European Enlargement, Trade Creation and Dynamics in Agro-Food Trade

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Abstract:

The effects of the European Union (EU) enlargement on agro-food trade creation and dynamics in comparative trade advantages are analyzed using the EU-27 markets as the benchmark of comparison. Between 2004 and 2007, the EU-15 was enlarged to the EU-27: in 2004 for ten and in 2007 for two new EU member states from different European geographic-trade regions. Level and composition of agro-food trade structures, revealed comparative export advantage index, relative import penetration advantage index and relative trade advantage index are used to identify trade creation and comparative trade advantages. The changes and differences in dynamics in trade creation and comparative trade advantages between four different groups of new EU member states and four different Broad Economic Categories classification agro-food product groups are analyzed based on Eurostat Comext trade dataset using regional and product trade structures, regression framework, Markov transition probability matrices and mobility indices with test of the stability and sensitivity of the results on the use of the pre-enlargement period. The empirical analysis revealed trade creation effects and to a lesser degree strengthening of relative trade advantages in agro-food products for new EU member states on the enlarged EU-27 markets.

Keywords: Trade creation, trade advantage, dynamics, mobility index.

JEL Subject Codes: F12; Q17; Q18.

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1. Introduction

The collapse of communism with the fall of the Berlin's wall in 1989 marked institutional and policy changes in the former European communist countries that have introduced measures that induced transition to a market economy. The associated rapid changes in East-West European reintegration processes within the European Union (EU) have followed. During the 1990s most of the former communist Central and Eastern European (CEE) countries entered into the Association Agreements with the EU and became members of the General Agreements on Tariffs and Trade (GATT) / World Trade Organisation (WTO). Several bilateral and multilateral free trade agreements entered into force to strengthen trade creation particularly in European regions. At the same time CEE countries agricultural and trade policies and the Common Agricultural Policy (CAP) of the EU have been reformed with shifts away from market-price support policies, and most recently in direction to create a Single Farm Payment to replace most of direct payments and to reduce the amount of export subsidies (e.g. Gohin and Latruffe 2006).

Vollrath et al. (2006) argued that several factors determine direction, composition and level of agro-food trade in staple commodities and manufactured products underling the importance of relative resource endowments and similarities in structure of partner demand as well as other socio-geo-political factors and government policies. Carter et al. (2006) investigated advantages and disadvantages of country-of-origin labelling scheme as a geographic product differentiation identifiers in trade branding strategy that needs to be complemented by supply and quality controls of the brand name. Woods et al. (2006) investigated voluntary food safety practice adoption and third-party certification at reducing microbial contamination, transportation and product shrinkage as determinant of inter-regional and international trade and segmentation of market structures of perishable agro-food products.

Recently a growing literature provides evidence on various aspects of changes in trade composition and patterns in level of trade between former communist countries and the EU. One

strand of research concentrates on the trade specialisation and trade dynamics (e.g. Havlik 2001, Landesmann and Stehrer 2002, Wörz 2003 and 2005, Yilmaz 2005, Zaghini 2005, Fertő 2007). Another stream of empirical literature focuses on intra-industry trade, exports quality and exports variety, and quality upgrading (e.g. Aturupane et al. 1999, Fidrmuc et al. 1999, Dulleck et al. 2005, Ferragina and Pastore 2005, Fidrmuc 2005, Kandogan 2005 and 2006). As a rule, these studies have focused on non agro-food products and therefore research focusing specifically on agro-food trade is still limited (Bojnec 2001, Fertő and Hubbard 2003). This gap in literature has motivated our research focusing particularly on EU enlargement and its effects on trade creation and dynamics in comparative trade advantages in agro-food produce in the enlarged EU-27 markets.

More specifically, this paper contributes to literature in the following three directions. First, there is no any study so far to deals with trade creation effects and dynamics in comparative agro-food trade advantages for the twelve New Member States (NMS-12) of the EU on the enlarged EU-27 markets. The NMS-12 of the EU are classified into four geographical-regional trade groups of countries: first, the three Baltic Free Trade Area (BFTA) or Baltic countries (Estonia, Latvia, and Lithuania); second, the five initial Central European Free Trade Agreement (CEFTA-5) countries (the Czech Republic, Hungary, Poland, Slovakia, and Slovenia); third, Cyprus and Malta as Mediterranean countries; and fourth, Bulgaria and Romania as Balkan countries, the latter also the part of the enlarged CEFTA-7 countries.

Second, we apply recently developed empirical methods to investigate trade creation effects and the dynamics of comparative advantages in agro-food trade of regional trade groups of NMS-12 on the EU-27 markets. Except of Balkan countries (Bulgaria and Romania) that entered into the EU-27 on January 1st, 2007, the other NMS-10 that are classified into three geographic-regional groups entered into the enlarged EU-25 on May 1st, 2004. As our dataset covers the individual years in the period 1999-2006, we investigate agro-food trade creation and dynamics in comparative agro-food trade advantages before and after the EU-25 accession in 2004. Third,

the paper is of a broader research and policy relevance in the context of the EU enlargement effects and effects of integration of NMS-12 into the borderless Single European Market (SEM) on trade creation and dynamics in comparative trade advantages.

The rest of the paper is organised as follows. Section 2 outlines the employed methodology and data used. Section 3 presents empirical results of our study on trade creation effects and on the dynamics of comparative agro-food trade advantages and on intra-distribution dynamics. Finally, Section 4 summaries and derives conclusions.

2. Methodology and data used

One of the most popular indicators of a country's trade specialisation is the revealed comparative export advantage (RXA) index proposed by Balassa (1965, 1977):

$$RXA = (Xij / Xrj) / (Xis / Xrs) \quad (1)$$

where X represents exports, *i* is a commodity, *j* is a country, *r* is a set of commodities and *s* is a set of countries. RXA index is based on observed trade patterns. It measures a country's exports of a commodity relative to its total exports and to the corresponding export performance of a set of countries. If RXA > 1, then a comparative export advantage is revealed, i.e. a sector in which the country is relatively more specialised in terms of exports.

Vollrath (1991) offered an alternative specification of trade comparative advantage indicator, called by the relative trade advantage (RTA), which accounts for imports as well as exports. The RTA is calculated as the difference between revealed comparative export advantage (RXA), and its counterpart, relative import penetration advantage (RMA):

$$RTA = RXA - RMA \quad (2)$$

where

$$RMA = (Mij / Mit) / (Mnj / Mnt) ,$$

where M represents imports. Thus,

$$RTA = [(Xij / Xit) / (Xnj / Xnt)] - [(Mij / Mit) / (Mnj / Mnt)] \quad (3)$$

If RTA>0, then a relative (comparative) trade advantage is revealed.

We focus on the stability of the RXA and RTA indices over time. At least two types of stability can be distinguished (Hinloopen and Van Marrewijk 2001): (i) stability of the distribution of the indices from one period to the next; and (ii) stability of the value of the indices for particular product groups from one period to the next.

The first type of stability is investigated in two ways. First, following Dalum et al. (1998) we use the RXA and RTA indices, respectively, in regression analysis:

$$RXA_{ij}^{t2} = \alpha_i + \beta_i RXA_{ij}^{t1} + \varepsilon_{ij} \quad (4),$$

where superscripts t1 and t2 describe the start year and end year, respectively. The dependent variable, RXA (or RTA, respectively) at time t2 for sector i in country j, is tested against the independent variable which is the value of RXA (or RTA, respectively) in year t1; α and β are standard linear regression parameters and ε is a residual term. If β=1, then this suggests an unchanged pattern of RXA (or RTA, respectively) between periods t1 and t2, that is there is no change in the overall degree of specialization. If β>1, the existing specialisation of the country is strengthened. If 0<β<1, indicates de-specialisation, meaning that commodity groups with low initial RXA (or RTA, respectively) indices grow over time, while product groups with high initial RXA (or RTA, respectively) indices decline. The special case exists where β<0, which indicates a change in the sign of the index. However, Dalum et al. (1998) point out that β>1 is not a necessary condition for growth in the overall specialisation pattern. Thus, following Cantwell (1989), they argue that:

$$\sigma_i^{2t2} / \sigma_i^{2t1} = \beta_i^2 / R_i^2 \quad (5a),$$

and hence,

$$\sigma_i^{t2} / \sigma_i^{t1} = |\beta_i| / |R_i| \quad (5b),$$

where R is the correlation coefficient from the regression and σ^2 is variance of the dependent variable. It follows that the pattern of a given distribution is unchanged when β=R. If β>R the degree of specialisation has grown, while if β<R the degree of specialisation has fallen. We

apply similar regression specification for RXA and RTA, respectively, indices using the same concerns on β.

The second type of stability investigates the value of the trade index for particular product groups in two ways. First, following a recent empirical method pioneered by Proudman and Redding (2000) and applied by Brasili et al. (2000) and Hinloopen and Van Marrewijk (2001), we employ Markov transition probability matrices to identify the persistence and mobility of RXA and RTA, respectively, indices. Our main concern is whether the comparative (trade) advantage has lost (gain) for a particular product group during the analysed period. Thus, we classify products into two categories: products with comparative (trade) disadvantage (RXA < 1 or RTA<0, respectively) and products with comparative (trade) advantage (RXA > 1 or RTA > 0, respectively).

Second, the degree of mobility in patterns of trade specialisation can be summarised using an index of mobility. This formally evaluates the degree of mobility throughout the entire distribution of RXA or RTA, respectively, indices and facilitates direct cross-country comparisons. The index M_1, following Shorrocks (1978) evaluates the trace (tr) of the Markov transition probability matrix. This M_1 index thus directly captures the relative magnitude of diagonal and off-diagonal terms, and can be shown to equal the inverse of the harmonic mean of the expected duration of remaining in a given cell.

$$M_1 = \frac{K - tr(P)}{K - 1} \qquad (6a),$$

where K is the number of cells, and P is the Markov transition probability matrix.

Furthermore, to test the equality of different Markov transition probabilities matrices we apply Anderson and Goodman's (1957) test statistics, which under null hypothesis $p_{ij} = \overline{p_{ij}}$, for each state *i* has an asymptotic distribution: $\sum_j n_i^* \frac{(p_{ij} - \overline{p_{ij}})^2}{\overline{p_{ij}}} \sim \chi^2(m-1)$, $n_t^* = \sum_{t=0}^{T-1} n_t(t)$,

where m is the member of states, p_{ij} is the estimated, $\overline{p_{ij}}$ is the probabilities under null, and $n_t(t)$ describes the number of sectors in cell i at time t.

RXA, RMA and RTA indices can be measured at the global level (e.g. Vollrath 1991), at a regional or sub-global level (as in Balassa's (1965) original specification) or restricted to the analysis of bilateral trade between just two countries or trading partners (e.g. Dimelis and Gatsios 1995, Gual and Martin 1995). Given that we are interested in trade creation and the dynamics of comparative advantages in agro-food trade of NMS-12 countries with the EU-27, calculation of the RXA, RMA and RTA indices is restricted to an EU-27 context, using total merchandise exports as the denominator (s and r, respectively, in equation (1)). We focus on the period 1999-2006, with data obtained from the Statistical Office of the European Communities (Eurostat) that provided the Comext trade database for agro-food products at the three-digit level classification of the products using the Broad Economic Categories (BEC) classification Revision 3 by the degree of processing and the purpose (final or intermediate) in consumption: 111 – primary products (food and beverages) mainly for industry, 112 – primary products mainly for household consumption, 121 – processed products mainly for industry, and 122 – processed food and products intended for final consumption in households.

3. Empirical results

3.1 Agro-food trade developments

We first present level and composition of agro-food trade structures by trade geographical-regional groups of NMS-12 and by BEC agro-food product groups (Table 1). The nominal Euro values are deflated by annual average harmonized indices of consumer prices (2005 = 100) for Euro-12 area as provided by Eurostat. The level of agro-food trade by NMS-12 has increased substantially particularly after the EU-25 enlargement in 2004. The fastest relative agro-food export growth in recorded by the Balkan countries and CEFTA-5 countries. On the other hand, the fastest relative agro-food import growth is recorded by the Baltic States and CEFTA-5

countries. The CEFTA-5 countries are far the most important in the composition of NMS-12 agro-food trade with the EU-27 with more than 70 percent of export share and more than 81 percent of import share.

In the composition of the NMS-12 agro-food trade with the EU-27 markets by BEC product groups, BEC 122 – processed products mainly for household consumption is the most significant single product category in exports (68 percent) and in imports (59 percent). BEC 112 – primary products mainly for household consumption is ranked on the second place: export share 17 percent and import share 19 percent. BEC 111 – primary products mainly for industry are more important in imports (15 percent) than exports (6 percent), and vice versa BEC-121 processed products mainly for industry (export share 9 percent and import share 7 percent). The fastest relative growth in agro-food exports and imports is found for BEC 111 – primary products mainly for industry and BEC 122 – processed products mainly for household consumption. Yet, on import-side is also relative fast growth of BEC-121 processed products mainly for industry. These results imply that trade creation effects are driven by both intermediary use of primary agro-food and similar produce for further processing and final consumption by households.

3.2 Dynamics of the distribution in relative trade advantages

The levels and compositions of relative trade advantages by country and product groups are analyzed over time to investigate their dynamics. Table 2 shows various RXA, RMA and RTA indices by geographical-regional country groups and BEC product groups at the start, mid and end of the analyzed period. The RXA indices indicate that only the Baltic States in primary and processed products mainly for household consumption and the Mediterranean countries in processed products mainly for household consumption experienced revealed comparative export advantage (RXA > 1) on the EU-27 markets. These pictures have not changed significantly after the EU 2004 enlargement. The NMS-12 performed better in relative import penetration advantage (RMA > 1) than in revealed comparative export advantages (RXA > 1) that are

revealed by the RMA indices mostly less than one. The major exception is found Balkan countries in primary products mainly for industry and initially Mediterranean countries in primary products mainly for household consumption. After the 2004 accession it holds also for Baltic States in primary products mainly for industry and processed products mainly for household consumption. The RTA indices clearly show differences by BEC product groups and by geographical-regional country groups and over time. Except of Mediterranean countries, the NMS-12 in primary products mainly for industry explored relative trade disadvantages (RTA < 0). In primary products only for household consumption, the NMS-12 experienced a shift from relative trade disadvantage (RTA < 0) before accession to relative trade advantage (RTA > 0) after the EU-2004 enlargement, but with differences by geographical-regional country groups: Balkan and Mediterranean countries experienced relative trade disadvantage, and vice versa Baltic states and CEFTA-5 countries. A slight relative trade advantage, but close to a break-even-point, the NMS-12 experienced in processed products mainly for industry. This finding holds by geographical-regional country groups and over time. The NMS-12 experienced relative trade advantage in processed products mainly for household consumption, but with significant differences between geographical-regional country groups and over time. Relative trade advantage is found for Baltic States, but with some deterioration over time, and Mediterranean countries with improvements over time. Balkan countries experienced relative trade disadvantage in this group of products with some slight improvements closer to a break-even point, whereas more significant efficiency improvements with shifts from relative trade disadvantage to relative trade advantage is found for CEFTA-5 countries.

There are two options in empirical literature to estimate equation (4). First, simply estimate regression of the RXA (RTA) index between the end period and the start period. Second, using pooled data to estimate equation (4) with various lags. We are interested in for dynamics within the period, thus we employ the second option. Since there is no accepted guideline to identify an appropriate time lag, we estimate our model with all possible lags resulting to 96 regressions. We

present our results with the one-year lag and the six-year lag. Tables 3 and 4 present the stability of the RXA and RTA indices by geographical-regional country groups and by BEC product groups between the start year and the end year of the analyzed period 1999-2006. The β values $0<\beta<1$ suggest that analyzed groups with low (negative) initial RXA or RTA indices are likely to grow over time, whereas analyzed groups with high (positive) initial RXA or RTA indices decline. In our case the β values are positive.

Table 3 shows rather mixed results on β and β/R values by geographical-regional country groups and for different time-lag periods. In general β values for the RXA indices are greater than for the RTA indices, but with different sensitivity developments on duration of time lag. Even more mixed results are found for level and developments of β/R values. In the case of the *one-year lag*, the β values for the RXA indices vary between 0.721 for Balkan countries and 0.87 for CEFTA-5 countries. The β/R values are slightly higher than one: between 1.004 for Balkan countries and 1.117 for Mediterranean countries. The β/R value that is greater than one indicates that the pattern of the distribution of the RXA or RTA indices has changed and that the degree of revealed comparative export advantages or relative trade advantages increased. The β values for the RTA indices for one-year lag vary between 0.553 for Balkan countries and 0.89 for CEFTA-5 countries. Their variations are in the case of the RTA indices a bit greater than in the case of the RXA indices. Different levels are also found for the β/R values for the RTA indices. Considering the *six-year lag*, the β value for Balkan countries declined considerably to 0.169. The β value close to the zero value indicates that the hypothesis of reverse patterns of the RXA or RTA values can not be rejected and that revealed comparative export advantage or relative trade advantage patterns have changed over the analyzed period. A slight decline in the β value is also observed for CEFTA-5 countries to 0.67. However, for the Baltic States (0.809) and Mediterranean countries (0.963) there are the increase in the β values closer to one. The β/R values ranged between 0.221 for Balkan countries and 1.432 for Mediterranean countries. For Baltic States and CEFTA-5 countries the β/R value is around 0.9. The β/R value close to one

suggests that the dispersion in the distribution of the RXA or RTA indices has not changed significantly. For the six-year lag, the β values for RTA indices are lower than for the RXA indices. The β value in the case of the RTA index for Balkan countries is less than one (-0.068). For CEFTA-5 countries and Mediterranean countries the β value for the RTA index decline with lag-duration and in comparison with the RXA index. However, for the former, it still remained between 0.5 and 0.6. The β/R value in the case of RTA index for six-year lag is les than 0 for Balkan countries, 0.633 and 0.82 for Mediterranean countries and CEFTA-5 countries, respectively, and greater than one (1.55) for Baltic States. These β/R values suggest that the dispersion in the distribution of the RXA and RTA indices has changed in different directions.

Differences for β and β/R values are also found by BEC product groups (Table 4). The size of the β value has changed with the lag duration. For BEC 111 – primary products mainly for industry the β values for the RXA indices are around 0.42 and a bit higher for the RTA indices. The β/R values are a bit higher than one, except for the RTA indices with six-year lag. For BEC 112 – primary products mainly for household consumption the β values are higher for the RXA indices, except for the RTA indices with six-year lag. The β/R values are greater than one for the RXA indices, and less than one for the RTA indices. For BEC 121 – processed products mainly for industry the β values are around 1 for the RXA indices, and less than one for the RTA indices. The β value is particularly low (around 0.3) for the RTA index with six-year lag. The β/R values are close or greater than one except for the RTA index with six-year lag. Finally, for BEC 122 – processed products mainly for household consumption the β values for the RXA and RTA indices are less than one (around 0.7) and declined with the lag duration. The β/R values for the RXA and RTA indices are close to one for the one-year lag, but declined considerably with the lag duration.

In summary, β/R values using both trade indices for the six-year lag suggest more profound changes in trade pattern regarding to both the country and product groups than for the one-year lag. These results imply that the trade pattern may change considerable in longer time due to

trade creation effects. Estimations differ considerable by various trade indices. In general, calculations based on the RTA indices indicate more products with relative trade advantages than for RXA indices. The reason of these phenomena is that the RMA indices are usually lower than the RXA indices implying the positive RTA values.

3.3 Intra-distribution dynamics

The dynamics of the RXA and RTA indices is also investigated by the analysis of the Markov transition probability matrices and mobility indices (see also Geweke et al. 1986). This analysis shows the probability of passing from one state to another between the starting year (1999) and the ending year (2006) of the analyzed period 1999-2006. The diagonal elements of the Markov transition probability matrix indicate the probability to stay persistently with a comparative export (trade) advantage (RXA > 1 or RTA > 0) between 1999 and 2006. The other elements of the Markov transition probability matrix provide further information on the dynamics of the comparative export (trade) advantage index, showing the probability of passing from one state to another between the starting year (1999) and the end year (2006).

Table 5 presents the Markov transition probability matrices for the RXA and RTA indices by geographical-regional country groups and BEC product groups. For the Mediterranean and Balkan countries, there is very low probability (between 1 and 2 percent) that products with revealed comparative export disadvantage (RXA < 1) shift to revealed comparative export advantage (RXA > 1). For the CEFTA-5 countries this probability is 8 percent and for the Baltic states 13 percent. Much higher are chances that products with revealed comparative export advantage (RXA > 1) move a backward by a switch to revealed comparative export disadvantage (RXA < 1): 12 percent for the CEFTA-5 countries, 25 percent for the Baltic states, 33 percent for the Balkan countries and 100 percent for the Mediterranean countries. Such high instabilities to sustain and maintain steadily revealed comparative export advantages is also consistent with relatively a low proportion of geographical-regional country groups that during the analyzed period have remained within this classified trade category.

The probability to remain with relative trade advantage (RTA > 0) is higher and more stable than to remain only with revealed comparative export advantage (RXA > 1). Besides the CEFTA-5 countries, Baltic States and Balkan countries, this holds also for the Mediterranean countries. Yet, also probability that relative trade disadvantage (RTA < 0) shall became relative trade advantage (RTA > 0) is higher as it ranged from 11 percent for the CEFTA-5 countries up to 44 percent for the Baltic states.

The probability to shift from revealed comparative export disadvantage (RXA < 1) to revealed comparative export advantage (RXA > 1) is less than 8 percent also by BEC product groups. On the other hand, the probability to stay with revealed comparative export advantage (RXA > 1) is relatively high for BEC 112 – primary products mainly for household consumption (92 percent) and for BEC 122 – processed products mainly for household consumption (91 percent), but less so for BEC 111 – primary products mainly for industry (25 percent). Moreover, the probability of shifts from relative trade disadvantages (RTA < 0) to relative trade advantages (RTA > 0) and the stability of probability to stay with the relative trade advantage (RTA > 0) is a bit higher by BEC product groups as it varies from 16 percent for BEC 122 – processed products mainly for household consumption to 33 percent for BEC 121 – processed products mainly for industry. The probability to stay with relative trade advantage (RTA > 0) is ranged between 64 percent for BEC 111 – primary products mainly for industry and 94 percent for BEC 121 – processed products mainly for industry.

The greater stability of relative trade advantages (RTA > 0) than revealed comparative export advantages (RXA > 1), except of the CEFTA-5 countries, and is also confirmed by mobility indices, M_1. Table 6 reports the mobility index, M_1, for each of the geographical-regional country groups and BEC product groups, which summarize the degree of mobility in patterns of comparative export (trade) advantages. Except for the CEFTA-5 countries, the size of the M_1 mobility indices for the RTA indices is greater than for the RXA indices. Between the geographical-regional country groups, M1 for the degree of mobility throughout the entire

distribution of the RTA index is a slightly greater than 0.5 for the Baltic states and Mediterranean countries, but closer to zero for the RXA index as well as for both the RXA and RTA indices for the Balkan and CEFTA-5 countries indicating relatively low mobility. By BEC product groups, the degree of mobility measured by the M_1 mobility indices in the RTA and RXA indices is greater than 0.5 for BEC 111 - primary products mainly for industry, but lower for BEC 112 - primary products mainly for household consumption and BEC 122 - processed products mainly for household consumption. A special case is BEC 121 – processed products mainly for industry, where the M_1 mobility index is greater for the RXA than for RTA indices. Anderson and Goodman's (1957) p-value test reject the equality of all Markov transition probability matrices relative to estimated benchmark. In other words, changes across different RXA or RTA classes were significant for all geographical-regional country groups and BEC product groups.

3.4. Structural changes in relative trade advantages

This section analyses structural changes in the relative trade advantages. Table 7 displays the breakdown of the share of BEC product groups in total number of products by NMS geographical-regional country groups in 1999 and 2006, for the cases where hold that RXA > 1 (RTA > 0). In general, the NMS geographical-regional country groups show a fairly stable agro-food pattern in terms of the RXA index except of the CEFTA-5 countries. The CEFTA-5 countries lost revealed comparative export advantage in BEC 111 – primary product mainly for industry, while they improved their position in BEC 112 – primary products mainly for household consumption. Estimations based on the RTA indices show a similar picture. The NMS geographical-regional country groups show a stable agro-food trade pattern except of the CEFTA-5 countries. The CEFTA-5 countries experienced a more profound changes in relative trade advantages, where the share of product groups with relative trade advantages increased for BEC 112 – primary products mainly for household consumption and BEC 121 – processed

products mainly for industry, while this ratio decreased for BEC 111 – primary product mainly for industry.

It is interesting to compare the dynamics that can be seen in Tables 6 and 7. As already noticed above, the mobility index, M_1, for the RXA (RTA) indices is the highest for the Baltic States and CEFTA-5 countries. However, for both cases, the mobility does not mean a movement towards the processed goods with revealed comparative export advantages and relative trade advantages. These results imply catching-up difficulties in relative trade advantages in higher value-added processed products for NMS-12 on the EU-15 markets, the aim that requires developed food processing and marketing complying the demands by consumers on the competitive EU-15 markets.

4. Conclusions

The implications of the enlarged EU-27 on agro-food trade creation and dynamics in relative trade advantages have been analyzed for NMS-12 countries that are classified into four geographical-regional trade groups: the Baltic States, the CEFTA-5 countries, the Mediterranean countries, and Balkan countries. We have found trade creation effects for the analyzed country groups and BEC product groups as a response to freer trade and borderless SEM. In the composition of NMS-12 agro-food trade with the EU-27 markets on one side the CEFTA-5 countries prevail, whereas the BEC 122 – processed products mainly for household consumption prevail on the other. This is consistent with the agro-food sector sizes and higher value-added processed products that increase in consumption is income driven.

We have not find substantial differences in levels and dynamics of revealed comparative export advantage indices, relative import penetration indices and relative trade advantage indices on the enlarged EU-27 markets. Less profound improvements in revealed comparative export advantages are also found as the main reason for mixed results and no significant improvements in relative trade advantages. Better performances in relative import penetration advantages than in revealed comparative export advantages imply that the NMS-12 have been focusing on

maintaining market shares on domestic, internal markets, whereas competition on the EU-27 markets as a whole, particularly on the old EU-15 markets, have been exposed to much stronger competition and thus greater probabilities of failures. Interestingly, neither NMS regional-geographic country groups have been identified to significantly gain nor loss in relative trade advantages in agro-food products on the enlarged EU-27 markets so far.

The regression analysis has shown mixed results on the changes and differences in dynamics in revealed comparative export advantages and relative trade advantages by NMS geographical-regional country groups and BEC product groups. In general, we have not found significant strengthening of the existing degree of the geographical-regional country group relative trade advantage specialisation, but only some shifts in improving or worsening in the existing position over time. For the Balkan countries, we have found a change of sign in relative trade advantage indices where the degree of relative trade advantages has fallen. However, by BEC product groups, we have found strengthening of the existing degree of revealed comparative export advantages for primary products mainly for household consumption and processed products mainly for industry.

The Markov transition probability matrices have confirmed that the relative trade advantage (RTA) indices are more stable in the case of relative trade advantages (RTA > 0) than this is the case for revealed comparative export advantage (RXA > 1) indices. The probability to keep and stay the RTA > 0 is greater than probability to stay the RXA > 1, which holds by analyzed NMS geographical-regional country groups and particularly by BEC product groups. Moreover, the probability of switches from the relative trade disadvantage (RTA < 0) to the relative trade advantage (RTA > 0) is higher than the probability of switches from the revealed comparative export disadvantage (RXA < 1) to the revealed comparative export advantage (RXA > 1), indicating that the improvements in the RTA indices have been based in a greater degree on import than export flows, whereas the RXA indices are based only on export flows. These findings are largely confirmed also by mobility indices. We have not found any catching up in

terms of movement towards higher-valued processed goods with revealed comparative export advantages.

Similarly to previous studies on general trade patterns (see Havlik, 2001; Landesmann and Stehrer, 2002; Wörz, 2003; Zaghini 2005 and Fertő 2007) our results indicate considerable differences across NMS geographical-regional country groups. In addition, we found mainly agro-food trade de-specialization in longer-run in line with earlier literature (Wörz. 2005). The empirical results imply that NMS-12 have to make greater efforts to improve and sustain agro-food revealed comparative export advantages on the enlarged EU-27 markets. The NMS-12 agro-food sectors successfully entered into the SEM of the EU-27 without substantial shocks on import-side, but also without significant improvements on export-side trade creation and in strengthening revealed comparative export advantages. A steady trade creation and simultaneous increase of agro-food trade in both directions have occurred, which are also expected to be one of major outcomes of the enlarged EU-27 markets for agro-food sectors in NMS-12 that have entered into larger and more competitive SEM.

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Table 1: Agro-Food Trade Developments of NMS-12 with EU-27 by Geographical Regions and BEC Product Groups

	Total agro-food trade of NMS-12 with EU-27 (in million Euros, deflated by harmonized indices of consumer prices 2005=100)		Shares by Geographical Regions (in percent)							
			Balkan countries		Baltic states		CEFTA-5 countries		Mediterranean countries	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
1999	5,867.5	4,945.6	9.2	12.0	14.9	4.9	69.2	80.3	6.7	2.9
2000	6,613.8	5,676.5	10.9	7.7	15.7	7.0	69.3	82.9	4.1	2.3
2001	7,599.7	6,590.4	11.4	9.4	15.8	8.3	67.1	80.3	5.7	2.0
2002	7,128.4	6,815.5	12.4	9.9	14.0	9.0	67.6	78.8	5.9	2.3
2003	7,436.7	7,322.3	13.2	9.5	17.6	9.1	63.4	79.6	5.8	1.9
2004	9,088.1	8,819.1	11.4	8.9	11.9	9.3	70.7	79.8	6.0	2.0
2005	12,477.2	11,640.8	9.5	7.8	13.5	9.8	72.3	80.7	4.7	1.7
2006	14,056.3	12,553.3	10.4	8.0	14.6	9.9	70.3	81.3	4.8	0.8
1999=1	2.40	2.54	2.70	1.69	2.34	5.12	2.44	2.57	1.69	0.74
	Total agro-food trade of NMS-12 with EU-27 (in million Euros, deflated by harmonized indices of consumer prices 2005=100)		Shares by BEC Product Groups (in percent)							
			111 – Primary products mainly for industry		112 – Primary products mainly for household consumption		121 – Processed products mainly for industry		122 – Processed products mainly for household consumption	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
1999	5,867.5	4,945.6	5.4	13.9	21.2	22.2	10.2	6.9	63.2	57.1
2000	6,613.8	5,676.5	8.5	15.4	20.9	19.4	9.9	7.6	60.7	57.7
2001	7,599.7	6,590.4	7.3	16.1	20.1	18.9	10.1	7.0	62.5	58.0
2002	7,128.4	6,815.5	4.7	17.7	16.8	18.0	12.5	6.1	66.1	58.2
2003	7,436.7	7,322.3	6.5	14.3	21.0	19.8	12.7	6.5	59.8	59.3
2004	9,088.1	8,819.1	6.4	13.5	17.4	17.7	11.4	7.6	64.9	61.2
2005	12,477.2	11,640.8	5.5	15.3	19.1	17.5	8.9	6.8	66.4	60.3
2006	14,056.3	12,553.3	6.4	14.9	16.8	19.0	8.7	7.1	68.1	59.0
1999=1	2.40	2.54	2.84	2.73	1.91	2.17	2.05	2.63	2.58	2.62

Source: Authors' calculations based on Eurostat dataset.

Table 2: Revealed Comparative Export Advantage (RXA), Relative Import Penetration Advantage (RMA) and Relative Trade Advantage (RTA) by Geographical Regions and by BEC product groups

	1999			2003			2006		
	RXA	RMA	RTA	RXA	RMA	RTA	RXA	RMA	RTA
Total agro-food products	0.602	**0.594**	**0.008**	0.553	**0.587**	-0.033	0.747	**0.777**	-0.030
BEC 111 – Primary products mainly for industry	0.448	**0.626**	-0.178	0.534	**0.823**	-0.289	0.818	1.279	-0.461
• Balkan countries	0.468	2.227	-1.758	**1.427**	1.781	-0.353	0.747	2.812	-2.064
• Baltic states	0.238	**0.081**	**0.156**	0.433	**0.979**	-0.546	0.599	1.552	-0.953
• CEFTA-5 countries	0.516	**0.503**	**0.012**	0.366	**0.575**	-0.209	0.650	**0.937**	-0.286
• Mediterranean countries	0.571	**0.145**	**0.426**	0.206	**0.247**	-0.040	**1.636**	**0.190**	**1.445**
BEC 112 – Primary products mainly for household consumption	0.716	**0.927**	-0.211	0.627	**0.666**	-0.039	0.775	**0.613**	**0.162**
• Balkan countries	0.424	**0.506**	-0.082	0.320	**0.490**	-0.170	0.342	**0.379**	-0.037
• Baltic states	**1.032**	**0.374**	**0.658**	0.933	**0.391**	**0.542**	**1.415**	**0.754**	**0.661**
• CEFTA-5 countries	0.665	**0.397**	**0.267**	0.579	**0.344**	**0.234**	0.697	**0.517**	**0.179**
• Mediterranean countries	0.660	3.501	-2.840	0.593	2.054	-1.461	0.442	**0.869**	-0.427
BEC 121 – Processed products mainly for industry	0.004	**0.002**	**0.002**	0.005	**0.002**	**0.003**	0.006	**0.004**	**0.002**
• Balkan countries	0.002	**0.001**	**0.001**	0.004	**0.001**	**0.003**	0.005	**0.001**	**0.004**
• Baltic states	0.001	**0.001**	**0.000**	0.002	**0.001**	**0.001**	0.002	**0.001**	**0.001**
• CEFTA-5 countries	0.006	**0.003**	**0.002**	0.008	**0.004**	**0.004**	0.011	**0.008**	**0.003**
• Mediterranean countries	0.001	**0.000**	**0.001**	0.001	**0.000**	**0.001**	0.001	**0.000**	**0.001**
BEC 122 – Processed products mainly for household consumption	0.895	**0.583**	**0.312**	0.838	**0.654**	**0.184**	0.983	**0.708**	**0.274**
• Balkan countries	0.700	**0.895**	-0.194	0.557	**0.625**	-0.068	0.615	**0.631**	-0.016
• Baltic states	**1.485**	**0.479**	**1.005**	**1.353**	1.014	**0.339**	**1.353**	1.281	**0.071**
• CEFTA-5 countries	0.511	**0.538**	-0.027	0.483	**0.533**	-0.050	0.715	**0.625**	**0.089**
• Mediterranean countries	**1.163**	**0.539**	**0.623**	**1.232**	**0.442**	**0.790**	**1.460**	**0.129**	**1.330**

Source: Authors' calculations based on Eurostat dataset.

Table 3: Changes in Revealed Comparative Export Advantages (RXA) and in Relative Trade Advantages (RTA) by Geographical Regions

RXA	One-year lag				Six-year lag			
	Balkan Countries	Baltic States	CEFTA-5 Countries	Mediterranean countries	Balkan countries	Baltic states	CEFTA-5 countries	Mediterranean Countries
Beta (β)	0.721	0.780	0.870	0.758	0.169	0.809	0.670	0.963
p-value	0.002	0.000	0.000	0.000	0.027	0.000	0.000	0.003
sig. of F(H0:b=0)	0.000	0.000	0.000	0.000	0.027	0.000	0.000	0.003
sig. of F(H0:b=1)	0.152	0.004	0.018	0.022	0.000	0.226	0.037	0.908
R^2	0.5149	0.5988	0.7379	0.4609	0.590	0.813	0.552	0.452
β/R	1.004	1.008	1.012	1.117	0.221	0.897	0.902	1.432
N	56	84	140	56	16	24	40	16
RTA								
Beta (β)	0.553	0.604	0.890	0.778	-0.068	0.789	0.584	0.478
p-value	0.002	0.000	0.000	0.000	0.718	0.000	0.000	0.000
sig. of F(H0:b=0)	0.002	0.000	0.000	0.000	0.719	0.000	0.000	0.000
sig. of F(H0:b=1)	0.011	0.000	0.011	0.015	0.000	0.348	0.001	0.000
R^2	0.288	0.3467	0.829	0.7501	0.441	0.260	0.507	0.571
β /R	1.030	1.026	0.977	0.898	-0.102	1.547	0.820	0.633
N	56	84	140	56	16	24	40	16

Source: Authors' calculations based on Eurostat dataset.

Table 4: Changes in Revealed Comparative Export Advantages (RXA) and in Relative Trade Advantages (RTA) by BEC Product Groups

RXA	One-year lag				Six-year lag			
	111 – Primary products mainly for industry	112 – Primary products mainly for household consumption	121 – Processed products mainly for industry	122 – Processed products mainly for household consumption	111 – Primary products mainly for industry	112 – Primary products mainly for household consumption	121 – Processed products mainly for industry	122 – Processed products mainly for household consumption
Beta (β)	0.413	0.848	**1.042**	0.657	0.422	**1.139**	0.967	0.228
p-value	0.000	0.000	0.000	0.000	0.278	0.000	0.003	0.141
sig. of F(H0:b=0)	0.000	0.000	0.000	0.000	0.278	0.000	0.003	0.141
sig. of F(H0:b=1)	0.000	0.201	0.056	0.003	0.138	0.544	0.918	0.000
R^2	0.152	0.528	0.951	0.445	0.124	0.523	0.865	0.520
β /R	1.060	**1.167**	**1.068**	0.986	1.198	**1.575**	**1.040**	0.317
N	84	84	84	84	24	24	24	24
RTA								
Beta (β)	0.573	0.787	0.892	0.716	0.482	0.411	0.291	0.306
p-value	0.000	0.000	0.000	0.000	0.043	0.000	0.177	0.357
sig. of F(H0:b=0)	0.000	0.000	0.000	0.000	0.043	0.000	0.178	0.357
sig. of F(H0:b=1)	0.000	0.022	0.111	0.003	0.030	0.000	0.001	0.037
R^2	0.299	0.839	0.814	0.522	0.282	0.776	0.521	0.285
β/R	1.048	0.859	0.988	0.991	0.908	0.467	0.403	0.574
N	84	84	84	84	24	24	24	24

Source: Authors' calculations based on Eurostat dataset.

Table 5: Markov transition probability matrices for Revealed Comparative Export Advantages (RXA) and Relative Trade Advantage (RTA) by Geographical Regions and BEC Product Groups

	Geographical Regions											
	Balkan countries			Baltic states			CEFTA-5 countries			Mediterranean countries		
	RXA<1	RXA>1	Total	RXA<1	RXA>1	Total	RXA<1	RXA>1	Total	RXA<1	RXA>1	Total
RXA<1	0.98	0.02	1.00	0.88	0.13	1.00	0.92	0.08	1.00	0.99	0.01	1.00
RXA>1	0.33	**0.67**	1.00	0.25	**0.75**	1.00	0.12	**0.88**	1.00	1.00	**0.00**	1.00
Total	0.95	0.05	1.00	0.70	0.30	1.00	0.61	0.39	1.00	0.99	0.01	1.00
	RTA<0	RTA>0	Total	RTA<0	RTA>0	Total	RTA<0	RTA>0	Total	RTA<0	RTA>0	Total
RTA<0	0.80	0.20	1.00	0.56	0.44	1.00	0.89	0.11	1.00	0.57	0.43	1.00
RTA>0	0.16	**0.84**	1.00	0.15	**0.85**	1.00	0.08	**0.92**	1.00	0.14	**0.86**	1.00
Total	0.45	0.55	1.00	0.23	0.77	1.00	0.43	0.57	1.00	0.25	0.75	1.00
	BEC Product Groups											
	111 – Primary products mainly for industry			112 – Primary products mainly for household consumption			121 – Processed products mainly for industry			122 – Processed products mainly for household consumption		
	RXA<1	RXA>1	Total	RXA<1	RXA>1	Total	RXA<1	RXA>1	Total	RXA<1	RXA>1	Total
RXA<1	0.92	0.08	1.00	0.97	0.03	1.00	1.00	1.00	1.00	0.94	0.06	1.00
RXA>1	0.75	**0.25**	1.00	0.08	**0.92**	1.00	0.00	**0.00**	1.00	0.09	**0.91**	1.00
Total	0.90	0.10	1.00	0.83	0.17	1.00	1.00	1.00	1.00	0.62	0.38	1.00
	RTA<0	RTA>0	Total	RTA<0	RTA>0	Total	RTA<0	RTA>0	Total	RTA<0	RTA>0	Total
RTA<0	0.82	0.18	1.00	0.72	0.28	1.00	0.67	0.33	1.00	0.84	0.16	1.00
RTA>0	0.36	**0.64**	1.00	0.10	**0.90**	1.00	0.06	**0.94**	1.00	0.08	**0.92**	1.00
Total	0.64	0.36	1.00	0.29	0.71	1.00	0.17	0.83	1.00	0.31	0.69	1.00

Source: Authors' calculations based on Eurostat dataset.

Table 6: Mobility indices and test statistic for equality of Markov transition probability matrices based on Revealed Comparative Export Advantage (RXA) and Relative Trade Advantage (RTA) indices

	M_1 (RXA)	M_1(RTA)	p-value (RXA)	p-value (RTA)
Balkan countries	0.35	**0.36**	0.000	0.000
Mediterranean countries	0.38	**0.57**	0.000	0.000
Baltic states	0.20	**0.58**	0.000	0.000
CEFTA-5 countries	**1.01**	0.19	n.a.	0.000
BEC 111 – Primary products mainly for industry	**0.83**	0.54	0.000	0.000
BEC 112 – Primary products mainly for household consumption	0.11	**0.38**	0.000	0.000
BEC 121 – Processed products mainly for industry	**1.00**	0.39	n.a.	0.000
BEC 122 – Processed products mainly for household consumption	0.15	**0.24**	0.000	0.000

Source: Authors' calculations based on Eurostat dataset.

Note: n.a. not available due to zero value in the Markov transition probability matrix.

Table 7: Share of product groups with Revealed Comparative Export Advantage (RXA > 1) and Relative Trade Advantage (RTA > 0) by Geographical Regions and BEC Product Groups (in percent)

	Balkan countries		Baltic States		CEFTA-5 countries		Mediterranean countries	
	1999	2006	1999	2006	1999	2006	1999	2006
Revealed Comparative Export Advantage (RXA > 1)								
BEC 111 – Primary products mainly for industry	0	0	0	0	20	0	0	50
BEC 112 – Primary products mainly for household consumption	0	0	67	67	0	50	0	0
BEC 121 – Processed products mainly for industry	0	0	0	0	0	0	0	0
BEC 122 – Processed products mainly for household consumption	0	0	100	100	0	0	100	100
Relative Trade Advantage (RTA > 0)								
BEC 111 – Primary products mainly for industry	0	0	67	0	40	20	100	100
BEC 112 – Primary products mainly for household consumption	50	50	100	100	60	80	50	50
BEC 121 – Processed products mainly for industry	100	100	67	67	40	60	100	100
BEC 122 – Processed products mainly for household consumption	50	50	100	67	60	60	100	100

Source: Authors' calculations based on Eurostat dataset.