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AGRI-FOOD EXPORTS AND THE ENLARGED EUROPEAN UNION

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REDAZIONE:
Dipartimento di Economia
Università degli Studi Roma Tre
Via Silvio D'Amico, 77 - 00145 Roma
Tel. 0039-06-57335655 fax 0039-06-57335771
E-mail: dip_eco@uniroma3.it

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Agri-food exports and the enlarged European Union

Alessandro Antimiani, INEA-Italian Institute for Agricultural Economics, Italy
Anna Carbone, University of Tuscia, Italy
Valeria Costantini, University of Rome - Roma Tre, Department of Economics, Italy
Roberto Henke, INEA-Italian Institute for Agricultural Economics, Italy

Abstract
This paper explores agri-food export dynamics in New Member States (NMS) and Old Member States (OMS) of the European Union during the enlargement process. A quality-oriented survey is conducted by developing an original analytical framework which combines information from trade similarity analysis with elements from the sophistication literature. Country and sector specific features seem to emerge, revealing a more complex picture than that produced by aggregated trade analysis. While for some NMS agri-food exports, patterns converge towards OMS with regard to size, competitiveness and quality improvement process, for other NMS, a low-quality trap seems to prevail.

J.E.L. codes: F14; F15; Q17

Keywords: Agri-food sector, export dynamics, EU enlargement, quality upgrading

1. Introduction

The economic integration of Eastern European countries into the European Union (EU) has been a great challenge for both Old Member States (OMS) and New Member States (NMS) from many points of view.

The combination of a fragile institutional setting with a considerable dependence on economic sectors characterised by an unskilled labour force and low capital-labour ratios was the basis of concerns that the overall effect of the EU enlargement process would have led to a substantial improvement in OMS export flows to the enlarged European market rather than to an increase in the economic integration of the NMS (Rollo, 1995). More precisely, a potential failure of the integration process could have been a deeper specialization pattern in low value added sectors for NMS and a simultaneous increase in imports of high value added goods from OMS, as the standard comparative advantage setting of a Hecksher-Ohlin model predicts. Nonetheless, Baldwin *et al*. (1997) have emphasized that, under specific conditions, the enlargement process would have led to much greater economic benefits than costs for both New and Old Member States. In particular, they have pointed out some key elements such as an open, integrated capital market, the mutual recognition of health, safety, and environmental standards for production processes and consumer goods, the adoption of a common competition policy and a common state aid policy, and finally, the removal of border controls.

If these conditions are complied with, the economic integration process may foster international relationships. This may result in a higher level of productivity for NMS and thereby reduce the economic and technological gap and foster a long run convergence process. If such productivity gains are converted into a quality improvement process, export performance may also be positively influenced since the presence and performance in rich countries' markets could be strongly driven by quality (Crozet *et al*., 2009).

Furthermore, richer countries are more likely to have a greater demand for high quality (Hallak, 2006). There may therefore be a double effect for the new EU countries: domestic productivity gains due to a stronger economic integration in the EU market may encourage export competitiveness at general level while on the external market, the demand for high quality products from old EU members may move export specialization patterns towards a quality improvement process.

If we look at past empirical contributions on trade effects related to the enlargement process, Egger *et al*. (2007) find robust results in favour of significant integration and convergence in behaviour in the East-West relationships whereas intra-East trade is far from converging to Western standards. At general level, there are two opposing forces affecting production and export

performances in NMS: the first one relates to a competition effect dominated by relatively lower wage costs in NMS and the second one consists of an overall increasing price level in NMS markets due to a generalized demand effect (Forslid *et al*., 2002). A specific emphasis on quality upgrading can be found in Dulleck *et al*. (2005) where the analysis tries to highlight export dynamics not only by comparing different sectors, but also by examining what happened inside each single sector, with a focus on the market segment covered by NMS in terms of high or low quality products. However, shortcomings in the existing literature leave space for further investigations.

First of all, contributions are either related to the pre-accession period (Jakab *et al*., 2001; Nahuis, 2004) or based on forecasts and simulations (Hertel *et al*., 1997). Hence, not enough attention has been paid to export trends and the specialization pattern after the enlargement process.

Second, to the best of our knowledge, empirical analyses on this topic only consider trade dynamics and quality upgrading separately.

In this sense, our specific contribution to this issue is to develop a methodological approach that combines information on these two distinct aspects: i) the convergence at sector level between NMS and OMS; ii) the quality upgrading process of export flows of the former countries with respect to the latter ones.

To this end, when focusing on the agri-food sector, we propose to combine two already existing methodologies: a standard trade similarity framework and a more recent "sophistication" approach. On the one hand, an analysis of export similarity reveals to what extent the productive system of NMS is closing the gap with export performances of OMS at sector-based level and checks differences in alternative destination markets. On the other hand, the sophistication approach provides a more general overview of these patterns since international market trends are highly relevant to explaining the changes in competitive advantages in individual countries during the enlargement process.

Recent contributions have emphasized the role of quality in systematically affecting the direction of international trade with regard to both the capacity of domestic firms with higher productivity to break into foreign markets and the overall higher demand for high-quality products from richer countries.

To some extent, the sophistication concept may explain the capacity of domestic firms to improve the remuneration of resources by increasing the content of technology, design, quality, branding and economies of scale of their export flows. By taking similarity indices into account, we can also check for the final destination markets which are separated into richer countries (the old 15 European Union Members) and the rest of the world.

Combining similarity and sophistication analysis helps us to discover which specific items have

effective trade similarity convergence and also if these items/sectors have a higher degree of sophistication or not. In particular, we are interested in two complementary issues. The first one regards to what extent the EU enlargement process has fostered a similarity of NMS export flows compared with OMS export structure up to now. The second issue regards to what extent NMS exports are catching up with the quality upgrading process that characterizes agri-food trade in richer countries.

We adopt a sector-specific approach since a deeper investigation into specific economic sectors may reveal divergent trends within the agri-food sector, especially when the quality improvement process is relevant (De Benedictis, Tajoli, 2007a, 2007b). As emphasized by Damijan and Kostevc (2006), there is mixed evidence on this point and each sector presents specific features depending on domestic firms' behaviours and endowments and, more generally, on market structures in the European Union.

The agricultural sector provides a useful case study since it presents some interesting features which may explain specific dynamic trade patterns . First of all, it is still more important in terms of value added and employment share in NMS than OMS. Second, this sector faced relatively stronger and earlier reforms during the accession process in the 1990s. Third, the intra-EU agri-food market has been much more protected from international influences than other sectors. Finally, the combination of strong financial support from the Common Agricultural Policy (CAP) and strict requirements in food safety standards will bring about substantial changes in the agri-food sector.[1]

The paper is structured as follows: Section 2 describes export similarity and sophistication approaches and proposes a methodology for merging information, Section 3 presents and discusses the general results from the two separate approaches, Section 4 reports detailed sector-based evidence resulting from the combining methodology and Section 5 provides some final remarks.

2. Sophistication and similarity of export flows

2.1 Sophistication of export flows

Sophistication is defined as the content of a good in terms of technology, design, quality, branding, economies of scale and any other factors affecting its value. Sophistication can be indirectly measured by the GDP per capita of exporting countries, through the so-called PRODY index (Hausmann *et al*., 2007; Lall *et al*., 2006). *PRODY* is defined as the weighted average of the GDP per capita of each country exporting a product where the weights reflect the revealed comparative advantage of each country in that specific product. It produces a ranking that shows the relative

[1]Agricultural production has been increasing since then and most NMS have been preparing for EU adhesion by implementing agricultural and rural policies which are very similar to those in effect in the EU. This set of policies was later supported by the Sapard programmes and then naturally assimilated into the EU CAP.

position of goods in terms of sophistication at world level.

The PRODY index can be calculated in slightly different ways. In this paper, we follow Hausmann *et al*. (2007):

$$PRODY_i = \sum_{j=1}^{N} s_{ij}\ GDP_j \qquad [1]$$

Products are indexed by i ($\forall i = [1, N]$), countries are indexed by j ($\forall j = [1, M]$) and s_{ij} represents the weighting factor of the per capita GDP of each country j exporting the *i-th* product expressed as:

$$s_{ij} = \frac{RCA_{ij}}{\sum_{j=1}^{M} RCA_{ij}} \qquad [2]$$

where the Revealed Comparative Advantage (RCA) is the Balassa index (Balassa, 1965).

The underlying idea is that countries with a high GDP per capita reached this goal because they were capable of producing goods with highly remunerative attributes that are progressively gaining advantage in the international markets. Since the increase in foreign market shares is mainly due to productivity gains of domestic firms and these improvements also correspond to a quality improvement process as pointed out earlier, we can state that the PRODY index associated with each exported good offers a synthetic indication of its level of sophistication and quality content at world level. In other words, the sophistication level associated with an exported good gives indirect information on the type of competition that each specific good has to deal with in international markets (Lall *et al*., 2007).[2]

The PRODY index can be used to measure a country specific specialization pattern in terms of the degree of sophistication of items. Hausmann *et al*. (2007) propose an index called EXPY which refers to the revenues from a country's export supply, calculated as the weighted average of the PRODY for each country where export specialization values are taken as weights. The value of EXPY for each *j-th* country is given by the following equation:

[2] Clearly, this index does not cover all the possible factors influencing the exporting performance of each good; this performance also depends on the intrinsic nature of the good itself and on other localization factors. This is particularly true for the agri-food sector in which localization factors linked to natural endowments are crucial to explaining comparative advantages and export flow performances.

$$EXPY_j = \sum_{i=1}^{N} \frac{X_{ij}}{X_j} PRODY_i \qquad [3]$$

While in its original form, EXPY is built upon the whole range of traded goods of a country, more recent contributions have emphasized the usefulness of such indices for selected sectors as well (Carbone *et al.*, 2009; Minondo, 2007). Here, we have built a sector-based EXPY which we call $EXPY_{AF}$, that includes only i-th PRODY indices associated with agri-food products.[3]

By comparing export specialization patterns with EXPY rankings in a specific sector, we can obtain preliminary information on the capacity of one country to close the productive gap in that sector by increasing its supply in more remunerative market segments (Hausmann and Rodrick, 2003; Rodrick, 2006).

Finally, the temporal dynamics of these indices may give additional information. The evolution of the PRODY index reflects changes in the sophistication level of each product. Given the formula of the index (eq. [1]), its variation over time can be explained by two distinguished effects.

First, the index for a specific product can change according to changes in GDP per capita of the exporting countries. Second, changes in the PRODY values may reflect delocalization processes due to changes in specialization patterns; in turn these changes reflect a different geographical distribution of export flows. These two effects can be disentangled by computing a PRODY where GDP values for j countries are taken at their initial levels whereas the other components related to world export specialization as expressed in eq. [2] are allowed to vary. By comparing the variation of the PRODY index values with those obtained using a constant GDP, the resulting variation reflects changes in the world specialization pattern (which we refer to as the GEO effect), disentangled from the variation related to the generalized GDP trend (which we refer to as the GDP effect).

Moreover, changes in the EXPY index are calculated according to Lebre de Frejtas and Salvado (2009) whereby EXPY is related to both current and constant PRODY. This allows us to distinguish between changes in the level of country export sophistication due to a change in the respective PRODY values and changes due to a modification in the country export specialization pattern (which we refer to as the Country specialization effect).

Given our interest in the time period in which the enlargement process occurred, we have taken two reference periods where the initial date is 1996-97 and the final date is 2006-07. In this way, we

[3] The agri-food sector is defined here by taking the first 2-digit chapters of the HS 1996 classification (chapters 01-24). The computation of all indices used in this work is based on an *ad hoc* disaggregation into 95 items, making it possible to combine information on the production process (raw materials vs. food industry) and the existence of quality differences related to the production processes. Details on the 95 items are in the Appendix (Table A1).

can compare the export flows and sophistication patterns of the European Union with 15 Members – and all acceding countries still outside (the initial period) – with those of the European Union with 27 Members with all acceding countries inside (the final period).[4]

2.2 Export similarity measures

Since our focus is on the dynamics of export flows in relation to the quality improvement process as well as absolute values, we also investigate to what extent final destinations and potential competitors act in the international markets.

To do this, we use trade indicators that measure the similarity between the export flows of two countries in the same reference market. The use of these indices as an analytical instrument for evaluating exports oriented towards a specific market is based on the idea that the more "similar" the bundle of goods two countries export to a common reference market, the more likely they are to be potential competitors. OMS are typically specialized in high-quality agri-food market segments and therefore, if analysis shows that NMS exports converge on OMS ones, this may be interpreted as a shift towards a quality improvement pattern induced by the trade integration that followed the enlargement process.

In order to obtain more detailed information, the analysis combines three different indicators, namely the export structure similarity index (ES), the product similarity index (PSI) and the quality similarity index (QSI), derived from a well-established international economics literature (Finger and Kreinin, 1979; Grubel and Lloyd, 1975; Kellman and Schroder, 1983; Rolli, Zaghini, 2002).

As far as the PRODY index is concerned, we have used the *ad hoc* classification of agri-food exports into 95 items in order to compare trade similarity performance at sector and country level with PRODY ranking. We compare results for three different reference markets: the European Union with 15 Members (EU15), the EU New Member States market (EU12), and, finally, the extra-EU market with the rest of the world (Table 1).[5] This disaggregation by destination markets also helps to understand the role played by final demand in enhancing the quality content of NMS

[4] All values for both export flows and GDP per capita are calculated as a two-year average value in order to reduce potential biases arising from statistical problems and/or conjectural features rather than structural conditions. Hence, data for 1997 relate to 1996-1997 average values and data for 2007 relate to 2006-2007. The choice of the reference year is partially constrained by trade data availability for HS1996 classification where 1996 is the first year in which data availability is homogenous in all countries.

[5] All similarity indices are computed on the basis of 6-digit disaggregated export flows and then summarized in a unique index or the 95 items. A deep disaggregation at digit level is particularly relevant in the computation of such indices especially when the average unit value (AUV) is used as a proxy for product quality as in the case of Quality Similarity Index (QSI) described below. A lower disaggregation could detect products with large qualitative differences in the same item. Moreover, in this case all export values come from a simple two-year average. Since we only work with 95 items for the agri-food sector, we would hardly expect similarity indices to remain constant over time because the deeper the definition of the commodity groups, the less stable the similarity ratios over time (Kellman and Schroder, 1983).

export flows, as emphasized by Hallak (2006). In this case, we assume that the EU15 market represents the demand for higher quality products by richer countries.

Table 1 – Country lists and market aggregation for similarity analysis

EXPORTERS		MARKETS	
New Member States (NMS)	**Old Member States (OMS)**	**CODE**	**Definition**
Bulgaria	France	EU15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom
Czech Rep.	Germany		
Hungary	Italy	EU12	Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovak Republic, Slovenia
Poland	Netherlands		
Romania	Spain		
	United Kingdom	Extra-EU	All COMTRADE countries excluding EU27

The first indicator refers to Export Similarity (ES) as an aggregate and compares the export structure of two countries with a specific reference market. The index is based on the incidence of each item on the total of agri-food exports for the two countries and is expressed as follows:

$$ES_{A,B} = \sum_{i=1}^{N} [\min(x_{iA}, x_{iB})] * 100 \qquad [4]$$

where x_{iA} and x_{iB} are the shares of item i on total agri-food exports of country A and country B respectively. The index may range between a lower bound equal to zero, indicating no overlap in any single item, and 100, indicating a perfectly overlapping export structure.

At general level, similarity increases with the value of the index. If everything else is equal, the more disaggregated the data, the smaller the value of the index. There is no way to establish a priori a threshold above which the export structure of two countries may be defined as similar. Hence, as a simple rule of thumb, we took the average value of 50% as a reference point for our reasoning which is mainly focused on the changes in time of the similarity values.

The ES index provides a measure of the export structure similarity between two countries in a specific market but it gives no information on the size of export flows.

In order to deal with this limit, the analysis needs to be integrated with another indicator, the Product Similarity Index (PSI) which can be used to refine the similarity analysis between the export flows of two countries in relation to the absolute values of export flows. Expressed as a formula, the PSI is:

$$PSI_{A,B} = \left\{1 - \left[\left(\sum_{i=1}^{N} |X_{iA} - X_{iB}|\right) \Big/ \left(\sum_{i=1}^{N} (X_{iA} + X_{iB})\right)\right]\right\} * 100 \quad [5]$$

where X_{iA} and X_{iB} are the export flows of item *i* for countries A and B, respectively. As for ES, the PSI varies between 0 and 100 and in the first case, the similarity is null whereas in the second case, the export flows are identical.

The PSI also shows some limits which are specifically related to the quality of the product: two countries may have a similar structure and size of export flows but the quality of the exported products may be different (Antimiani et al, 2006). Consequently, the two countries are not actually competing in the same market segment. To highlight the role played by product quality, the PSI may be broken down into three components related to the average unitary values (AUV), which represents the share of the PSI coming from trade on similar products, $QSI^{S}_{A,B}$ (similar), and two other components, $QSI^{L}_{A,B}$ (low), and $QSI^{H}_{A,B}$ (high) where the similarity condition is not reached (Monti, 2005), namely:

$$PSI_{A,B} = \alpha QSI^{S}_{A,B} + \beta QSI^{L}_{A,B} + \gamma QSI^{H}_{A,B} \quad [6]$$

The first component of the $PSI_{A,B}$ is defined as:

$$QSI^{S}_{A,B} = \left\{1 - \left[\sum_{i=1}^{N} |X^{S}_{iA} - X^{S}_{iB}| \Big/ \sum_{i=1}^{N} (X^{S}_{iA} + X^{S}_{iB})\right]\right\} * \alpha * 100 \quad [7]$$

where $\alpha = \left(\sum_{i=1}^{N} (X^{S}_{iA} + X^{S}_{iB}) \Big/ \sum_{i=1}^{N} (X_{iA} + X_{iB})\right)$. In this case X^{S}_{iA} and X^{S}_{iB} respectively represent export flows of country A and country B for the product *i* limited only to cases where the quality similarity condition $[(1-a) < (AUV_{X_{iA}} / AUV_{X_{iB}}) < (1+a)]$ is respected and where the AUV of each *i-th* item exported by the two countries to the reference market is used as a *proxy* of the export price. In turn, following the usual hypothesis that production costs increase as quality rises, price is used as an indicator of product quality (Hallak, 2006).

Similarly, the second component is defined as follows:

$$QSI^{L}_{A,B} = \left\{1 - \left[\sum_{i=1}^{N} \left|X^{L}_{iA} - X^{L}_{iB}\right| \Big/ \sum_{i=1}^{N} \left(X^{L}_{iA} + X^{L}_{iB}\right)\right]\right\} * \beta * 100 \quad [8]$$

where $\beta = \left(\sum_{i=1}^{N} \left(X^{L}_{iA} + X^{L}_{iB}\right) \Big/ \sum_{i=1}^{N} \left(X_{iA} + X_{iB}\right)\right)$ and X^{L}_{iA} and X^{L}_{iB} represent export flows of country A and country B respectively for the product *i* limited only to cases where the quality similarity condition is given by $\left[\left(AUV_{X_{iA}} / AUV_{X_{iB}}\right) \leq (1 - a)\right]$.

Finally, the third component is expressed as follows:

$$QSI^{H}_{A,B} = \left\{1 - \left[\sum_{i=1}^{N} \left|X^{H}_{iA} - X^{H}_{iB}\right| \Big/ \sum_{i=1}^{N} \left(X^{H}_{iA} + X^{H}_{iB}\right)\right]\right\} * \gamma * 100 \quad [9]$$

where $\gamma = \left(\sum_{i=1}^{N} \left(X^{H}_{iA} + X^{H}_{iB}\right) \Big/ \sum_{i=1}^{N} \left(X_{iA} + X_{iB}\right)\right)$ and X^{H}_{iA} and X^{H}_{iB} represent the export flows of country A and country B respectively for the product *i* limited only to cases where the quality similarity condition is given by $\left[\left(AUV_{X_{iA}} / AUV_{X_{iB}}\right) \geq (1 + a)\right]$.

In this paper we have chosen a relatively high coefficient (a = 0.25) since price range is lower for agri-food products than in other sectors. A smaller value for a would be an overwhelming constraint for quality similarity and would reduce similarity indices to zero for almost all export flows.[6] Hence, the overall *PSI* value can be used to evaluate the total export similarity between two countries in a specific market whereas from the first component of the *PSI*, $QSI^{S}_{A,B}$, we can obtain additional information on the extent to which this general similarity refers to a product with similar quality (i.e. the extent to which the two countries are actually in competition in a reference market).

2.3 How to combine quality with quantity changes in an export-oriented analysis

In order to provide a more detailed picture, we developed an original framework to match similarity and sophistication indices. This is done by ranking the 95 items of our agri-food aggregations for each NMS on the basis of similarity index values for each bilateral comparison (e.g.: Bulgaria vs. its competitors France, Germany, Italy, Netherlands, Spain, UK, on the three distinguished markets, i.e., EU12, EU15 and extra-EU) for the two reference periods. We then synthesized information from bilateral ranking analysis by summing up all ranking values corresponding to the OMS

[6] A large body of empirical contributions in the scientific literature assume that coefficient *a* is normally distributed in the range 0.15-0.25.

competitors, resulting in one ranking for each NMS, disaggregated for the three reference markets (SIM_j^{Ω}, for $\Omega = EU12, EU15, extra-EU$), where the top list item for each country corresponds to the lowest value. This procedure corresponds to the application of the so-called Borda rule, a quite common analytical tool when ranking values that need to be aggregated.[7]

In this way, we have a single similarity measure for all competitors in each country which is disaggregated at item level. In order to compare countries by bilaterally synthesizing the item dimension, we have adopted a Spearman's rank correlation coefficient, calculated for bilateral comparison of similarity trends (e.g., Bulgaria vs. Czech Republic, Hungary, Poland, and Romania). The resulting Spearman's $\rho_{jz}^{SIM^{\Omega}}$ is:

$$\rho_{jz}^{SIM^{\Omega}} = 1 - \frac{6 \times \sum_{i=1}^{N} \left(r_i^{SIM_j^{\Omega}} - r_i^{SIM_z^{\Omega}} \right)^2}{N \times \left(N^2 - 1 \right)} \qquad [9]$$

where the correlation in similarity between country *j* and country *z* is given by the sum of *N* bilateral comparison of ranking values from the PSI applied to each *i-th* item.

By applying this aggregation rule, we are able to understand, in a synthetic view, not only the bilateral similarity trend but also the product specialization path for an increasing or decreasing trend of this type. For example, let us assume that two NMS (Czech Republic and Poland, for example) show increasing export similarity on the EU12 market when compared with all OMS in the period analyzed. This result does not help us understand the qualitative content of export flows. Hence, we also compare the synthetic index based on the Borda rule in order to perform a bilateral comparison on the EU12 market. If we find significant differences, for instance, the bilateral similarity between the two NMS has decreased during the time span, it may well be that product specialization of export flows has been differentiated between these two countries even if they have increased their similarity with OMS. In other words, this increase (similarity trend) comes from different sectors (product specialization).

Nonetheless, we are still far from integrating information on similarity trends with a potential quality upgrading process. Hence, in order to give information on similarity and quality only, we need to synthesize ranking values for the 95 items calculated according to similarity and sophistication at country level. In this case, we have computed a Spearman correlation index by working with the aggregated similarity ranking values for each NMS described above, and with the

[7] Here we have adopted the PSI index because the qualitative content of each item is given directly by the sophistication index (PRODY) rather than by the QSI.

rankings based on the PRODY index that is unique for the world countries as a whole. In doing so, we can understand where similar, or different, product specialization is converging or not with product sophistication.

We obtain a Spearman's $\rho_j^{SS^\Omega}$ value aggregating similarity and sophistication for each *j-th* country as follows:

$$\rho_j^{SS^\Omega} = 1 - \frac{6 \times \sum_{i=1}^{N} \left(r_i^{SIM_j^\Omega} - r_i^{PRODYw} \right)^2}{N \times \left(N^2 - 1 \right)} \qquad [10]$$

where the correlation index for country *j* is given by the sum of *N* bilateral comparison of ranking values from SIM_j^Ω index for each market (EU12, EU15, extra-EU) and the global PRODY index at world level applied to each *i-th* item.

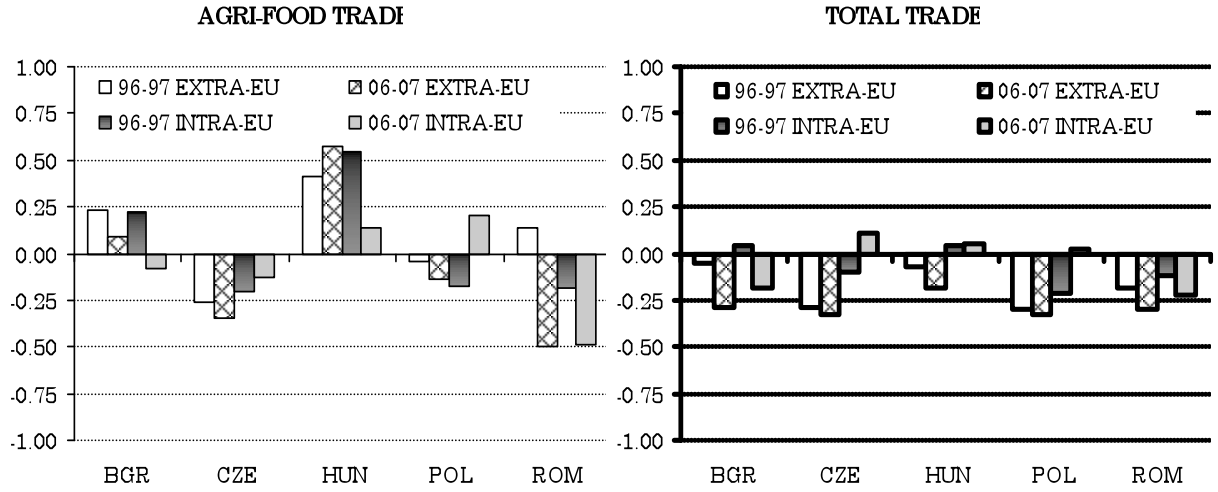
3. Sophistication and similarity of the agri-food exports in the enlarged European Union

Before going into details on the sophistication and similarity analyses, some broad figures may help to sketch a picture of agri-food sector trade dynamics in these countries at aggregate level. NMS as a whole are net importers of agri-food products, especially from extra-EU markets (Figure 1). Hungary, however, is a net exporter of agri-food products in both market areas whereas Poland is a net exporter towards EU and a net importer towards extra-EU markets (Figure 1). As shown in Figure ?, dynamics in the NMS agri-food trade flows are quite heterogeneous.

Between 1996-97 and 2006-07, both total and agri-food exports from NMS towards OMS have grown considerably even if percentage changes vary significantly among NMS. Polish agri-food exports to the EU25 market grew by 500% and by "only" 130% for Hungary. Furthermore, total export has grown more than agri-food, or is at least equal, and the share of agri-food sector in the trade from NMS towards OMS has decreased; the agri-food share has only increased significantly for Latvia, Lithuania and Poland.

At the same time, it is worth noting, that, during the period examined, trade between NMS increased more than trade with OMS but was significantly higher than the increase in trade flows from EU25 to NMS. For the NMS, their share of the EU25 market, as destination market, increased from 1996-97 to 2006-97: for total trade, it goes from 71% in 1996-97 to 76% in 2006-07, whereas for agri-food, it goes from 51% to 73%.

Figure 1 - Normalized trade balance for selected NMS in the agri-food sector and total trade



Source: own elaboration on UNCTAD-COMTRADE data

3.1 Agri-food export sophistication before and after enlargement

First of all, the sophistication level of the basket of agri-food traded goods by each country - as expressed by eq. [3] - here referred to as EXPYAF, is discussed. In the initial period, values for the $EXPY_{AF}$ referring to the five NMS and six OMS examined varied from a minimum of 13,628 to a maximum of 16,058 US$ (Table 2).

EU Member States are positioned quite close to each other on the upper level of agri-food sophistication distribution among the 76 countries for which the index was calculated. This level goes from a lower bound value of 6,282 to a maximum of 17,574. Germany presents the highest level of agri-food export sophistication at the beginning of the period with an $EXPY_{AF}$ ranked in the 10th position at global level. The Netherlands, France and UK follow, in 13th 18th and 19th positions, respectively whereas the other two OMS, Italy and Spain (27th and 31st, respectively), are preceded by Hungary, Czech Republic, Romania and Poland (21st, 24th and 29th, respectively). Bulgaria is at the bottom of the agri-food sophistication ranking.

The picture changes after ten years (Table 2). All the analysed countries increased the sophistication level of their agri-food exports. Nonetheless, their relative positions are quite different now. OMS are all better off and Italy, France and Poland, in particular, experienced major relative increases. The only exception is the Netherlands which significantly fell in the ranking. Patterns of change for NMS are mixed. Hungary and Romania lost many positions and are now ranked 35th and 44th respectively. Bulgaria is still at the bottom of the distribution, and lost three positions (now ranked 45th). On the contrary, Poland and the Czech Republic have improved their relative position in the sophistication level of agri-food exports.

Table 2 – Trends in EXPY for the agri-food sector (1996-2007)

	$EXPY_{AF}$ 96-97		$EXPY_{AF}$ 06-07		
	US $	Ranking	US $	Ranking	Ranking variation
Italy	14,903	27	20,386	11	16
France	15,689	18	20,646	9	9
Poland	15,005	25	20,067	16	9
Spain	14,675	31	19,443	24	7
Czech Rep.	15,082	24	19,812	20	4
UK	15,612	19	20,097	15	4
Germany	16,058	10	20,705	8	2
Bulgaria	13,628	42	17,427	45	-3
Hungary	15,272	21	18,613	35	-14
Romania	14,794	29	17,465	44	-15
Netherlands	15,883	13	18,968	30	-17

Source: elaborations on UNCTAD-COMTRADE data

The overall variation of the $EXPY_{AF}$ index was then separated into three different components, where the most relevant one seems to be the GDP effect (Table 3). From this specific investigation, it is worth noticing that this component is prevalent and is significantly uniform in amount across the observed countries, ranging from +24.4% to +28.6%.

Table 3 – Trends in EXPY for the agri-food sector and its components (1996-2007)

	$EXPY_{AF}$ total variation	GDP effect	World GEO effect	Country specialization effect
Bulgaria	24.6	26.9	-6.0	3.7
Czech Rep.	27.3	27.2	-3.6	3.7
France	27.5	26.8	-0.7	1.4
Germany	25.4	26.4	-3.4	2.4
Hungary	19.8	27.4	-5.9	-1.8
Italy	31.3	24.4	4.0	3.0
Poland	29.1	26.8	-3.6	5.9
Romania	16.6	27.7	-6.4	-4.7
Spain	28.1	24.9	0.2	3.1
UK	25.3	28.6	-2.3	-1.1
Netherlands	17.8	25.2	-5.2	-2.2

Source: own elaboration on UNCTAD-COMTRADE and WDI (World Bank) data

With regard to the GEO effect, it has a generally negative effect among the NMS. This is particularly true for Bulgaria, Hungary and Romania where this component had a strong negative variation.

The trend of the so-called country export specialization effect is particularly interesting. Hungary and Romania increased their export specialization in low sophisticated agri-food goods, as shown by the negative sign associated with this variation component. On the contrary, Poland

experienced the largest improvement in terms of specializing in sophisticated agri-food exports, followed by Bulgaria and Czech Republic.

It is clear from this preliminary picture that Romania and Hungary have lost a number of positions in the sophistication ranking because their agri-food exports are oriented towards goods whose sophistication is decreasing due to the re-localization of production and exports in favor of countries with a lower GDP per capita. Poland and Czech Republic faced smaller negative GEO effects. In addition, they also succeeded in improving their export specialization towards more sophisticated goods.

It is also worthwhile to look at the major changes in the export product composition of each single country more closely in order to understand which specific goods were mainly responsible for the observed trends. Focusing only on NMS, changes in the export quotas confirm the dynamics observed, with an evident shift from more sophisticated products - as is the case for wine in Bulgaria and livestock products in Hungary and Romania - to less processed and often residual products which are often used as byproducts for other production processes such as minor cereals, oilseeds and oilseed panels.

The only relevant exceptions are Czech Republic and Poland that keep their share of sophisticated products in the period considered such as beer, milk, feedstuff and processed fruits and vegetables, animal products and live animals. These first findings will be better understood with the help of the similarity approach that allows a more detailed comparison of export patterns between OMS and NMS.

3.2 The agri-food exports similarity before and after the enlargement

The first similarity index we consider (ES) measures the similarity between two exporters towards a specific market in terms of export structure.[8]

In our country sample, values of ES are generally well below 50% in both the initial and the final period (Table 4). Similarity of the export structure between the selected countries is higher in the EU12 market and much lower in the EU15 and extra-EU markets. However, it is worth observing that the average ES values referred to the EU15 market have increased from 18.4 to 27.1, revealing that NMS are experiencing a process of adjustment in terms of export structure. Of all the OMS, Germany seems to be the one whose similarity with the NMS increases the most. This is probably due to a "geographical" effect that seems to be predominant in the enlargement process, reinforced by the fact that, of the NMS, Poland – the closest country to Germany - is showing the highest increases in ES values, in all the three markets considered here.

[8] For the sake of simplicity, this section contains results for similarity indexes at aggregated total agri-food sector level only whereas values for the 95 items are available from the authors.

Table 4 - Similarity matrix for ES index

		Germany		Italy		Netherlands		France		Spain		UK	
		1996-97	2006-97	1996-97	2006-97	1996-97	2006-97	1996-97	2006-97	1996-97	2006-97	1996-97	2006-97
Bulgaria													
	EU12	20.5	28.7	20.8	28.6	18.8	19.7	16.5	37.5	18.2	16.6	13.3	21.8
	EU15	13.1	23.6	21.3	20.3	10.4	18.4	20.4	30.3	15.0	19.7	12.5	22.2
	extraEU	28.1	32.4	27.8	29.3	18.6	16.5	30.3	32.6	29.7	27.3	28.0	17.2
Czech Rep.													
	EU12	**43.4**	**55.1**	28.9	37.5	31.4	36.6	32.6	38.7	14.6	23.5	43.9	41.4
	EU15	29.7	43.1	14.3	20.5	19.4	26.7	22.7	40.7	12.6	18.1	21.7	37.5
	extraEU	35.7	41.4	20.9	19.6	29.7	40.1	20.0	28.8	15.2	19.8	26.8	25.2
Hungary													
	EU12	31.6	39.1	26.9	29.5	23.1	26.4	35.9	39.4	18.3	23.0	29.3	30.1
	EU15	24.1	27.3	19.6	18.0	22.8	20.1	27.9	35.2	21.3	20.6	20.3	23.3
	extraEU	30.9	32.4	26.5	19.5	26.7	23.5	31.2	33.7	24.7	23.4	19.8	18.0
Poland													
	EU12	40.1	**52.5**	34.2	37.0	27.6	34.4	34.9	34.5	17.6	21.6	38.5	37.7
	EU15	24.0	**49.4**	13.8	28.6	17.9	36.9	19.8	39.5	13.7	26.5	16.4	39.5
	extraEU	36.1	**49.3**	26.7	25.2	27.0	37.5	25.7	35.6	27.3	29.9	23.4	29.2
Romania													
	EU12	12.5	27.1	12.4	19.4	8.8	19.0	18.5	24.5	11.0	8.9	8.7	18.7
	EU15	13.9	24.9	19.7	13.6	9.5	21.9	27.4	29.3	15.8	14.6	10.1	22.3
	extraEU	15.2	25.5	8.5	11.8	6.8	11.1	19.4	22.4	10.6	13.9	8.2	14.2

Source: own elaboration on UNCTAD-COMTRADE data

If we look at the PSI we also get a measure of the intensity of this potential competition. All PSI values are lower than ES, thus showing that the potential for actual competition is limited in absolute terms. PSI trends in the three markets analyzed (Table 5) show a generalized increase in the similarity pattern between NMS and OMS even if it mainly regards the EU12 market and, to a lesser extent, the EU15 market, whereas for the extra-EU market convergence seems to be far lower.

The PSI values also reveal that during the enlargement process there was a significant convergence between NMS and OMS in the structure of agri-food exports directed towards the European Union market. Conversely, trends in exports in the extra-EU market seem to be quite heterogeneous with the similarity of exports that decreases in many cases. To some extent, this specific result may be interpreted as a trade diversion from extra-EU to intra-EU.

If we follow the PSI formula, we can disentangle this index into three components, one of which is the QSI^s as expressed by equation [7]. QSI^s represents the share of PSI explained by qualitative similar products. Results of QSI^s are particularly interesting if we look at the EU15 and extra-EU markets since the quality "gap" may play a specific role especially in those markets. For this purpose, it is worth noting that the share of QSI^s as a component of PSI explains, on average for the three markets , almost one third of the total similarity in 2006/07 whereas in 1996/97, the share was around 25%. Focusing on EU15 and extra-EU markets (Table 6), the share of QSI^S is often around 50% and, overall, it increases during the period considered. Even if the value of PSI is still low, and the relevance of QSI^S is still far from being significant, the dynamic showed confirms the idea that not only the absolute values of agri-food trade have increased during the enlargement process, but also the quality of the traded products. Values for these indices are still lower than

those observed among OMS, but there is quite significant evidence of an increase in similarity and quality convergence.

Table 5 - Similarity matrix for PSI

		Germany		Italy		Netherlands		France		Spain		UK	
		1996-97	2006-97	1996-97	2006-97	1996-97	2006-97	1996-97	2006-97	1996-97	2006-97	1996-97	2006-97
Bulgaria													
	EU12	3.2	7.7	7.8	15.1	3.6	8.0	9.8	24.7	8.5	13.0	4.0	18.7
	EU15	1.9	2.3	2.8	3.9	0.9	1.9	1.3	2.6	2.4	3.2	2.6	4.8
	extraEU	8.4	7.2	11.3	6.3	0.4	3.8	0.2	5.2	15.3	8.5	6.7	6.0
Czech Rep.													
	EU12	19.2	39.7	22.7	36.9	21.8	32.3	32.4	36.5	15.1	23.4	37.8	25.6
	EU15	2.1	8.5	1.5	7.7	1.4	6.3	1.3	7.8	2.0	7.7	3.5	17.9
	extraEU	4.7	8.1	3.6	4.4	3.6	5.2	2.5	4.5	5.3	6.8	4.1	8.1
Hungary													
	EU12	22.2	28.5	25.5	27.5	20.3	23.1	38.8	37.8	17.7	22.7	27.2	24.0
	EU15	8.0	9.7	9.5	10.5	6.2	6.4	6.8	11.7	9.7	9.5	11.1	14.5
	extraEU	16.6	15.1	15.4	7.6	13.8	8.5	12.2	11.3	17.9	13.3	12.5	8.5
Poland													
	EU12	17.7	43.0	27.6	34.9	17.7	31.2	29.3	28.7	18.8	19.9	33.0	21.2
	EU15	8.2	24.6	7.3	22.8	5.4	19.3	5.0	21.2	7.2	21.3	8.6	33.0
	extraEU	26.5	31.6	21.4	18.4	21.0	23.5	15.8	20.2	28.1	24.4	21.4	23.8
Romania													
	EU12	1.8	6.1	3.2	10.4	3.0	7.8	6.2	13.7	4.5	6.1	2.3	13.2
	EU15	0.9	2.3	1.1	3.1	0.5	2.0	0.6	2.7	1.1	2.9	1.2	4.0
	extraEU	2.8	4.0	2.2	2.1	2.4	1.7	2.6	3.2	3.8	3.3	2.0	2.3

Source: own elaboration on UNCTAD-COMTRADE data

Table 6 - Similarity matrix for QSI^{S} (as % on PSI)

		Germany		Italy		Netherlands		France		Spain		UK	
		1996-97	2006-97	1996-97	2006-97	1996-97	2006-97	1996-97	2006-97	1996-97	2006-97	1996-97	2006-97
Bulgaria													
	EU12	32.1	0.0	0.0	1.3	37.4	0.0	0.0	1.7	0.0	2.9	9.2	0.1
	EU15	13.5	27.6	11.8	27.7	12.5	38.8	19.0	48.6	19.2	36.0	14.4	34.9
	extraEU	12.0	33.8	9.5	9.8	6.3	17.8	4.4	15.6	7.7	27.4	5.2	22.5
Czech Rep.													
	EU12	47.8	58.2	0.0	0.1	40.4	46.5	0.0	0.2	0.3	2.1	31.8	27.3
	EU15	51.1	0.0	20.8	0.0	40.7	0.0	31.9	0.0	16.1	0.0	25.3	0.0
	extraEU	62.6	65.8	28.9	34.5	62.3	29.1	26.3	49.2	50.6	37.5	28.4	42.4
Hungary													
	EU12	40.7	64.8	-	0.0	52.0	30.4	0.0	0.1	0.2	15.1	49.1	38.2
	EU15	35.9	65.8	27.7	40.8	37.3	46.4	43.0	61.8	29.8	42.0	41.9	53.9
	extraEU	35.4	47.5	23.1	29.2	40.2	41.4	51.0	38.6	47.0	41.0	24.9	29.8
Poland													
	EU12	60.8	67.9	0.0	0.7	42.7	56.9	0.0	99.9	n.a.	99.9	35.6	33.1
	EU15	51.1	59.8	18.5	47.2	31.4	56.4	31.1	50.3	34.1	45.4	40.0	59.8
	extraEU	41.3	51.1	27.4	25.9	54.6	52.3	52.6	55.4	27.6	51.0	31.9	48.8
Romania													
	EU12	0.0	61.4	n.a.	0.1	0.0	25.1	0.0	5.0	0.0	1.0	0.0	39.4
	EU15	16.0	33.7	22.5	22.8	19.3	34.3	23.1	59.3	15.7	27.9	15.0	39.1
	extraEU	11.5	47.0	10.7	19.1	48.7	33.1	45.5	51.4	56.5	22.7	23.7	30.5

Source: own elaboration on UNCTAD-COMTRADE data

Moreover, quality similarity is particularly evident when Germany is taken as the reference country since flows of similar quality products account for a large share (between 60 and 70%) of total flows. Assuming that Germany may well represent one of the richest countries investigated here, with a relative comparative advantage in exporting high-quality products as the sophistication analysis has revealed, we support the idea that the NMS which are increasing their competition with Germany in qualitatively similar products are also fostering the upgrading process in the production value chain, thus allowing NMS to catch up with the leaders on the international market.

4. How much does quality matter in the export dynamics of NMS?

Since the sophistication and similarity analyses provide different pieces of the trade dynamics puzzle, we have adopted the methodology described in par. 2.3 in order to capture the informative contents of both approaches simultaneously.

First, if we look at the correlation between similarity rankings among all OMS (Table 7), it is worth noting that, generally speaking, correlation values are higher for the EU15 market, revealing that we can find the highest and most homogenous similarity among agri-food exports of NMS in this specific market.

Table 7 – Correlation of similarity rankings for NMS based on PSI index ($\rho_{jz}^{SIM^{\Omega}}$ eq. [9])

	1996-1997				2006-2007			
				EU12				
	Bulgaria	Czech Rep	Hungary	Poland	Bulgaria	Czech Rep	Hungary	Poland
Czech Rep	0.199				0.204			
Hungary	0.382	0.438			0.219	0.449		
Poland	0.406	0.442	0.504		0.202	0.380	0.357	
Romania	0.316	0.080	0.269	0.236	0.576	0.184	0.189	0.183
				EU15				
	Bulgaria	Czech Rep	Hungary	Poland	Bulgaria	Czech Rep	Hungary	Poland
Czech Rep	0.311				0.275			
Hungary	0.553	0.426			0.422	0.326		
Poland	0.560	0.488	0.513		0.346	0.452	0.390	
Romania	0.601	0.398	0.628	0.583	0.700	0.247	0.369	0.276
				EXTRA-EU				
	Bulgaria	Czech Rep	Hungary	Poland	Bulgaria	Czech Rep	Hungary	Poland
Czech Rep	0.155				0.147			
Hungary	0.389	0.404			0.337	0.256		
Poland	0.169	0.370	0.159		0.098	0.215	0.283	
Romania	0.339	0.167	0.393	-0.111	0.417	0.279	0.255	0.167

Source: own elaboration on UNCTAD-COMTRADE data

Second, two specific results seem to be particularly interesting since they allow us to disentangle two opposite effects for different countries. On one side, we see that the correlation of similarity between Poland and all the other NMS decreased for all the three markets, revealing some heterogeneity at country level (the only exception being the Czech Republic). On the other side, we can see that the strongest increase in trade similarity is measured for Bulgaria and Romania. Since these two countries appear to be far from closing the gap of similarity in high quality products with the OMS, a first clear pattern of falling down the quality ladder emerges.

A closer look at similarity indices for the 95 items shows some interesting points. In Bulgaria, the low number of products in the EU12 and EU15 markets where the PSI is higher than 50 and the share of QSI is higher than 50%, explains the decreasing correlation values with other NMS except Romania.[9] Item-specific analysis for Romania also reveals that this country has increased

[9] We do not report detailed values of similarity indices for the 95 items, but they are available upon request from the authors.

competition with the OMS mainly in the EU12 market, and only for a few selected products such as couscous, mineral water, wheat, bakery and raw tobacco. These correspond to products with different sophistication levels where items such as raw tobacco (at the very bottom of the PRODY ranking) also play an important role in quantitative terms.

This point may be reinforced from the evidence given by the correlation between similarity and sophistication as described in Table 8. Bulgaria and Romania have the highest negative values of the Spearman index. It is also worth noticing that the worst performance corresponds to the EU15, with a slight improvement for Bulgaria and a deterioration for Romania, perfectly fitting with item-specific similarity trends.

Table 8 – Correlation between similarity and sophistication for NMS ($\rho_j^{SS^{\Omega}}$ eq. [10])

	EU12		EU15		EXTRA-EU	
	96-97	**06-07**	**96-97**	**06-07**	**96-97**	**06-07**
Bulgaria	-0.255	-0.141	-0.344	-0.316	-0.211	-0.274
Czech Rep	-0.080	-0.098	0.009	0.011	-0.005	-0.011
Hungary	0.035	0.184	-0.036	-0.079	0.015	0.015
Poland	0.142	-0.022	-0.207	0.106	0.041	-0.039
Romania	-0.134	-0.247	-0.244	-0.341	-0.167	-0.221

Source: own elaboration on UNCTAD-COMTRADE and WDI (World Bank) data

Results for these two countries suggest that there has not been a substantial convergence at high quality level of agri-food exports during the enlargement process. Somehow, it is as though their less efficient productive systems, as well as their shorter integration history, weakens their competitive capability especially on the EU15 market where the greater demand for high-quality products creates a chance to increase remuneration of inputs.

A different picture emerges for the Czech Republic and Poland, and to a lesser extent for Hungary. Here we can find positive values for $\rho_j^{SS^{\Omega}}$, while some heterogeneity can be noted in changes that occurred during the time period analyzed. Czech Republic and Poland have positive Spearman index values for the final period in the EU15 market which corresponds to the only market where correlation has improved throughout the decade. On the contrary, for the other two markets, correlation has decreased, revealing that the similarity rankings become more distant from sophistication rankings. In other words, those items where the similarity between NMS and OMS is higher do not correspond to more sophisticated items. Hence, both Czech Republic and Poland increased their competitiveness more than OMS in the EU15 market for high-quality segments of demand. If we look at EU12 and extra-EU markets, there is less competition between NMS and OMS. This can be interpreted as the consequence of a different specialization pattern.

If we take a quick look at item-specific similarity indices, it is worth noting that Czech Republic mainly competes with Germany and the Netherlands, where high similarity indices are seen in quite a large number of agri-food products (processed rice, prepared or canned tomatoes, apples, kiwis and pears for Germany, eggs and sparkling wine for the Netherlands).

With regard to the item-specific similarity for Poland, it can be seen that this country represents the most evident case of convergence during the enlargement process since PSI and QSI shares sharply increased in the time period and the number of items with significant trade similarity increased. This means Poland's competitiveness capacity is far from being concentrated in few sectors, but involves a large number of items in the agri-food sector.

Finally, Hungary is an interesting case where the correlation between sophistication and similarity is higher for EU12 and extra-EU markets (with a substantial improvement for the former during the time period analysed) while a slight decrease in the correlation values can be observed for the EU15 market. If we consider item-specific similarity values (PSI and QSI), even if the similarity is still far from OMS for all markets, the enlargement process has led to increased heterogeneity at item level. The general picture that clearly emerges is that similarity tends to be explained by two sets of products: livestock products, whose PRODY tends to be quite high and increased during the period considered, and the fruit and vegetable sector, whose PRODY was lower and increased at a slower pace, thus revealing that the country specialization deriving from the natural endowments and past economic orientation is still playing an important role in export competition.

5. Concluding remarks

This paper provides some new insights in trade dynamics analysis of the agri-food sector for the enlarged European Union market, implementing an original methodology for matching two already existing methodological tools developed for trade analysis which have only been used separately.

On the methodological side, the paper contributes in two ways to the economic literature on international trade. First, it applies the sophistication index to the agri-food sector while introducing a way to disentangle different effects within its dynamics. In more detail, the overall sophistication variation of a country basket of exports is divided into three components. The first one measures the impact of the variation of per capita GDP. The second one allows the impact of world re-localization of exporting countries to be measured. Finally, the third component is the “true” country specific effect since it measures changes in the export structure of one country compared with the sophistication level of the exported goods. In our opinion, this way of decomposing

variations in the sophistication indexes allows for a better understanding of which factors are really influencing the sophistication dynamics at country as well as at product level.

From a preliminary look at the empirical results, it seems quite evident that Romania and Hungary have lost many positions in the sophistication ranking because their agri-food exports are oriented towards goods whose sophistication is decreasing due to the re-localization of production process and export flows towards countries with lower GDP per capita. On the contrary, Poland and Czech Republic seem to have succeeded in improving their export specialization towards more sophisticated goods.

The second methodological contribution of the paper is the original combination of the similarity indexes with the sophistication ones. This is simply done by computing correlation measures among the similarity rankings, on the one side, and the sophistication rankings, on the other. The advantage of the methodology lies in its capability to synthesize a huge quantity of trade data and, thus, effectively highlight a number of different trends within a trade analysis that refers to many countries (both reporters and partners) and products.

The main features of the picture produced by our analysis cam be summarized in a quite complex general framework. A mixed blend of shadows and lights have emerged for the agri-food trade dynamics at this stage of the integration process that may now be considered quite mature especially when compared with the primary sector.

First of all, our results show an increase in agri-food trade between NMS and OMS, revealing that their reciprocal role as consumers and suppliers is developing. This process is not perfectly symmetrical as shown by trends in the normalized trade balances which are improving for Poland and Czech Republic, but worsening for Romania, Bulgaria and Hungary.

The same two subgroups of countries still hold when looking at sophistication patterns: Poland and Czech Republic are ranked in higher positions and have experienced an improvement in the relative sophistication level of their agri-food exports. On the contrary, Romania and Hungary have lost several points from an already low position in the ranking while Bulgaria has remained almost stationary at its very low starting point.

Moreover, the similarity analysis highlights a variety of situations and trends. First of all, it is worth noticing that agri-food export structures in NMS and OMS are still far from being overlapped, indicating limited potential for competition at the moment which is particularly true for the extra-EU-market. To some extent, this specific result can be interpreted as a trade diversion from extra-EU to intra-EU.

For the EU15 market, the correlation between the similarity rankings of NMS and OMS showed a different performance among NMS: after EU enlargement, the correlation between similarity

rankings on the EU15 market generally decreased, except for Bulgaria and Romania, which correspond to the latest enlargement wave.

Hence, our results suggest that different processes are under way. The richer NMS, Poland and Czech Republic, are involved in a virtuous cycle of trade integration and stronger competitive advantages even on high-quality markets. On the contrary, the less developed countries, Romania and Bulgaria, seem to be in a vicious cycle where the enlargement process has not yet fostered a substantial improvement in the quality of agri-food exports, thereby confining their export capacity to markets where demand is qualitatively inferior. Somehow, the increasing competition of the other NMS seems to create a race to the bottom of the value chain in the agri-food sector for Bulgaria and Romania, especially on the EU15 market, where the potential demand for high-quality products is larger.

Evidence for Hungary, a country with an intermediate per capita GDP level within the group, is mixed and seems to be somewhere in between. Upon entering the EU15 market, Hungary suffered in terms of export quotas of its exports of high-quality products, especially when compared with the performance of Poland and Czech Republic. However, this seemed to be contrasted by an improvement in its position on the EU12 and extra-EU markets, especially for high-quality products, compared with Bulgaria and Romania. To some extent, the market segments of the EU12 previously dominated by Polish and Czech Republic export flows now seem to be covered by Hungarian export flows which are relatively more competitive than other NMS such as Bulgaria and Czech Republic.

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Table A1 – 95 items (classified by 6 digit HS1996 codes) describing the agri-food sector

CODE	DEFINITION	CODE	DEFINITION
1	Live animals (breeding)	51	Wheat
2	Live animals (no breeding)	52	Other cereals
3	Live animals (poultry, turkey, fowls)	53	Processed rice
4	Bovine carcasses (fresh or chilled)	54	Flours, semola etc.
5	Bovine carcasses (frozen)	55	Oil seeds and flours
6	Swine carcasses (fresh or chilled)	56	Seeds
7	Swine carcasses (frozen)	57	Roots, rubbers, etc.
8	Sheep, goats, horses, fresh or frozen	58	Rattan etc.
9	Edible offal	59	Animal fats
10	Whole chickens, fresh or frozen	60	Virgin olive oil
11	Chickens in pieces, fresh or forzen	61	Non-virgin olive oil
12	Meats and offals, fresh or frozen	62	Olive oil (excl. Crude & virgin)
13	Prepared bovine and swine meat	63	Vegetable oils from seeds
14	Prepared meats	64	Meat cuts
15	Live fish	65	Low-fat meat preparations
16	Fresh and refrig. fish	66	Edible meat
17	Frozen fish	67	Meat sauces
18	Preparations of fish	68	Other preparations of fish
19	Milk	69	Sugars and sugar confectionery
20	Yogurt and butter	70	Candies and chewing gums
21	Semi-processed milk	71	Raw and semi-processed cocoa
22	Fresh cheese	72	Processed cocoa
23	Grated/powdered cheese	73	Chocolate and choc. products
24	Soft cheese	74	Uncooked pasta, cont. eggs
25	Blue-veined cheese	75	Pasta
26	Other cheeses	76	Couscous etc.
27	Eggs	77	Confectionery
28	Honey	78	Bakery products
29	Plants, flowers, etc.	79	Tomatoes prepared or preserved
30	Potatoes	80	Preparations of veg. (excl. tomato)
31	Fresh tomatoes	81	Preparations of fruit
32	Fresh vegetables	82	Fruit juices
33	Frozen vegetables	83	Sauces, soups, etc.
34	Semi-processed vegetables	84	Ice creams
35	Preparations of vegetables in pieces	85	Mineral waters
36	Roots	86	Non-alcolic drinks
37	Nuts	87	Beer
38	Tropical fruits	88	Sparkiling wine
39	Citrus	89	Wines in conts. of 2 l/less
40	Grapes	90	Wines in conts. of >2 l
41	Melons and watermelons	91	Cider, alcohol, etc.
42	Apples, kiwis and pears	92	Vermouth
43	Berries	93	Liqueurs and alcoholic drinks
44	Wild berries	94	Feedstuffs
45	Frozen semi-processed fruit	95	Unmanufactured tobacco
46	Dried fruits		
47	Coffee, not roasted		
48	Coffee roasted		
49	Spices		
50	Durum wheat		