MiI exports watching at their "sophistication". This is defined as the content of a good in terms of technology, packaging, branding, other aspects of quality, as well as scale economies and any other factor affecting the value of the product (Lall *et al.*, 2006). The basic idea is that the more sophisticated the items produced and exported the higher the income earned. Thus, the sophistication content of a product can be indirectly measured by the per-capita GDPs of the exporting countries through the Prody index (Lall *et al.*, 2006; Rodrik, 2006; Hausmann *et al.*, 2007). Following the literature, the Prody index associated to each good (or set of goods) *i* is defined as the sum of the per-capita GDP of all the countries *j* exporting that good, where each country's GDP is weighted by a measure of the trade specialisation of the country in that item, expressed by Balassa's index of revealed comparative advantages – RCA, normalized by the sum of RCA of all exporting countries. Formally:

$$Prody_i = \sum_j s_{ij} GDPpc_j \tag{2}$$

where $s_{i,j}$ is the weighting factor given by

$$s_{i,j} = \frac{RCA_{i,j}}{\sum_j RCA_{i,j}}$$

The index produces a ranking of values that is interpreted as a relative measure of the content of attributes that better remunerate inputs. More in details, products with a high index are sold by richer countries, that are supposedly better able to focus on quality attributes and on market imperfections to reduce the impact of sheer price competition.

Furthermore, the evolution of the Prody index reflects changes in the sophistication level of each product. Here the time trend is caught by comparing the 2010-11 values with those at the beginning of the observed period, 1996-97. From the formula above, it is clear that its variation over time can be explained by two different effects. First, it can

[5] In unreported regressions, available from the authors upon request, we have verified that our results are basically unchanged using a fixed effect estimator.

change according to variation in GDP per capita of the exporting countries. Second, it may reflect changes in countries' export specialization patterns.

Though relatively new, the Prody index has already been applied to the analysis of Chineese exports (Rodrick, 2007), Portoguese exports (Lebre De Freitas and Salvado, 2009), Italian total exports (Di Maio e Tamagni, 2008) and Italian agri-food exports (Carbone and Henke, 2012).

In this paper, we apply the Prody index to agri-food products that are defined also by the quality level within each category. Following Minondo (2007), for each product we considered two levels of quality according to the median world-level value of the export AUV and then apply the usual formula. Formally:

$$Prody_{iq} = \sum_j \frac{RCA_{i,jq}}{\sum_j RCA_{i,jq}} GDP_j$$

were q indicates the different level of quality of the exports (high and low), and all other expressions are as defined above.

The index is built using the same export dataset as in other parts of the research and per capita GDP as released by World Bank (Development indicators series) measured in purchasing power parity (PPP) at constant 2005 values.

Combining the analysis of the elasticities with that one of the sophistication, we can obtain a broader picture of the global and country specific determinants of competitiveness for MiI agri-food exports. More in detail, the proposed approach allows on one side, to look at the kind of competition that characterizes world markets for a given product and, on the other side, to detect to what extent Italian exports are able to adjust to trends in both costumers' demand and competitors supply, focusing on markets where price competition is less intense and exports are, hence, more rewarding.

4. Empirical findings

4.1 Elasticities of Italian exports of MiI agri-food products

Measures of the short-run and long-run elasticities of Italian exports with respect to the evolution of world demand allow a better understanding of the strength and weaknesses of the country agri-food international specialization. A high elasticity with respect to world demand, for example, witnesses the ability to single out the fastest growing markets. On the contrary, it clearly implies a higher vulnerability during recessions.

The elasticity with respect to relative prices is also a crucial characteristic of exports. Indeed, when exporters enjoy some degree of market power, the total value of aggregate exports is less affected by changes in Italian export AUVs or in the AUVs of the imports of our clients from our competitors.

Table 2 presents the summary statistics of the data used in the regressions, showing a high degree of variability. In particular, although the mean and median values of the annual rates of growth of exports and AUVs by country of destination, year and product are relatively small, the standard errors and the minimum and maximum values point to significant heterogeneities, that justify our econometric analysis.

Table 2. Summary statistics of regression data.

Variable	Mean	Median	Standard deviation	Minimum	Maximum
Import – rate of growth	0.12	0.10	1.05	-10.37	13.10
Export – rate of growth	0.10	0.09	0.61	-12.77	10.14
AUV of exports – rate of growth	0.03	0.03	0.60	-9.55	9.06
AUV of imports – rate of growth	0.04	0.03	0.47	-10.12	14.86
Exports – natural logarithm	12.96	13.19	2.76	0.00	20.79
Imports – natural logarithm	16.46	16.73	2.60	0.00	24.00
AUV of exports – natural logarithm	0.91	0.92	1.22	-4.52	12.54
AUV of imports - natural logarithm	0.56	0.57	1.28	-7.94	15.80

Table 3 reports the results of the estimation of the econometric model described in Section 3 on a sample of yearly data within 15 years (1996-2011) on exports to our 48 major trade partners. Panel (1) reports the results of the estimates on the whole sample. All coefficients have the expected sign and are statistically significant at the 1% level, providing strong support to our empirical specification. In particular, the negative coefficient of the lagged dependent variable suggests the presence of an error correction mechanism in the dynamics of exports. Columns (2) to (5) present the results of the estimates on different sub-samples, distinguishing between MiI and other products and between exports towards high income and lower income countries, according the World Bank classification. These respectively accounts for about 94% and increasing over the period, and about 6% and descreasing. The distinction between the two groups of clients is relevant as high income countries are the major buyers of quality products.

In all specifications, the coefficients have the expected sign, although in some cases they are not statistically significant. Interestingly, the estimates obtaiened from the different sub-samples are rather similar.

A neater interpertation of the economic meaning of these coefficients can nonetheless be gained whatching at the short and long-run elasticities with respect to world demand and prices that can be obtained as a function of the estimated coefficients. Table 4 presents such values.

The estimated instant elasticity to import demand is 0.37. This means that, on average, a 10% increase in the total value of agri-food imports of our trade partners determines immediately a 3.7% increase in the value of Italian exports. This reaction is larger for MiI agri-food exports (0.40) than for other agri-food products (0.34), although the difference is not statistically significant. The expansion of our exports in reaction to an increase in demand is higher for high income countries (0.39) than for low income countries (0.32), but then again, the difference is not statistically significant. The estimates of the short-run elasticity – that measures the total effect after two years – show the capacity to better adjust to changes in demand as time goes by. The average coefficient raises to 5.2%, and the adjustment remains significantly higher for MiI agri-food products (0.54 vs 0.45)and for high income countries (0.49 vs 0.35), although in none of the cases the difference is statistically significant at the standard confidence levels.

Table 3. Regression results.

Variable	Total (1)		Made in Italy (2)		Others (3)		High income countries (4)		Low income countries (5)	
	Coeff. s.e.	Sig.	Coeff. s.e.	Sig.	Coeff. s.e.	Sig.	Coeff. s.e.	Sig.	Coeff. s.e.	Sig.
Δln(exportijt-1)	-0.346	***	-0.235	**	-0.305	***	-0.194		-0.214	*
	0.084		0.105		0.117		0.147		0.123	
Δln(importijt)	0.366	***	0.399	***	0.335	***	0.394	***	0.326	***
	0.020		0.032		0.028		0.030		0.029	
Δln(importijt-1)	0.158	***	0.139	***	0.111	***	0.096	*	0.123	***
	0.030		0.038		0.045		0.056		0.042	
Δln(AUVexpijt)	-0.107	***	-0.085		-0.106	***	-0.092	***	-0.135	***
	0.021		0.055		0.026		0.031		0.039	
Δln(AUVimpijt)	0.097	***	0.097	***	0.086	***	0.091	***	0.144	***
	0.020		0.032		0.027		0.027		0.038	
ln(exportijt-1)	-0.117	***	-0.126	***	-0.133	***	-0.145	***	-0.045	
	0.028		0.049		0.046		0.048		0.041	
ln(importijt-1)	0.074	***	0.094	***	0.081	***	0.097	***	0.027	
	0.018		0.037		0.029		0.033		0.020	
ln(AUVexpijt-1)	-0.105	***	-0.057		-0.114	***	-0.123		-0.051	*
	0.022		0.044		0.030		0.038		0.031	
ln(AUVimpijt-1)	0.088	***	0.068	*	0.078	***	0.111	*	0.030	
	0.023		0.040		0.028		0.038		0.031	
No. observations	38,496		15,202		23,294		29,259		7,743	
Hansen test (p-value)	0.05		0.18		0.05		0.08		0.04	

The dependent variable is the rate of growth of exports. Estimates are conducted using the two-steps, orthogonal, system estimator of the xtabond2 Stata routine by David Roodman (2009), that follows the Arellano and Bond (1991) GMM methodology; lags 5 to 7 of Δln(exportijt-1) and of *ln(exportijt-1)* are used as instruments; standard errors are robust to heteroskedasticity; *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level.

The value of -0.11 of the short-run elasticity with respect to export AUVs implies that a 10% rise of Italy's export prices determines a reduction in total revenues of 1.1%, a small value also in comparison to similar analyses for other sectors (e.g., Hooper *et al.*, 2000). This means that Italian exports enjoy a relatively stable demand even in situations of increasing prices. In the case of non MiI agri-food produtcs, this elasticity is slightly smaller (0.08 as opposed to 0.11), however, the difference is not statistically significant. Accordingly, the coefficient is larger in the case of exports to low income countries (1.3% as opposed to 0.09% for high income countries), although also in this case the difference is not statistically significant. As expected, exports to low income countries are therefore more sensitive to price competiton.

Table 4. Elasticity of Italian exports of agrifood products.

	Elasticities	Total		Made in Italy (A)		Others (B)		Difference (A) vs. (B)		Low income countries (C)		High income countries (D)		Difference (C) vs. (D)	
β_2	instant to import demand	0.37	***	0.40	***	0.34	***	2.26		0.32	***	0.39	***	3.83	**
$\beta_2 + \beta_3$	short-run to import demand	0.52	***	0.54	***	0.45	***	1.34		0.45	***	0.49	***	0.14	
β_4	short-run to export AUV	-0.11	***	-0.08		-0.11	***	0.12		-0.13	***	-0.09	***	1.50	
β_5	short-run to import AUV	0.09	***	0.10	***	0.09	***	0.07		0.14	***	0.09	***	0.68	
$-\beta_7/\beta_6$	long-run to import demand	0.63	***	0.74	***	0.60	***	12.11	***	0.61	***	0.67	***	1.21	
$-\beta_8/\beta_6$	long-run to export AUV	-0.89	***	-0.45	**	-0.85	***	0.08		-1.13	**	-0.84	***	0.10	
$-\beta_9/\beta_6$	long-run to import AUV	0.75	***	0.54	***	0.59	***	3.18	*	0.68		0.77	***	0.81	

The colums Difference reports the values of the chi-squared test for differences between the coefficients estimated in the two samples; *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level.
Source: our elaborations on UN-Comtrade data.

In the case of the elasticity with respect to average AUVs of imports of the trade partners, the average short-run elasticity is relatively low (0.09), implying that in the short-run Italian exporters are relativley shed from price competition coming from their foreign competitors. Looking at the disaggregated coefficients, we see that the results are consistent with the previous findings, with MiI products ready to get advantage of competitors' price increases and with low income countries more sensitive to prices.

Consistent with economic theory, long-run elasticities are higher than instant and short-run elasticities. Table 4 shows that a 10% increase in world import agri-food products determines a raise in Italian exports of 6.3%. A high value, although smaller than unity, indicating that Italian shares are declining in the long-run. As expected, the elasticity in the case of MiI agri-food products is higher than the one of the other products, and in this case the difference between the two values is statistically significant at the 1% level. Once again, this is evidence of the ability of MiI to better follow world demand. A similar result applies to long-run elasticity to import AVUs when separating high income countries and low income countries. The former value being well above the second with statistically significant difference.

Long-run elasticities with respect to Italy's export AUVs are higher for low income countries than for high income countries, while the opposite is true for the average import AUVs of trade partners. Elasticities to export's and import's AUVs are also lower for MiI agri-food products.

The elasticities presented so far are average values. However, we are interested in differences across products, depending on their capacity to match consumers' needs and

Table 5. Prody Index for the Made in Italy agri-food products.

	1996-97		2010-11		variation	
products	($)	ranking	($)	ranking	($)	%
herborinated cheese LQ*	27,759	1	47,196	1	19,437	70.0
grated cheese	19,988	16	40,636	2	20,649	103.3
processed coffee	19,481	17	34,534	3	15,053	77.3
fresh cheese	26,754	2	34,209	4	7,455	27.9
fresh pasta	20,548	14	33,422	5	12,874	62.7
other cheese	26,742	3	30,669	6	3,927	14.7
sparkling wine LQ**	10,732	29	27,592	7	16,860	157.1
chocolate products	24,133	5	27,254	8	3,121	12.9
confectionery products	21,070	10	27,497	9	6,427	30.5
bakery products	24,897	4	27,216	10	2,320	9.3
Meat cuts	20,086	15	26,350	11	6,263	31.2
sauces and other condiments	21,808	9	25,873	12	4,065	18.6
ice creams	23,136	7	24,994	13	1,858	8.0
virgin olive oil	19,314	18	24,045	14	4,731	24.5
apples, kiwi and pears	23,520	6	22,906	15	-614	-2.6
fruit juice	14,859	22	21,479	16	6,620	44.6
vermouth LQ**	18,636	19	20,118	17	1,483	8.0
fresh tomatoes	22,971	8	19,409	18	-3,563	-15.5
fresh vegetables	17,284	20	18,358	19	1,074	6.2
mixed olive oil LQ*	10,203	30	17,782	20	7,579	74.3
canned tomatoes LQ**	15,013	21	16,818	21	1,805	12.0
non virgin olive oil LQ*	20,921	12	16,802	22	-4,119	-19.7
prepared vegetables LQ**	13,666	24	16,583	23	2,917	21.3
wine <2lt LQ*	20,606	13	15,827	24	-4,780	-23.2
mineral water LQ**	13,202	26	15,810	25	2,608	19.8
dry pasta LQ*	13,938	23	14,201	26	263	1.9
wine>2 lt LQ**	10,915	28	13,346	27	2,431	22.3
prepared fruit LQ**	12,406	27	11,555	28	-851	-6.9
grapes LQ**	13,395	25	10,237	29	-3,159	-23.6
processed rice	21,028	11	6,065	30	-14,963	-71.2

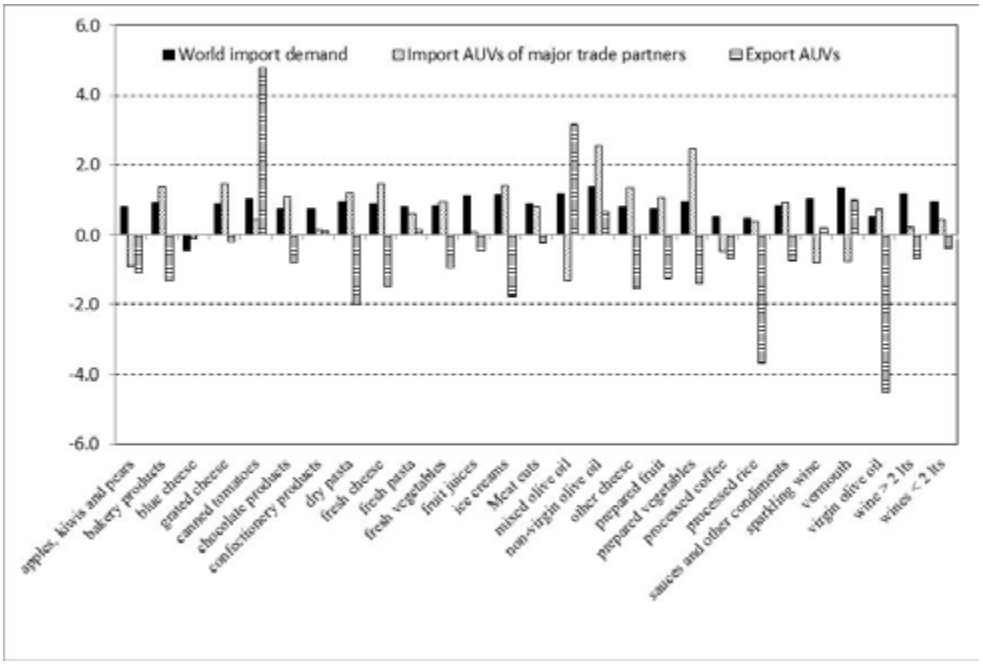
Source: our elaborations on UN-Comtrade and World Bank data.
*Low quality products at 2010-11.
** Low quality products both at 1996-97 and at 2010-11.

the degree of market power gained in different sectors and countries. To gauge a sense of these differences, we have estimated the econometric model of Section 3 separately for each MiI agri-food product.

Figure 2 presents the long-run elasticities of Italian exports of each MiI agri-food product with respect to: i) the total import of that same product by our 48 major trade partners; ii) the export AUVs; iii) AUVs of imports of the same product by our main trade partners[6].

[6] In the case of few products, econometric estimates did not provide statistically and economically significant results; for this reason we have decided to drop them from this and the following figures; results of regressions for each product are available from the authors upon request.

Figure 2. Long-run Elasticity of Italian Exports.



With respect to the ability of MiI exports to satisfy an increase in foreign demand, data show that the majority of the products are capable to take advantage from an increase in clients demand. With the exception of *blue cheese* (that shows a negative value, probably due to some export dynamics that are not adequatly captured by the econometric specification), all other products show elasticities ranging from slightly below 0.5 for *sauces and other condiments* to values above unity for *ice creams, mixed olive oil and non-virgin olive oil, fruit juices, vermouth, sparkling wine* and *wine in large bottles*. In these sectors, exporters are therefore able to successfully exploit the long-run dynamics of foreign demand. The smallest values are, instead, those of *processed rice, virgin olive oil* and *of processed coffee*.

In the long-run, many items show negative elasticities to exports AUVs, consistent with the hypothesis that market power of exporting firms becomes weaker over time, because buyers can change their consumption habits and other exporting countries may adopt more aggressive pricing strategies. Products that suffer most from a long-run increase in their export price are *virgin olive oil*, *processed rice* and *dry pasta*, followed by all cheeses, but grated ones. Nevertheless, four products show a statistically and economically significant positive elasticity: *mixed olive oil*, *non-virgin olive oil*, *canned tomatoes* and *vermouth*. In the whole, this measure shows much more mixed patterns across products compared with the previous one.

Finally, also the long-run elasticities of Italian MiI agri-food exports, with respect to competitor's AUVs, show quite different values depending on the product considered.

For many products, the estimated elasticity is positive and larger than unity, indicating a strong ability of Italian exporters to take advantage from any increase in the price of competitors and, conversely, the risk of loosing market shares if they reduce their prices. In the long-run, the elasticites are particularly high for *non-virgin olive oil, prepared vegetables, cheeses, excluding blue cheese, and ice creams*. Although less common, negative values are recorded for: *processed coffee, fresh fruit and vegetables (*excluding *grapes), mixed olive oil, vermouth and sparkling wines.*

Last, it is worth to pinpoint that further unreported results show that, although the relationship between the long-run elasticities of Italy's export AUVs and import AUVs from our competitors is, as expected, negative and statistically significant (since a rise in export AUVs has the same effect of increasing relative prices as a reduction of our competitiors' AUVs), it is not particularly strong. Similarly weak is the relationship between the short- and long-run elasticities to export and import AVUs.

Finally, the long-run elasticity of exports with respect to import and export AVUs shows no correlation with the incidence of each product on total exports at constant prices. In other words, contrary to what one might expect, the elasticities with respect to AVUs are not higher in absolute value for the products that represent a significant share of our MiI agri-food exports.

In a nutshell, our results show that although Italian exporters of MiI agri-food products enjoy some degree of market power, price competition remains a relevant issue, suggesting the existence of a significant trade-off between strategies based on quality, brand reputation and so forth, on the one side, and strategies basically focused on prices, on the other side.

4.2. The Sophistication Level of the Made in Italy Exports

As underlined in the methodological section, the Prody index is a measure of the sophistication level of an exported good. Table 3 shows, for agri-food MiI exports, the values of the index as well as the rankings built upon these values and the absolute and percentage variations of the index in the period under study.

Focusing on the Prody values at 2010-11, it is easy to see that the range covered is quite wide, spanning from a maximum of about 47,000 USD for blue cheese, to a minimum of about 6,000 USD for processed rice. Although MiI products embrace almost the entire range of Prody values, it is important to underline that MiI exports are predominantly located in the upper half of the distribution (>15,000 USD). In other words, this means that MiI mostly includes agri-food items that are quite sophisticated relative to other agri-food exports. The market segments in which these products are competing are diverse but, overall, high quality and highly differentiated; conversely, there are also some products for which price competition is relatively more important.

It is interesting to highlight that at the top of the ranking there are highly processed products such as cheese, bakery, sparkling wines, chocolate products, confectionery, processed coffee, and others: all products for which branding, packaging and market segmentation are all cues of competition. On the contrary, at the bottom of the ranking there are less processed, simpler products such as preparation of fruit and vegetables, fresh fruit, canned tomatoes, olive oils, wine, processed rice, for which sophistication seems to be a less important key to compete in the world markets.

Fully consistent with the observed sophistication ranking, at the bottom of this distribution there are many products for which the Italian exports are classified as Low quality according to their AUV (see Section 3). These are, overall, 8 products with AUVs below the world median for the entire period (prepared vegetables, canned tomatoes, grapes and prepared fruits, and also mineral water wine> 2 lt., sparkling wine and vermouth); plus 5 products whose AUVs were above the world median at the beginning of the period and fell under this value at the end of the period (dry pasta, wine< 2 lt., non-virgin olive oil and mixed olive oil, and blue cheese). The tendency of Italian exports to reach world markets at low prices for those products that compete on low sophisticated market segments indicates that Italy is somehow catching up the kind of competition that characterize more the market for these products.

Looking at the variations of the Prody index, the first evidence is that there is a majority of positive signs (23 products) while for 7 products the level of sophistication reduced over the period. Among the latter there are: processed rice, grapes and tomatoes, processed fruits, non-virgin olive oil and wine in bottles with less than 2 litres. Due to this reduction, these products fall in the lower part of the distribution where the role of lower income countries is increasing and, thus, price competition is more intense and remuneration of inputs tends to be lower. On the other side, the products that met the major increase of the Prody index climbed many positions on the sophistication ranking and are ready to engage competition on quality attributes that better reward inputs.

4.3. Export elasticities and changes in Prody index

The very different values of the elasticity of Italian MiI agri-food exports to world demand are due to different factors, such as the degree of substitutability among similar goods in the food consumption basket, the quality of our products, constraints on the supply side and the market strategies of producers, the market power of exporting companies. These features may also drive changes over time in the Prody indeces. Indeed, both elasticities and sophistication deal somehow with the nature and intensity of competition: the first refers to the country's exports, while the second refers to overall world exports. It is then interesting to merge the two measures in order to obtain a unified view of the impact of world markets trends for MiI goods and of Italy's position in those markets. This is done comparing the values of the long-run elasticities with the rate of change of the Prody index (Figures 3-5).

At first sight, there seems not to be a simple relationship between these two variables: the coefficient in a cross-section regression is not statistically significant on all the three cases considered. However, dividing each figure into four quadrants, depending on whether the Prody index has grown or decreased over the sample period and on whether each elasticity is greater or smaller than unity in the case of the elasticity of imports to world demand – or grater or smaller than zero in the case of elasticity to AUV –, we obtain a more nuanced picture where Italian exports performance is compared to global tendencies.

As we have already mentioned earlier, an increase of the Prody index indicates that competition in world markets increasingly relies on quality and product/process attributes, and less on price. Clearly, a reduction indicates the opposite trend, where price competition becomes more pressing.

Figure 3 shows that most of the products that have registered an increase of their Prody index show a long-run elasticity of exports with respect to world demand that is smaller than one (e.g., *processed coffee, grated cheese,* but also *confectionery and chocolate products, fresh pasta, meat cuts* and *virgin olive oil*). This means that, while world demand for these products is increasingly sophisticated and therfore should allow higher price/cost margins, Italian exports are not fully responsive to these trends and, hence, Italian firms are unable to fully benefit from the opportunities arising in international markets. Of course, an elasticity lower than one implies at the same time that Italian exporters are better shielded from the negative consequences of contractions of world demand.

For other products (i.e., *mixed olive oil, ice creams, sparkling wines* and *wine in large bottles, fruit juice* and *canned tomatoes*) the increase in the degree of sophistication is associated instead with a high elasticity with respect to the demand for imports. In these cases, Italian exporters are able to exploit the opportunities that come from foreign markets, although this clearly implies that they are more severly affected during downturns.

Coming to the elasticity of demand wih respect to changes in the AUVs of exports (Figure 4), this is negative for the majority of MiI agri-food exports, showing that Italian exporter have narrow margins to increase their prices. In other words, despite the high reputation commonly tributed to MiI, many of these products are definitely price sensitive. However, it is worth to pinpoint that there is a group of items whose demand is less price sensitive even in the long run, among these mixed olive oil, canned tomatoes, vermouth, confectionery, fresh pasta and meat cuts.

The fact that most of the products that show a rise in their Prody index also have an elasticity of exports with respect to the AUVs of imports from our competitors that is larger than zero (Figure 5) confirms that, even in the higher market segments, price competition is relevant in the long term and that Italian goods not only suffer from other countries' competition but it is also able to take advantage from competitors' lack of price competitiveness.

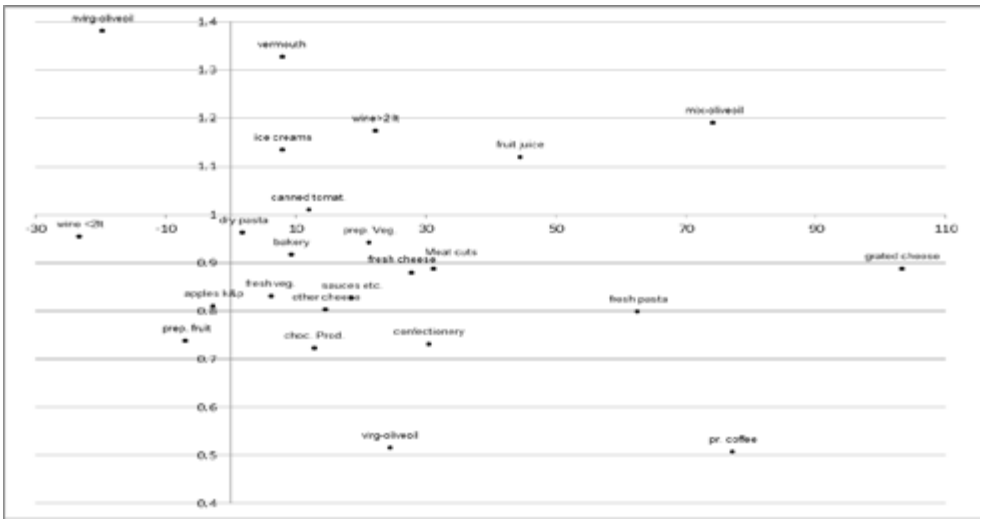
Finally, some products show very perculiar market trends. Canned tomatoes, for example, have registered a strong increase of the Prody index and at the same time show a high long-run elasticity with respect to export AUVs, a trend that is consistent with a progressive switch towards higher quality and, at the same time, a good export performance. On the contrary, in the case of processd rice, the reduction of the Prody index associated with a low elasticity with respect to both the foreign demand and AUVs suggests that the overall performance is likely to depend on a qualitative mismatch between the Italian product attribute specification and the world demand major trends.

4.4 Further insights on two important Italian export sectors: wine and olive oil

In this subsection we focus on two sectors, the olive oil and the wine sectors. These are of major importance for Italian agro-food exports and help in getting a sound idea of the useful insights that can be derived from the joint methodology proposed in the paper.

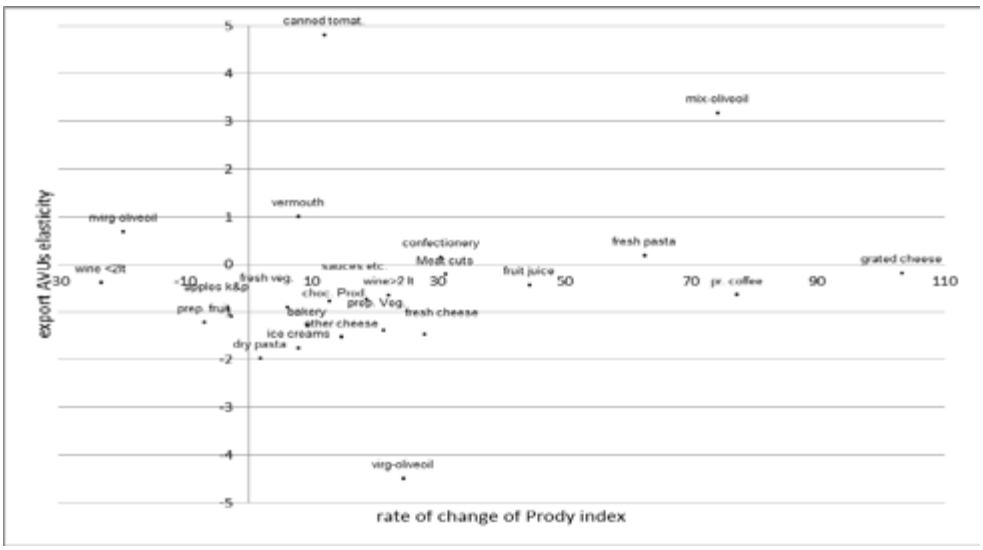
In our dataset the olive oil sector is represented by three lines of exports: *virgin olive oil, non-virgin olive oil* and *mixed olive oil*. Among these, the first features higher intrinsic quality and is more rooted in the place of production. The analysis shows that: competition on international markets for this product is increasingly based on sophis-

Figure 3. Changes in the Prody index and long-run elasticity of Italian exports to world demand.



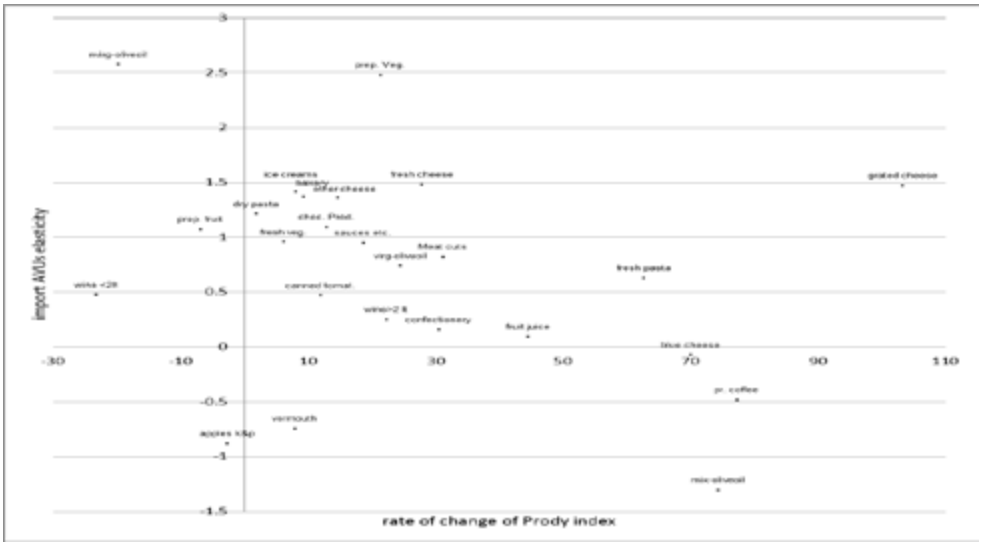
Sparkling wine, processed rice, fresh tomatoes and *blue cheese* have been removed from the gaph as they are outliers

Figure 4. Changes in the Prody index and long-run elasticity of Italian exports to export AUVs.



Sparkling wine, processed rice, fresh tomatoes and *blue cheese* have been removed from the gaph as they are outliers

Figura 5. Changes in the Prody index and long-run elasticity of Italian exports to import AUVs.



Sparkling wine, processed rice and *fresh* have been remouved from the gaph as they are outliers

tication; Italy acts in the higher layer of the market (AUV is high) where it has high and increasing revealed competitive advantages. Besides, long-run elasticities show that the Italian product is not well able to benefit entirely from the positive trends in world demand and, also, that it is affected from the concurrence of other countries both when its own exports price increases and when facing changes in the competitors' prices. Thus, *virgin olive oil* well represents the general trends pinpointed for the whole MiI. On the contrary, *non-virgin* and *mixed olive oils* occupy less sophisticated market segments, with the former facing a decline of the sophistication index in the time span observed, while the latter records an improvement. Also the positioning of Italian export flows in these two sectors is different from what we have seen for *virgin oil*: in this case AUV has shifted below the world median and the RCA are smaller and declining even if the value of the long-run elasticity of exports to world demand is higher than what we have found for the virgin olive oil. We interpret this as a consequence of the more stringent conditions on the supply side for *virgin olive oil* than for the other two product types. Also different is the behaviour of exports with respect to AUVs: for both, direct price elasticity is positive, indicating the capability to face price increase with a smaller reduction of sales. This is especially true for *mixed olive oil* where branding is increasingly important; as it is also witnessed by the mentioned improvement in the sophistication ranking. The same line of interpretation may be applied to the negative values of cross-price elasticity for the *mixed olive oil* for which strong market segmentation seems to reduce substitutability.

Summing up, the analysis made it clear that these items represent three well distinct segments in the world's market both from the consumers' perspective and the supply side and also that Italy plays different roles and shows different performances in each of them.

Another example of the potential of the joint methodology when looking at trade dynamics is provided by the wine sector. Also in this case the data set distinguishes three different export flows: *wine in small bottles (< 2lt), wine large in bottles (>2 lt)* and *sparkling wines*, the first being by far the most important for Italian agri-food trade balance (16.4% of MiI exports) with Italy showing high RCAs for the three of them. The three sectors are connected in different respects at the production level via reputational links, scope economies and, in many cases, by joint production. World markets for these products seem to be influenced by different determinants in the observed time span, with competition driven by higher and increasing sophistication in the *sparkling wine* market; a prevalence of price competition *for wine in large bottles* and a shift from more to less sophisticated markets for *wine in small bottles*. In such a complex global arena Italy is a major player both for the quantity sold and the quality of its products. Actually, the low level of the AUVs of its exports in these cases is to be regarded as the mere consequence of its very high shares of world supply. More significant here are the elasticity values that confirm the different behaviours of the three products. Indeed, as expected to some extent, *wine in large bottles*, that is a rather bulk production, shows the highest value of demand elasticities as a consequence of looser constraints on the production side that allow for easier adjustments to expansion of clients' demand. The values of price elasticities, both direct (positive) and cross (negative), for *sparkling wine* seems to indicate the behaviour of a luxury good signalling a higher status and for which consumers are willing to pay more. This is just the opposite of what holds for the other two wine categories.

5. Conclusions

The paper assesses the export performance of the so-called Made in Italy agro-food products. Our results show that world markets for MiI products are characterized by high quality and sophisticated attributes and that these increased over the observed time span. These markets seem to remunerate better MiI exports, which seem to be also growing at a constant pace, allowing Italy to be a leading global competitor in world supply, as it is also confirmed by its high revealed comparative advantages. The general picture stemming out from the elasticity analysis seems also good, with MiI exports that are able to at least partially follow world demand and enjoying quite stable share even in presence of rising prices and increased competition by competitors.

Nonetheless, it has been also highlighted that these exports show only a slightly better performance on more rewarding markets of high income countries with respect to non-MiI exports. Furthermore, some specific weaknesses are depicted by the product specific analysis. Actually, for some products, quality is still too low to be able to provide strong competitive advantages; while for others, in spite of the high quality of our exports, Italy is unable to defend its world market shares.

Among the 30 sectors that form the MiI, 8 have an AUV below the world median and another 5 switched from the upper half of the AUV distribution to the lower half. Furthermore, the small values of the long-run elasticities of exports to world demand indicates that Italian agri-food exports are so far on a declining trend as these are not able to fully catch up with the expanding demand, even though the MiI products do better. In addition to that, both direct and cross price elasticities show that even in these partially

competitive markets where product quality is key, price competition is still important and affects the competitive dynamic although with varying intensity.

All in all, the methodology suggested, that combines the traditional elasticity analysis with the newer "sophistication" approach, has been able to capture product specific behaviours and relevant discrepancies between the tendencies on world markets and the country trends. This is clearly shown by the cases of canned tomatoes and processed rice. Where the strong increase of the Prody index and the high long-run elasticity with respect to export AUVs, for the first indicate a progressive switch towards higher quality and, a good performance of Italian export. On the contrary, the reduction of the Prody index associated with a low elasticity with respect to both the foreign demand and AUVs, in the case of processd rice, suggests the Italian product is not able to adjust the world demand major trends.

The in-depth line of reasoning on the different market positioning and exports performance for wine and olive oil exports provided an example on the potential of the combined methodology proposed that allows for comparisons that are revealing of trends that cannot emerge neither from more aggregate analysis nor from analysis that focuses only on one product at a time.

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