Drivers of the duration of comparative advantage in the European Union's agri-food exports

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Abstract: The article investigates the duration of comparative advantage indices in the European Union (EU-27) agri-food exports using the normalised revealed comparative advantage index on the global market. There is employed both a descriptive analysis of the duration of comparative advantage, and examined the major drivers using discrete-time duration models with proper controls for unobserved heterogeneity. The robustness of the models is tested with alternative estimation procedures and sub-samples. Estimations show that the comparative advantages for most agri-food products survived for a certain number of years, but a high percentage of them have a shorter duration. Larger trade costs decrease the probability of survival in comparative advantages, while the level of economic development, the size of the country, the agri-food export diversification, and being a new EU member state increases it. Implications for the EU-27 member states and agri-food policies are suggested in the conclusion.

Keywords: normalised revealed comparative advantage, duration analysis, discrete time models, agri-food exports, European Union

The EU-27 member states are one of the major global agri-food exporters. The success (or lack thereof) of their comparative advantage in the agri-food export value chain on the global markets is a crucial factor for the economic sustainability of the agri-food sector, which can play an important role in the economic development of regions with the strong presence of the agri-food sector.

Theoretical literature on trade and competitiveness emphasises the dynamic aspects of comparative advantage allowing both convergence and divergence in comparative advantage over time (Redding 2002; Smutka and Burianová 2013). One important implication of trade theories is that comparative advantage usually evolves slowly over time (e.g. Matsuyama 1992). However, the recent studies provide the evidence that both trade relationships (Besedeš and Prusa 2006b; Nitsch 2009; Brenton et al. 2010; Obashi 2010; Cadot et al. 2013) and comparative advantages (Bojnec and Fertő 2015) are surprisingly short-lived. While the duration models and factors of trade duration are relatively

well explored (Besedeš 2008; Fugazza and Molina 2009; Gullstrand 2011), the research explaining the duration of comparative advantage is less explored, which has motivated our research.

The empirical literature on comparative advantage usually employs the concept of revealed comparative advantage developed by Balassa (1965). Several studies have explored the characteristics and limits of comparative advantage. Yu et al. (2009) introduce a normalised revealed comparative advantage (NRCA) index that is more appropriate for the comparison among products, countries and over time.

The aim of this paper is to examine the duration of comparative advantage and the determinants of the duration of comparative advantage in the EU-27 agri-food exports using the NRCA index. A discrete time hazard model is applied to explain the determinants of the duration of the NRCA index considering the structural nature and dynamic aspects of an economy affected by policy changes. The robustness of the model is tested with alternative estimation procedures and different data sub-samples.

MATERIALS AND METHODS

The starting point is a brief description of the previous literature and, on this basis, hypotheses are derived. Exports, including agri-food, in the spatial economy, are shaped by the interregional trade costs and intraregional commuting costs (e.g. Anderson and van Wincoop 2004). Consistent with the trade theory (e.g. Anderson and van Wincoop 2003; Olper and Raimondi 2008), we can expect that the duration of the agri-food export competitiveness will increase with declines of the relative trade costs, which will contribute to a stronger comparative advantage. When the transportation costs are small, comparative advantage can then be of a longer duration. This inverse relationship between the duration of comparative advantage and trade costs is set in the following hypothesis:

H1: Larger trade costs decrease the probability of survival in comparative advantage.

The duration of agri-food competitiveness can be sensitive to the level of economic development, which is proxied by the per capita gross domestic product (GDP) of exporting countries. Income disparities among the regions of the EU have been widely analysed (e.g. Magrini 1999) and can vary across industries. The EU member states that reach higher levels of economic development are expected to gain a more stable comparative advantage in agri-food exports. A positive relation between the duration of comparative advantage and the per-capita GDP is consistent with a hypothesis on the preferences of consumers for quality and a demand for varieties with higher levels of economic development (e.g. Philippidis and Hubbard 2003; Hallak 2006; Choi et al. 2009; Curzi and Olper 2012). We set the following hypothesis:

H2: The duration of comparative advantage is positively associated with the level of economic development.

The size of the economy can be measured by the size of GDP and/or by the size of the population (e.g. Helpman 1998). The size of the economy is a traditional trade model variable with expected positive associations between the duration of comparative advantage and the size of the economy. We expect that larger countries tend to have comparative advantages for longer periods than the smaller ones. The increases in the population differential between the regions increase the duration of comparative advantage. We set the following hypothesis:

H3: Larger countries tend to have comparative advantages of longer duration than the smaller ones.

The previous literature argues on the gains from different varieties of the product and higher value-added product varieties of exports for the final consumption during globalization (e.g. Cheptea et al. 2014). When modelling the export duration for final products within a sector, the assumption of product homogeneity is often quite unrealistic due to the different differentiation of the product varieties and its considerable heterogeneity (e.g. Helpman and Krugman 1985; Volpe-Martincus and Carballo 2008). For the agri-food products, we assume that more product heterogeneity exists in the value chain according to the degree of the product processing. Heterogeneity between vertical stages in the agri-food value chain is related to the processing of primary agricultural products, either for a further processing or for the final human consumption. The duration of comparative advantage is expected to be longer for differentiated agri-food products than for the homogeneous ones (Rauch and Watson 2003; Besedeš and Prusa 2006a, b; Tovar and Martínez 2011). On the basis of this exploration, we set the following hypothesis:

H4: The duration of comparative advantage is longer for differentiated agri-food products than the homogeneous ones.

The previous literature provides empirical supports that the more diversified export structures in a product on the higher number of exported agri-food products will have a better chance to survive for longer periods of time (Nitsch 2009; Hess and Persson 2011).

H5: Export diversification has a positive impact on the duration of comparative advantage in a given agri-food product.

Chevassus-Lozza et al. (2008) argue on the presence of the overall trade resistance for the Central and Eastern European (CEE) countries agri-food exports to the EU market prior the accession despite the undertaken integration and trade liberalisation processes with the EU-15 market access. Difficulties for the CEE countries in market access to the EU market prior the accession are partially explained by the tariff and non-tariff measures (sanitary and phytosanitary standards, and other quality measures), and a large part of the border effect remains due to the non-trade policy related factors such as the home bias and consumer preferences.

In addition, the literature argues the importance of the EU enlargement for the export and competitiveness duration and on the performance difference between the old and new EU member states (NMSs) in the export and competitiveness duration (e.g. Jeníček

and Krepl 2009; Nitsch 2009; Svatoš and Smutka 2012; Bojnec and Fertő 2014, 2015; Smutka et al. 2016). Despite the fact that the new EU member states (NMSs) anticipated the accession before 2004 and they were being incorporated into the regional values chains already in the 1990s, the trade integration of the enlarged EU market was not completed with the accession process (Customs Union and the adoption of the EU standards) in 2004 (and for Bulgaria and Romania in 1997). Cristobal-Campoamor and Parcero (2013) argue a crucial role of the trade liberalisation as the driving force behind the Eastern-Western European convergence path. Inside each group of the old EU member states and the NMSs, there is the spatial evolution of the regional wage and GDP disparities (Bosker 2009). Except for Cyprus and Malta, the NMSs are the CEE transition economies. We set the following hypothesis:

H6: The EU enlargement has a positive impact on the duration of comparative advantage, which differs between the old and new EU member states.

Static and dynamic measures of comparative advantage have been developed in the literature. The most widely used indicator in the empirical trade analysis is based on the concept of the revealed comparative advantage (RCA) index, which was developed by Balassa (1965), and its variants. Despite some critiques of the RCA index as a static export specialisation index, such as the asymmetric value problem and the problem with the logarithmic transformation (De Benedictis and Tamberi 2004; Hoen and Oosterhaven 2006), the importance of the simultaneous consideration of the import side (Vollrath 1991), and the lack of a sound theoretical background (Leromain and Orefice 2014), it remains a popular tool for analyzing export competitiveness in the empirical trade literature (Bojnec and Fertő 2014). Yu et al. (2009, 2010) adopted an alternative measure to assess the dynamics of comparative advantage, utilising the NRCA index to improve certain aspects of the original RCA index in static patterns in comparative advantage in order to create an appropriate export specialisation index for comparison over space and the changes in comparative advantage and its trends over time. Yu et al. (2009) define the NRCA index as follows:

$$\text{NRCA}_{ij} = \frac{E_{ij}}{E} - \frac{E_i}{E}\frac{E_j}{E} \tag{1}$$

where E denotes the total world trade, E_{ij} describes country i's actual export of the commodity j in the world market, E_i is the country i's export of all commodities and E_j denotes export of the commodity j by all countries. If NRCA > 0, a country's agri-food comparative advantage on the world market is revealed. The distribution of NRCA values is symmetrical, ranging from –1/4 to +1/4 with 0 being the comparative-advantage-neutral point.

We examine the duration of the NRCA index. Calculating the duration then appears to be straightforward: it is simply the time (measured in years) that a product has maintained comparative advantage (NRCA > 0) index without any interruption. Alternatively, applying statistical techniques from the survival analysis, the duration can be modelled as a sequence of conditional probabilities that a product's NRCA > 0 index continues after t periods, given that it has already survived for t periods. Specifically, let T be a random variable that denotes the length of a spell, which means the periods of time of NRCA > 0 index without any interruption. A spell is a way of distinguishing a continued period with NRCA > 0 index from the total number of the analysed years (continuing or not) with NRCA > 0 index. Then, in the discrete time, the survival function, $S(T)$ is defined as:

$$S(T) = Pr(T \geq t) \tag{2}$$

In empirical studies, the survival functions (e.g. Cox and Oakes 1984; McCall 1994; Jenkins 1995) are estimated (in a non-parametric way) by computing the number of spells that survive (end) as a fraction of the total number of spells that are at risk after t periods. More specifically, the duration of the NRCA > 0 index for each of the EU-27 countries is estimated by applying the nonparametric Kaplan-Meier product limit estimator (Kaplan and Meier 1958). The Kaplan-Meier estimator of the hazard function is the fraction of spells that fail after t periods of all spells that have survived t periods (e.g. Kiefer 1988). The survival function is the share of spells that survive at time t, but this time is cumulative of all preceding time intervals. Specifically, if all spells survive and the ratio is one, the survivor function is flat at this interval; otherwise, the function is stepwise declining. Formally, the Kaplan-Meier estimator of the survival function is:

$$\hat{S}(t) = \prod_{t(i)<t} \frac{n_j - d_j}{n_j} \tag{3}$$

where n_j denotes the number of subjects at the risk of failing at $t(j)$, and d_j denotes the number of observed failures. Given that many observations are censored,

it is then noted that the Kaplan-Meier estimator is resistant to censoring and uses information from both censored and non-censored observations. It is possible that in some cases the normalised revealed comparative advantages (NRCA > 0) were dissolved (NRCA < 0) and later re-established (NRCA > 0) during the sample period. The episodes of the uninterrupted normalised revealed comparative advantage (NRCA > 0) are the primary unit of analysis.

The recent literature on the determinants of trade and comparative advantage duration uses the Cox proportional hazards models (e.g. Besedeš and Prusa 2006b; Nitsch 2009; Brenton et al. 2010; Obashi 2010; Cadot et al. 2013). However, the recent papers highlight three relevant problems inherent in the Cox model that reduce the efficiency of estimators (Brenton et al. 2010; Hess and Persson 2011, 2012). First, the continuous-time models (such as the Cox model) may result in biased coefficients when the database refers to discrete-time intervals (years in our case) and especially in samples with a high number of ties (numerous short spell lengths). Second, the Cox models do not control for the unobserved heterogeneity (or frailty). Thus, the results might not only be biased, but also spurious. The third issue is based on the proportional hazards assumption that implies similar effects at different moments of the duration spell. Following Hess and Persson (2011), we estimate different discrete-time models including the probit, logit, and complementary log-log (Cloglog) specifications, where the product-exporter country random effects are incorporated to control for the unobservable heterogeneity.

To calculate the NRCA indices, we use exports data from the United Nations (UN) International Trade Statistics UN Comtrade database (UNSD 2013), specifically the six-digit harmonised commodity description and coding systems (HS6-1996). As defined by the World Customs Organisation, the annual sample of agri-food trade contains 789 product groups at the HS six-digit level. The value of trade is expressed in US dollars.

We employ the average trade costs by country for agricultural products from the World Bank (2014a). This data on the trade cost indicators are convenient to use, but their foundations and aggregation levels need to be considered as a proxy, because the trade costs for the appropriate HS6 agri-food code are not available.

The proxy for economic development is the log of the GDP per capita at the purchasing power parity (PPP) at constant 2005 international US dollars

based on the World Bank (2014b). The logarithm of the populations of the exporter country is used as a proxy for the market size. Population data are also from the World Bank (2014b).

The agri-food export diversification is measured by the natural logarithm of the number of agri-food exported products per year. We define a dummy for the differentiated agri-food products as consumption or final agri-food products based on the UN classification by the Broad Economic Categories (BEC). For the agri-food items, final goods are described by two BEC categories: BEC 112 – primary agricultural products mainly for household consumption and BEC 122 – processed agri-food products mainly for household consumption. The primary source of data for export diversification (the number of exported agri-food products) and consumer (differentiated) agri-food products is the UNSD (2013).

For the EU enlargement and the NMSs, we introduce two dummy variables: first, a dummy variable for the EU enlargement, which is equal to one when the NMSs join to the EU, and zero otherwise, and second, a dummy variable for the NMSs, which takes value one for the NMSs, and zero otherwise.

Dependent and all explanatory variables are capturing each of the EU-27 member states in the twelve years analysed (2000–2011).

RESULTS AND DISCUSSION

Duration of the comparative advantage

The duration of the normalized revealed comparative advantage (NRCA > 0) indices is investigated in two steps: first, the duration of the NRCA > 0 index in years, and second, the description of the periods of time (or 'spells') of NRCA > 0. The former indicates for how many years the NRCA > 0 at the HS-6 agri-food product level, ranging from one to 12 years. The latter indicates whether NRCA > 0 is a continuous process during the analysed periods and whether there is a single spell as a continuous period with the NRCA > 0 index or multiple spells with switches from the NRCA > 0 to NRCA < 0 over the analysed years.

The left histogram in Figure 1 presents the distribution of the duration density of the number of agri-food products with the NRCA > 0 over the twelve years analysed, which is slightly more concentrated on the left side, indicating fewer years continuously being at the NRCA > 0, than on the right side of the same
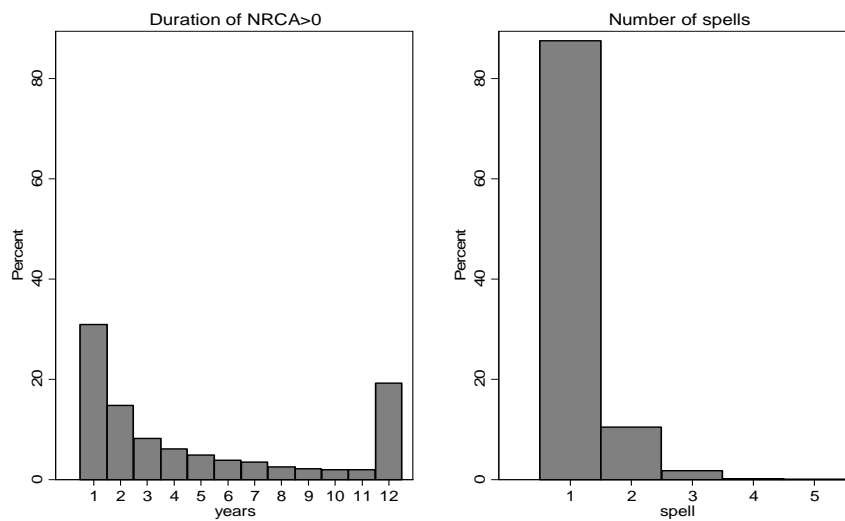
Figure 1. Histograms of the duration of the NRCA > 0 indices (in percentage of the number of agri-food products at the HS-6 level) and the number of spells with the NRCA > 0 indices

Notes: Duration of the NRCA > 0 – the exit rates from being the continued survival in comparative advantage are indicated up to eleven years, and for the twelfth year the continued survival rate in comparative advantage at the HS-6 agri-food product level; and number of spells – the percentage of the number of the HS-6 agri-food products that survived with the continuous NRCA > 0 a certain number of years 2000–2011.

Source: Authors' calculations based on the Comtrade database (UNSD 2013) with the WITS (World Trade Integration Solution) software (The World Bank 2013)

histogram, indicating more years being continuously at the NRCA > 0. Around one-fifth of the HS-6 agri-food products have a perfect continued survival rate in NRCA > 0 during the twelve analysed years.

The right histogram in Figure 1 presents the number of spells with the NRCA > 0, focusing on the difference between single spells and multiple spells per the given agri-food product. First, the high share of a single spell with the continuous NRCA > 0 indicates that most of the EU-27 member states have a high percentage

Table 1. Summary statistics of the length of spells that survived with the continuous NRCA > 0 a certain number of years in the 2000–2011 period

	Length of spells (in years)		Number of spells
	mean	median	
All spells	4.924	3	7 797
Single spell	5.560	4	6 050
NRCA > NRCA median	4.924	3	7 797
Export > 10 000$	4.941	3	7 761

Source: Authors' own calculations based on the Comtrade database (UNSD 2013) with the WITS (World Trade Integration Solution) software (The World Bank 2013)

of HS-6 agri-food products that survived a certain number of years in 2000–2011. During the analysed 12-year period, the minimum length of a spell is one year, and the maximum length of a spell for a given EU-27 agri-food product with the continuous NRCA > 0 is 12 years. Second, among the multiple spells with the NRCA > 0 per given agri-food product, two and three spells, and to a lesser extent four and five spells for a given agri-food product are identified. There is no agri-food product with six spells as the maximum possible multiple spells for a given agri-food product during the twelve-year analysed period due to switches year-to-year from the NRCA > 0 to NRCA < 0.

Table 1 provides some summary statistics on the length of the EU comparative advantages. The calculations show that the median duration of a spell with the NRCA > 0 in our sample is three years. The mean duration of comparative advantages is close to five years. Changing the definition of a spell has some effects on the median and mean durations. We use single spells, i.e. observations in which a specific exporter-product group combination has only one single coherent period of comparative advantage (NRCA > 0). The mean and median of length of comparative advantage increase to 5.56 and 4, respectively. Focusing on product groups

with the above median of the NRCA indices and larger than 10,000 US dollars has not altered the results on the length and number of spells.

The duration of the NRCA > 0 indices for agri-food exports in the EU-27 member states on the global market is tested by examining the nonparametric Kaplan-Meier estimates of a survival function over the 12-year period. The higher estimated survival rates of the NRCA > 0 index can be expected for more competitive agri-food exported products with longer durations. Figure 2 clearly illustrates that the Kaplan-Meier survival rates for the NRCA > 0 indices have declined over the 12-year analysed period. The Kaplan-Meier survival rates for agri-food products with single spells with the continuous the NRCA > 0 indices are lower than for the median value of the NRCA > 0 indices. Slightly lower survival rates for the single spell as well as for the total NRCA > 0 indices are also observed in the Kaplan-Meier survival rates for the NRCA > 0 indices, when agri-food export value is greater than 10 000 US dollars. The relatively lower Kaplan-Meier survival rates for agri-food products with single spells with the continuous NRCA > 0 indices indicate relatively high percentages of less competitive HS-6 agri-food products with shorter NRCA > 0 indices durations that survived only a smaller number of years in 2000–2011.

Regression results

The baseline model specification is estimated using discrete-time models including the probit, logit, and Cloglog specifications (Table 2). All models include random effects for every exporter-product combination. In general, the regression coefficients are similar for the various estimation procedures. We confirm the largest log-likelihood value for the logit model, and the smallest for the Cloglog model, which is in line with our *a priori* expectation. Because the logit model with frailty provides the best fit for our data, we focus on this model when discussing the regression estimation results.

Positive regression coefficients on trade costs indicate that higher trade costs increase the likelihood of failure in the NRCA > 0 indices. These results are in line with the findings of the previous studies emphasising the negative relationship between trade costs and the trade duration (Besedeš and Prusa 2006b; Nitsch 2009; Brenton et al. 2010; Obashi 2010; Hess and Person 2011, 2012). The GDP per capita and the population size, respectively, have negative and significant regression coefficients, suggesting that the likelihood of failure in the NRCA > 0 indices involving economically developed and large economies are less likely to happen. The negative and significant
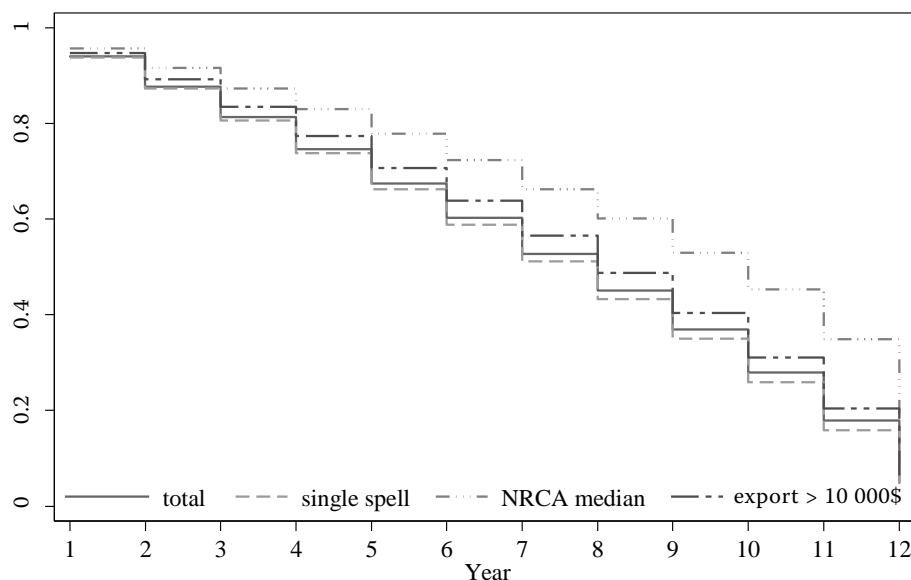

Figure 2. Kaplan-Meier survival functions for the NRCA > 0 indices

Note: The corresponding figures on the lines indicate a probability of the NRCA > 0 index continuous survival in a certain year during the twelve years analysed.

Source: Authors' own calculations based on the Comtrade database (UNSD 2013) with the WITS (World Trade Integration Solution) software (The World Bank 2013)

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regression coefficients on the number of exported agri-food products (export diversification) indicate that exporting many products has a negative effect on the probability of failure in the NRCA > 0 indices. This is consistent with findings on the export diversification by the previous studies (e.g. Nitsch 2009; Hess and Persson 2011). Based on the theoretical predictions by Rauch and Watson (2003), we confirm that the NRCA > 0 indices for differentiated consumer agri-food products will have a smaller likelihood of failure than the homogeneous ones. We find that the NRCA > 0 indices for agri-food exports in the NMSs are more likely to survive as the NMS reduces the probability of failure in the NRCA > 0 indices. Similarly, the EU enlargement increases the probability of survival in the agri-food NRCA > 0 indices in the EU-27 member states.

Table 2 provides evidence that there are few qualitative differences between the results from the probit, logit, and Cloglog estimations, which is an important first robustness test. Focusing, therefore, on our preferred logit model with random effects, we perform further robustness checks. Following the same procedure as in the descriptive analysis, we construct three subsamples. First, we change the definition of a spell and use single spells with the NRCA > 0. Second, we restrict observations with the above median value

of the NRCA indices. Finally, we focus on product groups with higher than 10 000 US dollar exports.

The sensitivity analysis with different sub-samples reinforces the majority of the previous findings, but we can observe also some differences (Table 3). The sign of the coefficient of GDP per capita turns positive and significant, and the population variable loses its significance in the subsample of above 10 000 exports. The most striking differences are related to the impacts of the EU enlargement. Table 3 shows that the coefficients of the EU enlargement are significantly negative in subsamples for the export > 10 000 US dollars, but they are significantly positive in the remaining subsamples. This suggests that agri-food products with greater exported values were being incorporated into the regional value chains already before the EU enlargement. These mixed results cast some doubts on the unambiguous direction of the EU enlargement on the survival in comparative advantage.

Our sensitivity analysis presents a greater consistency in the regression results in comparison with the estimated logit model in Table 2: significant positive regression coefficients on trade costs and significant negative regression coefficients for the GDP per capita,

Table 2. Regression results of the determinants of the normalised revealed comparative advantage (NRCA > 0) indices

	Dependent variable: NRCA > 0 indices		
	(1) probit	(2) logit	(3) Cloglog
lnTradecost	0.969***	1.734***	1.188***
lnGDP/capita	−0.116**	−0.257***	−0.020
lnPopulation	−0.166***	−0.378***	−0.165***
ln number of products	−0.404***	−0.725***	−0.523***
NMS	−0.423***	−0.713***	−0.081
EU	−0.116***	−0.211***	−0.075***
Consumer goods	−0.139***	−0.420***	−0.444***
constant	4.283***	9.050***	3.370***
Wald chi^2	680.729	740.489	1 155.117
N	148 615	148 615	148 615
Log likelihood	−39 049.721	−39 040.659	−39 267.667
rho	0.934	0.926	0.938
LR test of rho = 0	0.000	0.000	0.000

**Significant at the 0.05 level; ***Significant at the 0.01 level

Source: Authors' own calculations

Table 3. Sensitivity analysis and regression results of determinants of the normalised revealed comparative advantage (NRCA > 0) indices

	Dependent variable: NRCA > 0 indices		
	(1) single spell	(2) NRCA > NRCA median	(3) export >10 000$
lnTradecost	1.032***	1.679***	1.694***
lnGDP/capita	−0.107	−2.194***	0.363***
lnPopulation	−0.342***	−2.003***	−0.019
ln number of products	−0.677***	−0.274*	−0.657***
NMS	−0.402**	−1.811***	−0.062
EU	0.204***	0.257***	−0.197***
Consumer goods	−0.402***	−1.587***	−0.107
constant	10.091***	47.657***	−4.326**
Wald chi2	282.721	3559.254	395.725
N	143 858	74 308	127 248
Log likelihood	−35 274.148	−24 026.147	−36 673.528
rho	0.917	0.886	0.922
LR test of rho=0	0.000	0.000	0.000

*Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level

Source: Authors' own calculations

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the population size, the number of exported agri-food products, NMSs, and differentiated consumer goods, respectively. Except for the number of exported products, the regression coefficients in the second logit regression model for the NRCA > NRCA median value are higher than in the first logit regression model for the first single spell (Table 3). This can be explained by the omitted observations for the cases without comparative advantage in the second logit regression model for the NRCA > NRCA median value, which is included in the first logit regression model for the first single spell with the continuous NRCA > 0 indices.

To summarise the main findings on the set hypotheses, it is clear that except for the mixed results for the EU enlargement, the hypotheses cannot be rejected. Consistently with the H1 set, larger trade costs decrease the probability of survival in the NRCA > 0 indices. The likelihood of failure in the duration of the NRCA > 0 indices is inversely associated with the higher level of economic development (H2), the larger country size (H3), the higher differentiation of exported agri-food products towards the consumer ones (H4), the higher number of the exported agri-food products (export diversification) (H5), and the NMSs and to a lesser extent the EU enlargement (H6). These findings are to a greater extent in support of the strengthening duration of the NRCA > 0 in the EU-27 agri-food exports on the global markets.

CONCLUSIONS

The study contributes to the theory and empirical analysis of the duration analysis of the NRCA index in general and for the agri-food products in particular. The NRCA index is explained and empirically quantified across space in the EU-27 member states, over time exploring the duration analysis of the NRCA > 0 indices, and in the regression analysis to test the set hypotheses assessing the determinants of the duration of NRCA > 0 indices. More specifically, this paper adds to the duration analysis of the NRCA index in the following three directions across space, time and in regression framework: (1) It is systematically calculated for the European Union (27) agri-food exports; (2) the trends of the NRCA indices for the EU-27 agri-food exports are analysed using the duration analysis, and (3) determinants of the duration of the NRCA indices are analysed using the regression analysis to identify which factors of the duration of comparative advantages exhibit a

statistically significant association in gaining or losing the durability of comparative advantage in the EU-27 agri-food exports on the global markets.

We find that while the NRCA > 0 indices for most of agri-food products have survived a certain number of years, a particularly high percentage of them are of a shorter duration, surviving only a smaller number of years. This is a challenging issue for the EU-27 member states agri-food value chains, because the short duration indicates the NRCA > 0 indices and thus the agri-food export competitiveness on the global markets are not always very strong on a long-term basis.

The link between the duration of comparative advantage (NRCA > 0 index) and the explanatory variables is found as a relevant research question to focus on the agri-food sectors with important implications. Except for the larger trade costs, which contribute to the deterioration or loss of the duration of comparative advantage (NRCA > 0 index), the other analysed determinants have contributed to gaining or at least maintaining the duration of the NRCA > 0 indices for the EU-27 member states' agri-food exports on the global markets on the long term.

The duration of the NRCA > 0 indices is positively associated with the typical macro-economic variables on the size of the economy (population) and the level of economic development (gross domestic product per capita). However, the duration of the NRCA > 0 indices is negatively associated with the trade costs, meaning an important role for proximity drivers of the agri-food export competitiveness and its durability.

The duration of NRCA > 0 indices is positively associated with the process of the EU enlargement, meaning that the economic integration fosters the duration of the NRCA > 0 indices, which supports policy efforts towards the enlargement. However, the EU enlargement does not *per se* contribute to the duration of the NRCA > 0 indices for the EU-27 member states. The results imply that the NMSs have contributed to the duration of the NRCA > 0 indices more than the old EU member states. The EU enlargement can provide opportunities to use and increase economies of scale for the specialization in existing products in the agri-food value chains in the intra- and extra EU agri-food trade and in the promotion of international competitiveness and its durability for the new and niche products and their varieties, which can be of the business and policy relevance.

Among striking findings is the importance of the duration of the NRCA > 0 indices for the EU agri-food value chain at different stages of product processing

and marketing as policy priority. In the agri-food exports, a specific role should be given to export diversification on the higher number of exported agri-food products and their greater differentiation towards the higher value-added agri-food product varieties for the final consumption. There is recommended the diversification of the agri-food export structure towards new agri-food products with the presence of different products and sectors among a country's agri-food export set and the presence of different varieties of the same existing agri-food product within one sector in the higher value-added varieties for the final consumption.

Among the issues for the future research, there is the investigation of different causes and consequences of drivers of the duration of the NRCA > 0 indices in different regional market segments, which is an issue for the global agri-food policy, businesses and international marketing. This can include variables capturing the changing institutional arrangements and the role of agricultural policies such as the impact of the reforms of the Common Agricultural Policy of the EU and the global agri-food market volatility.

Acknowledgements

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