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EU Enlargement and Agro-Food Export Performance on EU Market Segments

ŠTEFAN BOJNEC – IMRE FERTŐ

INSTITUTE OF ECONOMICS, RESEARCH CENTRE FOR ECONOMIC AND REGIONAL STUDIES,
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Authors:

Imre Fertő
research advisor
Institute of Economics, Hungarian Academy of Sciences
Corvinus University of Budapest
email: ferto@econ.core.hu

Štefan Bojnec
University of Primorska, Faculty of Management, Slovenia
email: stefan.bojnec@fm-kp.si

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EU Enlargement and Agro-Food Export Performance on EU Market Segments

Štefan Bojnec – Imre Fertő

Abstract

This paper examines the impact of EU enlargement on agro-food export performance across 12 new EU member states and 5 newly independent states in the EU markets covering the period 1999-2007. The performance is examined by duration of export and hazard model. We find larger duration for the agro-food exports from the new EU member states. The results confirm gains from the eastward EU enlargement and governance on export increases and longer duration for exporting higher value-added specialized consumer-ready food and more competitive niche agro-food products.

Keywords: EU enlargement, governance, agro-food export duration, hazard model, niche products

JEL classification: F14, F15, Q17, P27

Az EU-bővülés és az agrárexport teljesítménye az EU piaci szegmenseiben

Štefan Bojnec – Fertő Imre

Összefoglaló

A tanulmány az EU bővülés hatását vizsgálja a mezőgazdasági export teljesítményére a 12 új tagállamban és 5 új független államban az EU piacain 1999-2007 között. A teljesítményt az export tartósságával és hazard modellek segítségével elemeztük. Eredményeink szerint az export tartóssága nagyobb volt az új EU tagállamokban. Az eredmények megerősítik, hogy az EU keleti bővítéséből származó nyereségeket és a jó kormányzásból eredő exportnövelő hatást. A magasabb hozzáadott értékű, fogyasztásra termelt jószágok exportjának a tartóssága hosszabb volt.

Tárgyszavak: EU bővülés, kormányzás, agrárexport tartóssága, hazárd modell, réspiaci termékek

JEL KÓD: F14, F15, Q17, P27

INTRODUCTION

Transition from the central planning to a market economy at the beginning of the 1990s raised an expectation that the transition Eastern European countries and the Soviet Republics might become major agricultural exporters (Anderson, 1992; Tangermann, 1994). Among expected determinants for agro-food trade growth are the positive development implications from the restructuring of the economy, production technology and product quality improvements, and specialization changes towards comparative advantages. Almost two decades later, we investigate what has happened with agro-food export growth from transition Central and Eastern European countries (CEECs) to the European Union (EU) markets, and what might be the source of trade growth and how it may relate to the duration of trade. A question remains about the time dimension when countries conduct trade and the time horizon on duration of trade specialization relationships with implications for the agro-food sector. This issue is motivated by the finding of recent research that many countries do not trade in any given year and for any given product (Haveman and Hummels, 2004; Feenstra and Rose, 2000; Schott, 2004). Being in or out of the international market may be a particularly important issue when the market at stake is one of an expanding economic integration. The enlargement of the EU in 2004 is such a case with possible changes in export dynamics.

The main innovation of the analysis is on the impact of European enlargement and governance on CEECs agro-food export performance on the EU geographic market segments. Our research focuses on the question of how New EU Member States (NMS-12)1 and Newly Independent States (NIS-5)2 perform in agro-food exports in the EU geographic market segments, i.e., the old EU-15 and NMS-12 markets, in association with the EU enlargement employing survival and hazard rates, with the Cox proportional hazards regression used for the econometric analysis. Following the recently developed methodology pioneered by Besedeš and Prusa (2006a, 2006b) we analyze the duration of agro-food exports of the NMS-12 and NIS-5 on the EU geographic market segments using survival analysis. We find that agro-food exports of NMS-12 to the EU are characterised by larger duration.

In addition, recent literature emphasizes that institutions can affect the level of trade (e.g. Anderson and Marcouiller, 2002; de Groot et al., 2004). The empirical research finds supporting evidence that institutions play an important role in the shaping of export patterns (Francois and Manchin, 2007; Depken and Sonora, 2005; Levchenko, 2007; Nunn, 2007).

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[1] The NMS-12: ten NMS, which joined the EU in 2004 (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia), and two NMS, which joined the EU in 2007 (Bulgaria and Romania).

[2] The NIS-5: Belarus, Kazakhstan, the Republic of Moldova, Russia, and the Ukraine.

Thus, we investigate how the EU enlargement and quality of governance improves both the size and duration of agro-food trade.

Our contributions to the literature on the impact of EU enlargement and governance on trade development are threefold. First, although there is a wealth of literature on the trade between CEECs and the EU member states, the research periods usually end prior to the EU 2004 enlargement. This paper extends the analyzed periods after the EU 2004 enlargement to investigate possible shifts in export specialization patterns and development implications by main agro-food product groups and niche products. Second, we apply recently developed empirical methods to investigate the agro-food export dynamics for the NMS-12 and NIS-5. We try to identify the effects of EU membership for the NMS-12 in comparison with NIS-5, which is important for the duration of export specialization and patterns of domestic agro-food production. Third, we employ regression hazard model with trade and governance explanatory variables which may have an effect on the duration of bilateral agro-food exports.

The remaining part of the paper is structured as follows. Section I presents a brief literature review on determinants of trade level and trade duration. The methodology on the duration and hazard analyses and data used are described in section II. We use a survival analysis model to study the survival and hazard rates of agro-food exports of NMS-12 and NIS-5 on the EU geographic market segments, and the Cox proportional hazard regression model. The main results, which are presented in section III, show that the duration of agro-food exports to the EU-27 markets is longer for the NMS-12 than that for the NIS-5, and that the survival rates are higher on the NMS-12 than on the EU-15 market segment. The EU enlargement and good governance have contributed to longer duration in NMS and NIS agro-food export on the EU market segments. The final section IV summarizes and derives the policy implications.

I. BRIEF LITERATURE REVIEW

Literature argues that enlargement and good governance encourage trade and development. The environment shaping the economy affects the dynamics of trade. Institutions affect quality of governance and determine economic behaviour (North, 1990) and economic transactions (Williamson, 1998). Export growth contributes to greater economic growth (Balassa, 1971) and European economic integration and export orientation can have positive effects on economic growth (Balassa, 1975). International trade allows for a more efficient use of resources and exposes domestic producers to larger, more competitive and complex markets, which encourages productivity improvements (Sapsford and Garikipati, 2006). Production and export in enlarged markets are more likely to occur along a country's comparative advantage. Export competition in an international market can be encouraged by different determinants

such as productivity growth and technical progress (Balassa, 1988; Krueger, 1998), an increase in investments and capital accumulation facilitated by export earnings (Rodrik et al., 1995), capital or specifically human capital (Lucas, 1993), innovation and knowledge spillovers (Grossman and Helpman, 1990) as the important factors in explaining growth differentials. The increase in exports is often accompanied by an increase in the variety and complexity of differentiated goods (Krugman, 1979; Bils and Klenow, 2001; Yi, 2003).

A body of literature provides evidence on various aspects of changes in agro-food trade patterns between post-communist countries and the EU including trade specialization and trade dynamics (Eiteljörge and Hartmann, 1999; Bojnec, 2001; Fertő and Hubbard, 2003; Fertő, 2008; Bojnec and Fertő, 2008), price and quality competitiveness (Bojnec and Fertő, 2007), and intra-industry trade (Fertő, 2005; Majkovič et al., 2007). Crespo and Fontoura (2007) for trade in manufacturing goods found a significant increase in integration of the CEECs into trade links with the EU since 1989. The majority of exports from the CEECs are directed to the EU, implying a high degree of CEECs trade integration and trade market concentration with the EU market. They argued that, behind these developments, lies the dismantling of central planning in the CEECs and the interim Europe Agreements (EAs), which led to the abolition of tariffs for trade in manufactured goods. The EAs and pertinent questions were overcome by the pre-accession harmonization of policies, standards and trade adjustment measures, which strengthened deepening and widening of integration, and finally were successfully completed with the CEECs entry into the enlarged EU (e.g. Kramer, 1993; Crespo and Fontoura, 2007) and the reformed Common Agricultural Policy (e.g. Daugbjerg and Swinbank, 2007; Bojnec and Fertő, 2008).

So far there are rare studies to examine the export performance of NMS-12 in agro-food exports to the EU and that this performance is compared to that of the NIS-5. The performance, which is compared, is duration analysis of agro-food export. We estimate a hazard model with use some standard trade explanatory variables and governance explanatory variables.

II. METHODOLOGY AND DATA

MODEL SPECIFICATION

We are interested in investigating the duration of a country's agro-food export to the EU markets involving homogeneous and differentiated products with implications of the enlargement process. The duration analysis of agro-food exports by countries and by products

is estimated by the survival function, S(t), by using the nonparametric Kaplan-Meier product limit estimator. We assume that a sample contains n independent observations denoted (ti; ci), where i = 1, 2,..., n, ti is the survival time, and ci is the censoring indicator variable C taking a value of 1 if failure occurred, and 0 otherwise of observation i. We also assume that there are m < n recorded times of failure. The rank-ordered survival times are denoted as t(1) < t(2) < ... < t(m), while nj denotes the number of subjects at risk of failing at t(j), and dj denotes the number of observed failures. The Kaplan-Meier estimator of the survival function is then:

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

with the convention that $\hat{S}(t) = 1$ if t < t(1). Given that many observations are censored, we then note that the Kaplan-Meier estimator is robust to censoring and uses information from both censored and non-censored observations. We also check the equality of survival functions using the non-parametric log-rank test (Cleves et al., 2004).

We estimate a stratified Cox proportional hazard model:

$hs(t, x, \beta) = hs0(t)\exp(x' \beta)$,

where x denotes a vector of explanatory variables and β is to be estimated. The baseline hazard, hs0(t), characterizes how the hazard function changes as a function of time. As explanatory variables are used standard trade model variables including factor endowment and market size variables and cross-country differences. We hypothesise that the better factor endowments may foster the trade and might have positive effect on trade duration. We include agricultural land and gross domestic product (GDP) per capita as proxies for factor endowments. The GDP per capita is also a general proxy for the level of economic development (Linder, 1961). The market size is used to test the proposition stemming from the economic geography literature (Helpman and Krugman, 1985; Krugman and Venables, 1995). We expect that the larger countries tend to be exports more than smaller countries. Real effective exchange rate is used as a proxy of potential instability in the economy to explain duration of agro-food export. Exchange rates reflect, among other factors, the perceived level of instability in a country and also reflect the competitiveness of a country's exports with an impact on duration of trade. The currency depreciation may positively influence the trade duration.

In addition we employ agro-food product type dummy variables for products differentiation and a dummy for the year of accession to access the impact of the EU enlargement on duration of NMS agro-food exports to the geographic EU market segments. We do not have a priori expectation on the impact of degree product differentiation on duration of exports, but we expect a positive effect of the EU enlargement for the duration of agro-food exports.

Our special focus is on the variables that measure institutional aspects of governance with impacts on trading costs and agro-food export duration. Kaufmann et al. (2007) developed measuring the six dimensions of governance: voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption. We expect that economic reforms and the process of enlargement into the more competitive markets (e.g. Sachs et al., 1995) have contributed to improvements in governance and agro-food export performance by the lowering the hazard rate.

DATA

The NMS-12 and NIS-5 agro-food export performances in the EU markets are analyzed by using the detailed Eurostat Comext trade data for the years 1999-2007. The sample consists of 557 items for each year at five-digit level in the Standard International Trade Classification (SITC) system. The agro-food products are defined by the EU-Commission (1997). Following the new trade theory and the pioneering work by Krugman (1979) and Helpman and Krugman (1985), international trade involving homogeneous and differentiated products is different. Agro-food products are traditionally considered as homogeneous, but advanced research and developments in agricultural technologies, innovations in agro-food processing and marketing, have led to agro-food products differentiation and market segmentations. For this reason, we assume that agro-food products also contain both homogeneous and differentiated products. Following Chen et al. (2000), we classify agro-food trade into four commodity groups by the degree of processing: bulk raw commodities, processed intermediates, consumer-ready food, and horticultural produce.

The gross domestic product (GDP) and GDP per capita (GDPCAP) are measured at constant 2000 U.S. dollars. The LAND is the share (in per cent) of agricultural land in total land. All variables are based on the World Development Indicators database by the World Bank (2008). For the missing value, we extrapolate the value of the each explanatory variable for the year 2007. The real effective exchange rate (REER) is defined as the nominal effective exchange rate index adjusted for relative movements in national price or cost indicators of the home CEEC country and selected countries. An increase in the index reflects an appreciation. The REER indices (1995 = 100), which are available only for the NMS, are taken from the Bank of International Settlements database. The governance variables are taken from Kaufmann et al. (2007). The units in which governance is measured follow a normal distribution with a mean of zero and a standard deviation of one in each period. All scores lie between -2.5 and 2.5, with higher scores corresponding to better outcomes.

ROLE OF THE AGRO-FOOD SECTOR IN THE ECONOMY

The role of the agro-food sector in the NMS-12 and NIS-5 economies vary by countries. The relative importance of agriculture in the economy is higher for the NIS-5, Bulgaria, Poland, and Romania, and the share of agriculture in employment is also higher for Latvia and Lithuania (Table 1). The relative importance of agriculture in the economy has remained at a similar level or more often has declined over time. The agro-food export share and its pattern vary considerably by countries. For example, for Moldova, almost two-thirds of merchandise exports consist of agro-food products clearly indicating the important role that the agro-food exports play in development, particularly for the rural population, which has a considerable share in the total population in most of the NMS and NIS economies.

Table 1

The Role of the Agro-Food Sector in the NMS-12 and NIS-5 Economies

	1999				2006			
	Food exports (% of merchandise exports)	Rural population (% of total population)	Agriculture, value added (% of GDP)	Employment in agriculture (% of total employment)	Food exports (% of merchandise exports)	Rural population (% of total population)	Agriculture, value added (% of GDP)	Employment in agriculture (% of total employment)*
Belarus	7	31	15	..	7	27	9	..
Bulgaria	15	31	17	26	9	30	8	9
Cyprus	48	31		4	40	30	..	5
Czech Republic	4	26	4	5	3	26	3	4
Estonia	11	31	6	8	7	31	3	5
Hungary	9	36	5	7	6	33	4	5
Kazakhstan	7	44	10	..	3	43	6	32
Latvia	6	33	4	17	12	32	4	12
Lithuania	12	33	8	19	14	33	5	14
Malta	3	9	..	2	6	6	..	2
Moldova	63	54	28	49	63	58	18	41
Poland	9	38	5	18	9	39	4	17
Romania	6	45	15	42	3	46	11	32
Russia	1	27	7	15	2	27	5	10
Slovakia	4	43	4	7	4	44	4	5
Slovenia	4	49	3	11	3	51	2	9
Ukraine	12	33	14	23	12	32	9	19

Note: 2005 data for the employment share in agriculture.
Source: World Bank (2008).

AGRO-FOOD EXPORTS

The size of agro-food export and its share in total exports to the EU markets vary by the NMS-12 and NIS-5 countries (Table 2). The increase in agro-food exports in real 1999 Euro prices is shown for the EU-15, NMS-12, and EU-27 markets. The EU enlargement in 2004 and 2007, except for Belarus and to a lesser extent for Malta to the EU-15 markets, has contributed to the increase of agro-food exports of the NMS-12 and NIS-5 to the EU geographic market segments. However, the relative share of agro-food in total exports to the EU geographic market segments has largely declined suggesting the fastest of non agro-food export growth.

The geographic context and specific commodities involved in the trade patterns from the individual NMS-12 and NIS-5 to the EU geographic market segments are investigated in-depth by the five-digit SITC product codes and by the four product categories by the degree of product processing, under the assumption that the export value in the initial year 1999 is at least 10,000 Euro and has survived during the analyzed years 1999-2007.

Table A1 in Appendix presents these in-depth evidences on the EU geographic market contexts, and the three the most important specific commodities that are involved in the agro-food exports by the NMS-12 and NIS-5 to the EU-15, NMS-12, and EU-27 markets. Following Chen et al. (2000), we classify agro-food exports into four commodity groups by the degree of processing. Among higher-value added and niche consumer-ready food with the longer duration are cigarettes containing tobacco from the Czech Republic, Latvia, Lithuania, and Poland, other fruit from Belarus, poultry cuts and offal, frozen from Bulgaria, other cheese from Cyprus, caviar and caviar substitutes prepared from fish eggs from Kazakhstan, other fish, fresh or chilled, tomato ketchup and other tomato sauces, and other bakery products from Malta, walnuts, and apple juice from Moldova, meat of bovine animals, fresh or chilled, with bone in, and poultry cuts and offal, fresh or chilled from Poland, wine of fresh grapes from Bulgaria and Moldova, milk and cream from Slovakia and Slovenia, butter and other fats and oils derived from milk and beet sugar, other from Slovakia. Horticultural products have a greater potential in the more Mediterranean part, such as potatoes and other vegetables from Cyprus.

Table 2

Agro-Food Exports to the EU-15, NMS-12, and EU-27 markets

	1999	2003	2007	1999	2003	2007
	in million 1999 Euros			percent of agro-food in total exports		
	Export to the EU-15					
Belarus	75.5	128.7	80.7	14.0.	13.0.	4.1.
Bulgaria	297.6	318.5	420.4	13.2.	9.3.	8.5.
Cyprus	111.3	106.4	153.5	18.4.	12.4.	9.2.
Czech Republic	782.2	912.1	1815.7	4.6.	3.3.	4.1.
Estonia	378.6	441.0	474.9	20.0.	15.6.	14.7.
Hungary	1242.7	1548.8	2112.0	7.1.	6.5.	6.6.
Kazakhstan	34.7	49.8	118.5	2.0.	1.6.	1.2.
Latvia	576.7	722.5	850.1	41.0.	39.7.	32.7.
Lithuania	224.3	396.5	689.0	13.8.	14.5.	20.0.
Malta	11.3	10.1	17.9	1.3.	1.2.	1.7.
Moldova	40.6	51.9	63.8	28.6.	17.5.	19.9.
Poland	1477.1	2180.2	5430.8	8.4.	7.5.	10.9.
Romania	360.5	422.3	538.2	6.2.	4.1.	4.3.
Russia	1572.7	1771.7	2062.9	6.1.	3.7.	2.2.
Slovakia	212.9	235.8	555.5	3.6.	2.1.	3.1.
Slovenia	158.9	152.5	420.9	3.0.	2.3.	4.9.
Ukraine	257.5	489.5	859.0	12.4.	15.4.	15.5.
	Export to the NMS-12					
Belarus	23.8	64.5	131.3	5.2.	7.5.	7.6.
Bulgaria	46.2	97.2	159.7	19.7.	21.2.	14.4.
Cyprus	8.4	11.0	23.4	36.3.	9.8.	7.1.
Czech Republic	403.4	595.9	1471.8	9.3.	9.1.	9.9.
Estonia	55.0	112.6	209.5	17.8.	22.1.	13.8.
Hungary	495.1	582.4	1261.4	24.0.	15.5.	10.9.
Kazakhstan	19.9	31.3	45.6	9.2.	6.1.	3.2.
Latvia	46.0	81.2	368.2	22.1.	25.7.	20.4.
Lithuania	95.0	188.8	500.2	19.7.	20.1.	17.9.
Malta	0.4	0.4	5.5	2.7.	0.4.	5.3.
Moldova	39.0	45.4	61.2	55.3.	46.6.	21.1.
Poland	332.0	568.5	1885.4	13.0.	11.4.	13.9.
Romania	89.5	106.8	261.8	17.0.	9.2.	8.4.
Russia	178.9	349.9	573.9	1.8.	2.2.	1.9.
Slovakia	290.6	445.0	885.1	10.2.	10.5.	9.3.
Slovenia	15.1	15.6	72.3	2.2.	1.4.	3.0.
Ukraine	83.8	212.1	383.0	6.9.	7.4.	7.8.
	Export to the EU-27					
Belarus	99.3	193.2	212.0	9.9.	10.5.	5.8.
Bulgaria	343.8	415.7	580.1	13.8.	10.7.	9.6.
Cyprus	119.7	117.4	176.9	19.1.	12.1.	8.9.
Czech Republic	1185.6	1507.9	3287.5	5.6.	4.5.	5.6.
Estonia	433.6	553.6	684.4	19.7.	16.5.	14.4.
Hungary	1737.8	2131.2	3373.4	8.8.	7.7.	7.8.
Kazakhstan	54.6	81.2	164.1	2.7.	2.2.	1.5.
Latvia	622.7	803.8	1218.2	38.5.	37.7.	27.6.
Lithuania	319.2	585.3	1189.2	15.2.	16.0.	19.0.
Malta	11.7	10.5	23.4	1.4.	1.1.	2.0.
Moldova	79.6	97.3	125.0	37.5.	24.7.	20.4.
Poland	1809.0	2748.7	7316.2	9.0.	8.1.	11.6.
Romania	450.0	529.1	800.1	7.1.	4.6.	5.1.
Russia	1751.5	2121.6	2636.8	4.9.	3.3.	2.2.
Slovakia	503.5	680.8	1440.6	5.7.	4.4.	5.3.
Slovenia	174.0	168.2	493.1	2.9.	2.2.	4.5.
Ukraine	341.4	701.5	1242.0	10.4.	11.6.	11.9.

Note: The nominal Euro values are deflated by annual average harmonized indices of consumer prices (HICP 1999=100) for the Euro area.

Source: Own calculations based on Eurostat Comext trade dataset and Eurostat for HICP.

These agro-food export performances are related both to backward linkages to agricultural production structures and also to developed intermediary and final agro-food processing. The results imply some similarities, but also differences by the NMS-12 and NIS-5 in agro-food export specialization to the EU market segments as a possible result of privatization, restructuring and investments, particularly foreign direct investments, in technology and quality improvements in the food processing industry and in international marketing. Agricultural and particularly horticultural production depends also on climatic conditions.

III. DURATION RATES AND HAZARD EMPIRICAL RESULTS

DURATION ANALYSIS ACROSS EU GEOGRAPHIC MARKET SEGMENTS

We test whether the enlarged geographic EU market is not homogeneous for agro-food exports from the NMS-12 and NIS-5 to the old EU-15 and new NMS-12 geographic market segments. We expect that the length of agro-food exports, especially on the EU-15 markets, differs between NMS-12 and NIS-5. The former are expected to be more competitive and advanced in agro-food exports to the EU-15 markets, and hence their export patterns are expected to be of longer duration.

We begin the empirical analysis by examining the benchmark data, which contain all observations for the NMS-12 and NIS-5 agro-food exports to the EU markets independently of the initial size of agro-food export. Table 3 presents the Kaplan-Meier survival rates for each analyzed country in the last year of the spell.

The duration of agro-food exports differs in the two EU geographic market segments. For the majority of countries the duration of agro-food export is longer on the NMS-12 markets than on the EU-15 markets, except for Bulgaria, Cyprus, Kazakhstan, Malta, Poland, Romania, and Slovenia. The agro-food export survival rates, except for Malta, are higher for the NMS than for the NIS. The survival rates show that the duration of agro-food exports for the NMS is longer than that for the NIS. The Czech Republic, Hungary and Poland experience the highest survival rates, implying also the greater duration of their agro-food export specialization to the EU market segments. An explanation for the relative differences in the shortness or length of the observed relationships between NMS and NIS are differences in comparative advantage.

Table 3

Estimated Kaplan-Meier Survival Rate across EU Geographic Market Segments Between 1999-2007

	Benchmark			Export>Euro10,000 in 1999		
Country	EU-15	NMS-12	EU-27	EU-15	NMS-12	EU-27
Belarus	0.0232	0.0320	0.0483	0.2927	0.2588	0.3378
Bulgaria	0.1947	0.1178	0.2575	0.6478	0.5985	0.7004
Cyprus	0.1365	0.0380	0.1617	0.5856	0.3045	0.6133
Czech Republic	0.3497	0.5645	0.6450	0.7964	0.9021	0.8988
Estonia	0.1614	0.2508	0.3424	0.6904	0.7897	0.8121
Hungary	0.3645	0.4356	0.5506	0.7413	0.8112	0.8370
Kazakhstan	0.0101	0.0051	0.0128	0.2271	0.1991	0.2615
Latvia	0.0896	0.3079	0.3446	0.5749	0.8582	0.8506
Lithuania	0.1908	0.3859	0.4490	0.7063	0.9066	0.9027
Malta	0.0458	0.0103	0.0561	0.1976	0.2465	0.2741
Moldova	0.0256	0.0403	0.0542	0.4340	0.3093	0.3189
Poland	0.5113	0.4810	0.6372	0.8528	0.8666	0.8941
Romania	0.1687	0.1174	0.2432	0.6498	0.5751	0.6985
Russia	0.1537	0.1563	0.2681	0.5610	0.5618	0.6557
Slovakia	0.1813	0.4123	0.4734	0.5979	0.8348	0.8252
Slovenia	0.2132	0.0817	0.2510	0.6999	0.6559	0.6955
Ukraine	0.0823	0.1155	0.1653	0.5306	0.5036	0.5892

Note: EU-27 is treated as single country.
Source: Own estimations on the basis of Eurostat Comext dataset.

As expected, the survival rates are higher under the condition when the value of agro-food export is greater than 10,000 Euro in 1999 vis-à-vis the benchmark (all agro-food exports). The NMS, except for Bulgaria, Cyprus, Romania, and Slovenia, experience higher survival rates in agro-food exports in the NMS-12 markets than in the EU-15 markets, and vice versa for NIS countries, the exceptions being Russia and the Ukraine with no significant difference. In general, the enlarged EU-27 markets provide greater opportunities for competitive agro-food exports with higher survival rates.

DURATION ANALYSIS ACROSS AGRO-FOOD PRODUCT TYPES

Besedeš and Prusa (2006b) extend Rauch and Watson's (2003) matching model to test hypotheses on differences of trade duration by product groups. We use Chen et al. (2000) classification of agro-food products by the degree of processing. We test whether the survival rates for exports in differentiated agro-food products are longer than for homogeneous produce by examining nonparametric Kaplan-Meier estimates of survival function across product groups on the EU geographic market segments.

The survival rates on the EU-15 geographic market segment confirm that the survival rates for consumer-ready food and for horticultural products from the NMS are higher than for bulk raw commodities and processed intermediates, the exceptions being Bulgaria, Romania, and

Slovakia, where the survival rates for bulk raw commodities are higher than for consumer-ready food, and Latvia, where the survival rate for bulk raw commodities is higher than for horticultural products (Table 4). As a rule, the survival rates for the NIS-5, which are – except for Russia and for the Ukraine – relatively low, are the highest for bulk raw commodities. This less profound NIS agro-food export specialisation performance implies limited export viability of their agro-food sector, particularly for export competition in non-primary bulk raw commodities. Logrank tests show that we can reject the hypothesis of equality of survival time across product groups for all the countries, except for Kazakhstan.

The results for the survival rates on the NMS-12 geographic market segment provide similar conclusions, but with less substantial differences in performances between the NMS and NIS. The duration of exports for consumer-ready food and horticultural products is longer than the duration of exports for bulk raw commodities and processed intermediates. The exceptions are found mostly for NIS and Romania. For Moldova and Romania, where the survival rates for bulk raw commodities are higher than for consumer-ready food, and for Belarus, Kazakhstan, and the Ukraine, where the survival rates for bulk raw commodities are higher than for consumer-ready food and for horticultural products. These results again imply particularly difficulties in the NIS agro-food sector's ability to maintain agro-food exports not only on the EU-15 markets, but also on the NMS-12 markets. We can also reject the hypothesis of equality of survival time across product types, except for Kazakhstan.

Table 4

Estimated Kaplan-Meier Survival Rate across Product Types on the EU-15 and NMS-12 Markets Between 1999-2007

Country	Bulk raw commodities	Processed intermediates	Consumer-ready food	Horticulture	logrank test
			EU-15 market		
Belarus	0.0440	0.0181	0.0219	0.0256	0.0084
Bulgaria	0.2440	0.1125	0.2230	0.3317	0.0000
Cyprus	0.0579	0.0480	0.2419	0.2455	0.0000
Czech Republic	0.3565	0.2323	0.4292	0.4301	0.0000
Estonia	0.1191	0.0745	0.2622	0.1786	0.0000
Hungary	0.3845	0.2271	0.4499	0.4846	0.0000
Kazakhstan	0.0223	0.0080	0.0103	0.0040	0.7795
Latvia	0.1227	0.0328	0.1425	0.0740	0.0000
Lithuania	0.1654	0.0927	0.2967	0.1987	0.0000
Malta	0.0107	0.0074	0.0928	0.0862	0.0000
Moldova	0.0520	0.0138	0.0252	0.0412	0.0021
Poland	0.4444	0.3126	0.6996	0.5968	0.0000
Romania	0.2334	0.1059	0.1853	0.2469	0.0000
Russia	0.2142	0.1083	0.1795	0.1489	0.0000
Slovakia	0.2882	0.1120	0.1961	0.2568	0.0000
Slovenia	0.1970	0.1037	0.3191	0.2558	0.0000
Ukraine	0.1356	0.0691	0.0707	0.1281	0.0000

	NMS-12 market				
Belarus	0.0643	0.0246	0.0285	0.0398	0.0067
Bulgaria	0.1079	0.0456	0.1833	0.1731	0.0000
Cyprus	0.0145	0.0175	0.0623	0.0581	0.0000
Czech Republic	0.5528	0.3457	0.7450	0.6697	0.0000
Estonia	0.1689	0.1066	0.4667	0.2107	0.0000
Hungary	0.3560	0.2695	0.5912	0.5332	0.0000
Kazakhstan	0.0147	0.0020	0.0065	0.0000	0.5621
Latvia	0.2177	0.1320	0.5444	0.3284	0.0000
Lithuania	0.2554	0.1800	0.6506	0.4814	0.0000
Malta	0.0075	0.0007	0.0147	0.0275	0.0001
Moldova	0.0517	0.0207	0.0450	0.0825	0.0000
Poland	0.4510	0.2548	0.6869	0.6315	0.0000
Romania	0.1574	0.0643	0.1425	0.1675	0.0000
Russia	0.1625	0.0875	0.2082	0.1978	0.0000
Slovakia	0.3829	0.2351	0.5593	0.5280	0.0000
Slovenia	0.0566	0.0334	0.1378	0.0992	0.0000
Ukraine	0.1972	0.0862	0.1096	0.1659	0.0000

Note: EU-27 is treated as single country.
Source: Own estimations on the basis of Eurostat Comext dataset.

DURATION ANALYSIS ACROSS AGRO-FOOD PRODUCT TYPES AND INITIAL EXPORT SIZE

Following Besedeš and Prusa (2006b), who argue that for each product type, the duration of export increases with the initial export size, we filter out all observations with small export value in the first year below a minimum level. We use the minimum export size criteria 10,000 Euro in the initial year. The survival rates based on these minimum export size criteria increase, thus indicating that the agro-food produce with the initially established export size has experienced higher survival rates (Table 5).

The duration of agro-food exports is now longer, as compared to the EU-15 benchmark case for all agro-food exports. The results suggest that the larger the initial export size, the longer is the export duration for each agro-food product type. The survival rates for consumer-ready food and for horticultural products for the NMS are higher than for bulk raw commodities and processed intermediates. The exceptions are for Bulgaria, Latvia, Lithuania, and Slovakia, where the survival rates for bulk raw commodities are higher than for consumer-ready food and for horticultural products. The exception in the case of Latvia is caused by wood products, whereas the exception in the case of Lithuania is caused by dog or cat food and also different wood products. These results for the NMS suggest higher agro-food export specialisation for export oriented niche consumer-ready food and horticultural products. Such higher value-added agro-food products are absent in the NIS agro-food export structures to the EU markets. Except for Moldova, the NIS survival rates for bulk raw commodities are higher than for

consumer-ready food. The longrank test shows that we can reject the hypothesis of equality of survival time across product groups.

Except for the higher survival rates – and thus a greater duration for already export-oriented agro-food products – the main benchmark findings remain valid also on the NMS-12 markets. Among the NMS, the exceptions are now for Bulgaria, Cyprus, Romania, and Slovenia. Among the NIS, except for Russia, the survival rates for bulk raw commodities are higher than for consumer-ready food. In general, the survival rates on the NMS-12 geographic market segment are higher than on the EU-15 geographic market segment. We can also reject the hypothesis of equality of survival time across product types, except for Kazakhstan, Latvia, and Romania.

Table 5

Estimated Kaplan-Meier Survival Rate across Initial Export Sizes and Product Groups on the EU-15 and NMS-12 Markets Between 1999-2007

Country	Bulk raw commodities	Processed intermediates	Consumer-ready food	Horticulture	logrank test
			EU-15 market		
Belarus	0.8889	0.1600	0.1755	0.4555	0.0000
Bulgaria	0.8577	0.5161	0.6502	0.6280	0.0000
Cyprus	0.2959	0.3338	0.6961	0.8717	0.0000
Czech Republic	0.7980	0.6104	0.9120	0.9346	0.0000
Estonia	0.6834	0.4279	0.8002	0.9466	0.0000
Hungary	0.7610	0.5664	0.8148	0.8673	0.0000
Kazakhstan	1.0000	0.1995	0.1988	0.0000	0.0006
Latvia	0.9286	0.2643	0.7599	0.5577	0.0000
Lithuania	0.9013	0.4936	0.8261	0.6241	0.0001
Malta	0.0000	0.0000	0.4961	0.3987	0.0000
Moldova	0.2061	0.1513	0.5077	0.8980	0.0012
Poland	0.8803	0.6402	0.9580	0.9161	0.0000
Romania	0.6870	0.4322	0.7053	0.9033	0.0000
Russia	0.8438	0.3372	0.6387	0.7068	0.0000
Slovakia	0.8841	0.3861	0.6486	0.7555	0.0000
Slovenia	0.6579	0.5056	0.8306	0.6767	0.0007
Ukraine	0.7357	0.4109	0.4255	1.0000	0.0000
			NMS-12 market		
Belarus	0.5800	0.1210	0.2401	0.4143	0.0000
Bulgaria	0.6819	0.1116	0.7462	0.6456	0.0000
Cyprus	0.0796	0.2647	0.3918	0.1058	0.0000
Czech Republic	0.9356	0.7586	0.9625	0.9677	0.0000
Estonia	0.8083	0.6222	0.8415	0.8717	0.0184
Hungary	0.8281	0.6447	0.8867	0.8784	0.0000
Kazakhstan	0.2913	0.0696	0.2255	n.a.	0.5021
Latvia	0.7373	0.8011	0.8895	0.8732	0.5155
Lithuania	0.8826	0.6949	0.9767	1.0000	0.0000
Malta	n.a.	n.a.	0.2465	n.a.	n.a.
Moldova	0.4687	0.0885	0.3306	0.5751	0.0000
Poland	0.8728	0.6544	0.9369	0.9191	0.0000
Romania	0.6170	0.5079	0.5572	0.6652	0.3864
Russia	0.5511	0.4718	0.5788	0.8482	0.0028
Slovakia	0.8346	0.6553	0.9196	0.9023	0.0000
Slovenia	0.6494	0.3280	0.7335	0.6412	0.0000
Ukraine	0.6178	0.4539	0.4024	0.7629	0.0000

Note: n.a. not applicable, due to missing values in a particular product group. EU-27 is treated as single country.
Source: Own estimations on the basis of Eurostat Comext dataset.

Hazard Model

We aim to identify determinants that are causing the performance patterns in the NMS agro-food export duration. We present the results as the hazard rates (Table 6) for each of the EU geographic market segments.

Table 6

Cox Proportional Hazard Estimates for NMS by EU Market Segments

	EU-15	NMS-12	EU-27
lnGDP	0.652***	0.830***	0.752***
lnGDPCAP	0.563***	0.425***	0.409***
lnLAND	2.003***	1.139***	1.222***
REER	0.957***	0.957***	0.956***
Processed intermediates	1.288***	1.227***	1.272***
Consumer-ready food	0.994	0.725***	0.709***
Horticulture	0.919***	0.792***	0.737***
N	50130	50130	50130
LR $\chi 2(7)$	15249.83	17553.36	12388.36

*** 1 % significance level. Source: Own estimations.

The estimated hazard rate coefficient of less than (greater than or equal to) one is interpreted as indicating that the variable lowers (increases or has no impact on) the hazard rate. The empirical results confirm our expectations that the market size (GDP) and level of development (GDPCAP) decrease significantly the hazard rate of the NMS-10 agro-food exports for each of the EU geographic market segments, and vice versa agricultural factor endowment (LAND). The estimated hazard rate coefficient for the REER is close, but less than one. The hazard model estimates are also explained by the dummy variable for the degree of agro-food product processing using bulk raw commodities as the benchmark. When exporting processed intermediates, this increases the hazard rate, while the consumer-ready food and horticultural products decrease the hazard rate.

HAZARD MODEL WITH THE GOVERNANCE VARIABLE

The impacts of governance variables on transaction costs in bilateral international trade so far have been neglected in the research on the effects of governance on bilateral agro-food trade (Olper and Raimondi, 2007). We expect that good institutions are important not only for the size of trade, as argued by trade literature, but also that good governance might play an important role for the duration of trade. Therefore, we estimate governance variables using Kaufmann et al. (2007). In order to select the relevant variables from a larger number of variables, we apply the principal component method (Table 7). This instrument is used to identify the single common component for the governance indicators. Each weight within the common component is rather low, but all are positive and of rather equal size.

Table 7

Principal Component Analysis for governance variables

Institutions	Component 1
Voice and Accountability	0.4165
Political Stability	0.3783
Government effectiveness	0.4317
Regulatory quality	0.3863
Rule of law	0.4228
Control of corruption	0.4111
Cumulative proportion	0.8519
Kaiser-Meyer-Olkin measure of sampling adequacy	0.8818
Cronbach alpha:	0.9600

To estimate the importance of the governance on the hazard rate, we employ the extended hazard model to investigate the effect of the quality of good governance on agro-food export duration, which so far has been neglected in the literature. Table 8 presents the empirical results with the governance variable for the NMS-12 and NIS-5, but without the REER, which is only available for the NMS-10. As a striking finding, LAND decreases significantly the hazard rate of the NMS-12 and NIS-5 agro-food exports for each of the EU geographic market segments. The parameter pertaining to the variable governance indicates that good institutions improve agro-food exports in each of the EU market segments and thus confirms our theoretical expectations that good governance plays the important role not only for the size of trade, but also for the duration of agro-food trade from the NMS-12 and NIS-5 to the EU market segments. This finding adds to the trade literature that the governance framework is important for both the size of trade and for the duration of trade.

Table 8

Cox proportional hazard estimates for market segments with governance

	EU-15	NMS-12	EU-27
lnGDP	0.955***	1.068***	0.987***
lnGDPCAP	0.089***	0.117***	0.107***
lnLAND	1.569***	1.011	1.078**
Exchange rate	0.950***	0.952***	0.951***
Processed intermediates	1.283***	1.226***	1.270***
Consumer-ready food	0.990	0.724***	0.707***
Horticulture	0.919***	0.792***	0.737***
Governance	1.499***	1.332***	1.347***
N	50130	50130	50130
LR $\chi 2(8)$	20142.84	17291.25	14143.68

IV. CONCLUSIONS AND POLICY IMPLICATIONS

The agro-food exports play a significant role in the NMS and NIS-5 economies with still a relatively high share of rural population. The main contribution of the paper is to analyze the NMS-12 and NIS-5 exports performances after the eastward EU enlargement, using the survival analysis and hazard model. The EU enlargement has caused significant increases in agro-food exports between the NMS-12 and particularly from them to the EU-15 market. The duration analysis confirms higher survival rates for the NMS-12 agro-food exports than for the NIS-5 to the EU markets. This implies larger duration for the agro-food exports from the former. For the majority of the NMS-12 and NIS-5, the length of agro-food exports measured by the survival rates is higher on the NMS-12 geographic market segment than on the EU-15 geographic market segment. This fact can be explained by at least two factors. First, the results imply that agro-food exports to the NMS-12 markets may be easier for post-communist countries than to the EU-15 markets, probably due to still less competition and lower quality requirements. Second, the tradition with trade resistance and market fragmentation, and border effects due to different reasons such as complex trade policy with asymmetries in market access and border-related trade barriers can also play an important role in export destinations, which is consistent with the trade models.

We find significant differences in export duration by agro-food product groups. For the NMS-12, the duration of agro-food exports is longer for higher value-added consumer-ready food and horticultural products than for bulk raw commodities and processed intermediates. The larger initial agro-food export size is more likely to survive than for those starting with small values. These results confirm the hypotheses of Besedeš and Prusa (2006b). First, more differentiated consumer-ready food products are exported for more extended periods than more homogeneous bulk raw commodities. Second, trade relationships starting with larger initial exports are more likely to survive the observed five year period than those starting with small values. We note that these estimations for the NMS-12 are robust for both EU geographic market segments. On the other hand, this still does not hold for the NIS-5. For them the duration of agro-food exports is among the highest for lower value-added bulk raw commodities. This less profound agro-food export duration performance of the NIS on the EU markets can be explained by their being out of the eastward EU enlargement, and possibly by being left out of the greater internationalization and globalization of the NIS agro-food sector. This implies the importance of market imperfections in the NIS.

The hazard model by the EU geographic market segments confirms the significance of traditional trade variables in explaining the patterns in agro-food export duration in the NMS-12 and NIS-5. The market size and level of development decrease the hazard rate and thus provide comparative advantages for agro-food exports to each of the EU geographic market segments, while the results for richness in agricultural factor endowment are mixed. The real effective exchange rate appreciation decreases slightly the hazard rate. Exporting processed intermediates increases the hazard rate, while exporting consumer-ready food and horticultural products decreases the hazard rate. This implies that the NMS-12 and NIS-5 should aim to improve food processing and marketing in higher-value added and niche consumer-ready food and horticultural products. The EU eastward enlargement has strengthened agro-food trade creation for the NMS. The good governance improves the duration of agro-food exports.

In a spite of questioning the progressive story of European integration (Gilbert, 2008) and different economic mythology of European integration (Jones, 2010) our results confirm the importance of policy reforms assuring quality of governance to provide incentives for agro-food export expansion and duration. The lessons learnt and policy implications are in favour of EU enlargement and good governance for development on agro-food products that are demanded by the consumers in the EU importing markets. A model examining the costs and benefits of exporting agro-food products can provide a policy recommendation on which agro-food products to specialize, as an issue for future research.

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Table A1

The Three the Most Important Export Products

	SITC product code			Product category by the degree of processing		
	1st product	2nd product	3rd product	1st product	2nd product	3rd product
			EU-27			
Belarus	24820	24740	5839	1	1	3
Bulgaria	11217	12110	26873	3	1	2
Cyprus	5410	2499	5459	4	3	4
Czech R.	12220	24820	24740	3	1	1
Estonia	24820	24620	24740	1	1	1
Hungary	4490	4120	8195	1	1	2
Kazakhstan	4120	26310	3440	1	2	3
Latvia	24820	24740	12220	1	1	3
Lithuania	8195	24820	12220	2	1	3
Malta	3418	9842	23125	3	1	1
Moldova	5776	5994	11217	3	3	3
Poland	12220	1111	1234	3	3	3
Romania	121	119	24840	2	2	1
Russia	24820	24740	4120	1	1	1
Slovakia	24820	4820	2212	1	2	3
Slovenia	2212	24840	24740	3	1	1
Ukraine	42151	22261	24840	2	1	1
			EU-15			
Belarus	24820	5839	24840	1	3	1
Bulgaria	12110	1235	26873	1	3	2
Cyprus	5410	2499	5459	4	3	4
Czech R.	24820	24740	12220	1	1	3
Estonia	24820	24740	24620	1	1	1
Hungary	4490	4120	22240	1	1	1
Kazakhstan	4120	26310	3717	1	2	3
Latvia	24820	24740	24611	1	1	1
Lithuania	8195	24820	24740	2	1	1
Malta	3418	9842	4849	3	3	3
Moldova	5776	5994	11217	3	3	3
Poland	1111	12220	1234	3	3	3
Romania	119	24840	24820	2	1	1
Russia	24820	24740	4120	1	1	1
Slovakia	24820	2300	6129	1	3	3
Slovenia	2212	24840	24740	3	1	1
Ukraine	42151	22261	24840	2	1	1
			NMS-12			
Belarus	24820	24740	5839	1	1	3
Bulgaria	11217	4849	4842	3	3	3
Cyprus	4490	12220	1222	1	3	3
Czech R.	12220	11102	9899	3	3	3
Estonia	11102	1221	42179	3	3	2
Hungary	4490	4120	7131	1	1	3
Kazakhstan	3440	26310	4110	3	2	1
Latvia	12220	2212	24820	3	3	1
Lithuania	12220	6129	9899	3	3	3
Malta	3418	9899	4842	3	3	3
Moldova	42151	22240	42159	2	1	2
Poland	12220	1221	9899	3	3	3
Romania	8131	121	11102	2	2	3
Russia	24820	24740	3425	1	1	3
Slovakia	4820	4842	2212	2	3	3
Slovenia	9899	5740	7390	3	3	3
Ukraine	42151	24840	24820	2	1	1

Note: Export products are by the SITC product codes and by the product categories by the degree of product processing (Export>10,000 Euro in 1999 and survived during all the analyzed years 1999-2007). The five-digit SITC product code: 119 – other than pure-bred breeding animals; 121 – sheep, live; 1111 – meat of bovine animals, fresh or chilled, with bone in; 1221 – meat fresh or chilled; 1222 – meat, frozen; 1234 – poultry cuts and offal, fresh or chilled; 1235 – poultry cuts and offal, frozen; 2212 – milk and cream, of a fat content, by weight, exceeding 1%; 2300 – butter and other fats and oils derived from milk; 2499 – other cheese; 3418 – other fish, fresh or chilled; 3425 – cod, frozen; 3440 – fish fillets, frozen; 3717 – caviar and caviar substitutes prepared from fish eggs; 4110 – durum wheat, unmilled; 4120 – other wheat (including spelt) and meslin; 4490 – other cereals; 4820 – malt, whether or not roasted; 4842 – sweet biscuits, 4849 – other bakery products; 5410 – potatoes, fresh or chilled; 5459 – other vegetables, fresh or chilled; 5740 – apples, fresh; 5776 – walnuts; 5839 – other fruit; 5994 – apple juice; 6129 – beet sugar. other; 7131 – extracts, essences and concentrates of coffee, and preparations with a basis of these extracts, essences or concentrates or with a basis of coffee (liquor); 7390 – other chocolate and food preparations containing cocoa; 8131 – vegetable residues of soya beans; 8195 – dog or cat food; 9842 – tomato ketchup and other tomato sauces; 9899 – other food preparations; 11102 – waters (including mineral waters and aerated waters); 11217 – wine of fresh grapes; 12110 – cigars, cheroots and cigarillos; 12220 – cigarettes containing tobacco; 22240 – sunflower seeds; 22261 – rape or colza seeds; 23125 – technically specified natural rubber; 24611 – wood coniferous; 24620 – sawdust and wood waste and scrap; 24740 – wood of coniferous species, in the rough; 24820 – wood of coniferous species, sawn or chipped lengthwise; 24840 – wood of non-coniferous species specified in heading 247.5; 24740 – wood of coniferous species, in the rough; 26310 – cotton (other than linters); 26873 – wool tops and other combed wool; 42151 – crude oil; 42159 – refined oil and fractions thereof; 42179 – refined oil and fractions thereof. The product category by the degree of product processing: 1 – bulk raw commodities, 2 – processed intermediates, 3 – consumer-ready food, and 4 – horticulture. *Source:* Own estimations on the basis of Eurostat Comext dataset.

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