Hungarian and Romanian Agri-Food Trade in the European Union

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The paper investigates the competitiveness of Hungarian and Romanian agri-food products in the European Union by employing the Constant Market Share (CMS) method. The empirical results indicate that the driving force of export increase of agricultural products to the EU markets was the increase of import of these products to the EU (structural effect) and not the increase of competitiveness (residual effect and second order effect) for both countries. The positive signs of residual effect and second order effect indicate enhancing competitiveness of both countries in the EU, but the lower values compared to structural effect showed that they have not succeeded in increasing their market share.

Key words: Hungary, Romania, competitiveness, export, constant market share

Introduction

The competitiveness of Hungarian agri-food products has not received great interest in the literature; a few papers have investigated it at a specific period during the transition (Fertő 2004; Fogarasi 2003). No research, however, has attempted to provide a comparison with Romanian agri-food trade performance.

Comparing two countries in terms of competitiveness in contrast to a reference market has not been widely studied. Concerning the Eastern and Central European countries, the study by Bojnec and Fertő (2006) about comparative advantage and competitiveness of Hungarian and Slovenian agri-food trade in the EU markets over the period 1993–2003 should be mentioned. The authors used Revealed Comparative Advantage (RCA) indexes to measure comparative advantage and competitiveness of agricultural trade in the analysed countries. On the basis of the empirical results, the authors found that comparative advantage and competitiveness are not the same; therefore research on comparative advantage should be interpreted with care in terms of competitiveness.

By contrast, the Constant Market Share (CMS) method will be employed in this paper, giving the possibility to assess the competitive-

ness of the studied countries in the EU. The method applied is that proposed by Tyszynsky (1951) in the case of world trade concerning the manufactured commodities, and its theoretical foundation is synthesised by Fagerberg and Solle (1987). This method was also used by Fertő (2001) to assess the Hungarian agricultural trade competitiveness in the EU. The competitiveness of both countries will be measured by the CMS method based on the United Nations commercial data in SITC specification.

In order to compare the competitiveness of agri-food trade between Hungary and Romania, firstly the competitiveness of both countries in the EU agri-food markets will be assessed, followed by an analysis of bilateral competitiveness between the studied countries.

Chen and Duan (2000) defined two levels of CMS-model decomposition. First-level decomposition contains the structural effect, the residual effect and the second-order effect, while the second-level decomposition is a more detailed distribution of the first-level distribution. The second-level decomposition includes: the growth effect, market effect, commodity effect, interaction effect, pure residual effect, static structural residual effect, pure second-order effect and dynamic structural residual effect. This analysis is the first stage of a wider research project, hence we will employ the first-level decomposition of the CMS model.

Foreign trade with agri-food products in Hungary and Romania is expanding in terms of bilateral trade as well as with the European Union (EU). The question is whether the export increases are due to competitiveness improvement of agri-food products on the reference markets, or whether they are due to structural effects rising in to the reference markets of these products. It is also interesting to find out which products become more competitive and for which products the competitiveness has worsened in the analysed countries. Therefore, the aim of this paper is to investigate the competitiveness of agri-food trade between the two selected new EU member countries (Hungary and Romania, respectively) and EU member countries.

Methodology and Data

THE CONSTANT MARKET SHARE (CMS) METHOD

The CMS model is based on the assumption that export share in a certain market remains unchanged on the same competitiveness level. Thus any change occurring in the export of any country or competi-

tor countries can be attributed to changes in the market components and competitiveness. The traditional CMS model explains export alteration by two effects: residual ($S^0\Delta Q$) and structural ($Q^0\Delta S$) effects as follows:

$$\Delta q = S^0\Delta Q + Q^0\Delta S, \tag{1}$$

where S represents the country's share in the reference market, q is the particular country's exports to the reference country, Q indicates the exports directed to the reference market, and Δ is the first difference operator measuring the change occurring between two consecutive time periods. The share of a certain country in the reference market is defined as follows:

$$S = \frac{q}{Q}. \tag{2}$$

The first expression ($S^0\Delta Q$) on the right side of the equation (1) is the structural effect expressing the changes occurring in agri-food export directed to the reference market during the period in question due to the changes in import of these products in the reference market. If the export of these products increases (decreases), supposing a constant market share (S^0), the export directing to the reference market is also increasing (decreasing).

The second component ($Q^0\Delta S$) is the residual effect, which explains competitiveness alteration by the export change.

The traditional CMS model in recent works is extended by the second order effect ($\Delta Q\Delta S$), which captures the relation between structural and residual effects, as can be seen in the following:

$$\Delta q = S^0\Delta Q = Q^O\Delta S + \Delta Q\Delta S. \tag{3}$$

Equation 3 can be extended to several (n) products and several (n) markets and presented in more generalized form as follows:

$$\Delta q = \sum_i\sum_j S_{ij}^0\Delta Q_{ij} + \sum_i\sum_j Q_{ij}^0\Delta S_{ij} + \sum_i\sum_j \Delta Q_{ij}\Delta S_{ij}, \tag{4}$$

where Q_{ij} expresses the export of i product to the reference market from the j market.

The limitations of the traditional CMS model, i. e. that CMS estimations are sensitive to the starting point of the analysis, to the aggregation level of products and to the reference market definition, are discussed in more detail in the literature (Fertő 2001).

TABLE 1 Results of aggregate agri-food export

	Hungary		Romania	
	Million USD	%	Million USD	%
Structural effect	537.0	51.9	151.6	54.9
Residual effect	374.4	36.2	93.7	33.9
Second-order effect	122.9	11.9	30.7	11.1
Change in export	1,034.3	100.0	276.0	100.0

NOTE Source: author's calculations based on SITC data.

DATA

Hungarian and Romanian agri-food export data to the European Union are used at two and three digit SITC codes level from the United Nations' commercial (UNCTAD) database from the 1999 to 2005 period. The agri-food export contains 21 product groups, and the export to the European Union is analysed after aggregate level in 24 member states.

Empirical Results

AGGREGATE EXPORT PERFORMANCE

The agri-food export to the EU-25 increased from both countries in the analysed period mainly due to the structural effect (51,9% and 54,9%, in the case of Hungary and Romania respectively), while the improvement of competitiveness was responsible for export expansion to a lesser extent (36,2% and 33,9%). The relation between structural effect and residual effect expressed by second order effect is also positive, as can be seen in table 1.

The increase of Hungarian agri-food exports to the EU-15 was driven mainly by the structural effect, while the residual effect and second order effect were negative in the period of 1992–1998 (Fertő 2004). Whereas the residual effect and second order effect become positive after EU accession, comparative to the starting point of this analysis. This needs further research to test the sensibility of the results to the starting point of the analysis and to the different size of the European Union in terms of the number of member states, since the former analysis compared Hungarian agri-food export performance to the European Union containing 15 member states, while the present article compares it to the EU-25.

As a conclusion it can be stated that, although Hungarian export increase was four times that of Romanian export increase in the European Union (EU-25), in both countries the relative structure of the effects of traditional CMS model was almost the same.

AGRI-FOOD EXPORT PERFORMANCE BY PRODUCT GROUP

Table 2 indicates that structural effects within total export are positive for all product-groups in Hungary, except for tobacco, hides and textile fibres. The residual effects are also positive in most product groups during the analysed period, although negative value can be observed in the case of meat, vegetables and fruit, beverages, cork and wood, crude animal and vegetable materials, and animal and vegetable fats; while Fertő (2004) found negative residual effect for a former period also for live animals, dairy products and eggs, fish, coffee, oil seeds and fixed vegetable oils and fats. This table shows an improvement of competitiveness in the EU of Hungarian agri-food products with positive residual effects and in most cases with larger values than the structural effects, as can be seen in the case of dairy products and eggs, fish, sugar, tea and spices, animal feed stuff, miscellaneous edible, tobacco, hides, oil seed, crude rubber, textile fibres and starches.

In table 3 Romanian agri-food export results are presented, where negative signs of structural effects can be observed for tobacco, hides and textile fibres, and in the case of residual effects for fish, animal feed stuff, hides, crude rubber, fixed vegetable fats and oils, and animal and vegetable fats.

The residual effects are higher than structural effects for meat, dairy products and eggs, cereals, tea and spices, oil seed, textile fibres, animal oils and fats, and starches, which means that the competitiveness of these products has increased in the EU-25 in the analysed period.

In both countries an important export increase to the European Union has taken place in the analysed period, first of all due to structural effects, but residual effects become also positive which indicates increasing competitiveness in the majority of product-groups; moreover in a dozen of the product-groups residual effects are higher than structural effects.

AGRI-FOOD EXPORT PERFORMANCE IN THE EU BY MEMBER STATES

CMS analysis has also been applied by EU member countries in the case of both countries. Table 4 indicates that the market share of Hungarian agri-food exports in the European Union has risen from 0.70 to 0.79 per cent during the analysed period, as the export share has increased in twelve of the 24 countries: Austria, Denmark, Estonia, France, Germany, Greece, Ireland, Italy, Malta, the Netherlands,

TABLE 2 Results of Hungarian disaggregated CMS analysis by product groups

	Product group	(1)	(2)	(3)	(4)	(5)
00	Live animals	13.05	14.28	17.9	6.6	1.7
01	Meat, meat preparations	14.45	12.54	217.4	−57.5	−28.6
02	Dairy products, bird eggs	3.50	6.47	2.0	25.1	1.7
03	Fish, crustaceans, mollusc	0.04	0.07	1.7	3.1	1.9
04	Cereals, cereal preparations	7.95	9.83	98.3	39.3	23.3
05	Vegetables and fruit	2.53	2.36	158.5	−22.9	−10.8
06	Sugar, sugar preparations, honey	1.84	5.29	14.7	51.8	27.5
07	Coffee, tea, cocoa, spices	0.63	1.17	9.0	40.1	7.7
08	Animal feed stuff	1.18	2.92	25.3	90.4	37.3
09	Miscellaneous edible products and preparations	1.55	3.38	4.1	24.9	4.8
11	Beverages	2.58	2.09	41.9	−13.8	−7.9
12	Tobacco, tobacco manufactures	0.30	0.51	−0.8	5.5	−0.5
21	Hides, skins and furskins, raw	0.77	0.90	−1.2	1.3	−0.2
22	Oil seed, oleaginous fruit	2.00	3.78	22.8	80.2	20.3
23	Crude rubber	0.02	0.51	0.2	9.0	5.7
24	Cork and wood	2.36	2.20	36.6	−9.0	−2.4
26	Textile fibres	0.44	0.74	−1.4	11.2	−0.9
29	Crude animal and vegetable materials	2.70	2.14	20.4	−17.3	−4.2
41	Animal oils and fats	2.64	2.84	0.7	0.3	0.1
42	Fixed vegetable fats and oils	0.71	0.96	12.2	5.4	4.4
43	Animal and vegetable fats and oils, processed	0.47	0.39	1.0	−0.3	−0.2
59211/2/3	Wheat-/maize starch	3.54	5.06	0.02	0.09	0.01
Total		2.20	2.67	562.5	353.8	121.7

NOTES Column headings are as follows: (1) share of Hungarian exports in EU, 1999–2000 (%), (2) share of Hungarian exports in EU, 1999–2000 (%), (3) structural effect (million USD), (4) residual effect (million USD), (5) second-order effect (million USD). Source: author's calculations based on SITC data.

Portugal and the United Kingdom. The share of these countries has been 49 per cent in Hungarian agricultural exports in 2005.

The structural effects are positive for all member states and they are especially high for Austria, Czech Republic, Germany, Italy, Poland and Slovenia. The share of these countries concerning the total structural effect is about 75 per cent. In other words, the growth of exports to Hungary's main export markets can be explained mainly by the increase of imports in these countries. However, the residual and second order effects indicate that the competitiveness of Hungarian export in these markets has declined considerably, or else the

TABLE 3 Results of Romanian disaggregated CMS analysis by product groups

	Product group	(1)	(2)	(3)	(4)	(5)
00	Live animals	12.38	14.98	17.00	14.02	3.58
01	Meat, meat preparations	0.33	0.67	4.90	10.29	5.12
02	Dairy products, bird eggs	0.53	1.41	0.30	7.53	0.50
03	Fish, crustaceans, mollusc	0.03	0.01	1.37	−2.62	−1.02
04	Cereals, cereal preparations	0.77	1.90	9.52	23.52	13.94
05	Vegetables and fruit	0.39	0.49	24.48	13.44	6.33
06	Sugar, sugar preparations, honey	0.62	1.02	6.08	3.92	2.08
07	Coffee, tea, cocoa, spices	0.01	0.03	0.15	1.54	0.30
08	Animal feed stuff	0.32	0.24	6.85	−3.90	−1.61
09	Miscellaneous edible products and preparations	0.03	0.32	0.07	3.99	0.77
11	Beverages	0.67	0.45	10.94	−6.43	−3.69
12	Tobacco, tobacco manufactures	0.07	0.06	−0.17	−0.14	0.01
21	Hides, skins and furskins, raw	2.01	1.99	−3.11	−0.22	−0.04
22	Oil seed, oleaginous fruit	1.03	1.40	11.96	15.87	4.01
23	Crude rubber	0.08	0.03	0.95	−0.91	−0.58
24	Cork and wood	2.74	2.89	42.57	8.55	2.31
26	Textile fibres	0.13	0.34	−0.40	8.03	−0.65
29	Crude animal and vegetable materials	0.39	0.42	2.94	0.84	0.20
41	Animal oils and fats	0.01	0.96	0.00	1.40	0.47
42	Fixed vegetable fats and oils	0.73	0.63	12.62	−2.11	−1.69
43	Animal and vegetable fats and oils, processed	0.38	0.37	0.82	−0.03	−0.02
59211/2/3	Wheat-/maize starch	0.06	0.39	0.00	0.02	0.00
Total		0.62	0.74	158.8	86.9	29.9

NOTES Column headings are as follows: (1) share of Romanian exports in EU, 1999–2000 (%), (2) share of Romanian exports in EU, 1999–2000 (%), (3) structural effect (million USD), (4) residual effect (million USD), (5) second-order effect (million USD). Source: author's calculations based on SITC data.

importance of structural effects is more important (the competitiveness has not increased).

There are only six countries where the residual effects are higher than the structural effects, in other words the competitiveness has increased: Denmark, Greece, Ireland, Malta, the Netherlands, Portugal and the United Kingdom. But these countries cannot be considered the main export markets of Hungarian agricultural exports, as the share of agi-food export is only 11 per cent to these destinations.

Table 5 displays that market share of Romanian agri-food exports

TABLE 4 Results of Hungarian disaggregated CMS analysis by member states

Country	(1)	(2)	(3)	(4)	(5)
Austria	3.64	4.33	110.3	36.6	20.8
Belgium	0.28	0.26	21.6	−2.8	−1.9
Cyprus	0.56	0.44	1.3	−0.9	−0.3
Czech Republic	3.33	3.19	66.8	−3.1	−2.8
Denmark	0.12	0.23	3.9	6.3	2.9
Estonia	1.33	1.39	5.3	0.4	0.2
Finland	0.40	0.38	6.0	−0.6	−0.3
France	0.30	0.37	34.0	18.9	7.3
Germany	1.06	1.13	154.3	28.0	9.6
Greece	0.36	1.27	8.8	35.8	21.9
Ireland	0.02	0.04	0.4	1.0	0.5
Italy	0.78	0.94	86.3	45.9	18.1
Latvia	1.79	1.29	9.5	−2.3	−2.7
Lithuania	2.99	1.68	18.4	−9.2	−8.0
Luxembourg	0.01	0.01	0.1	0.0	0.0
Malta	0.16	0.42	0.2	0.8	0.3
Netherlands	0.37	0.62	33.7	51.4	23.2
Poland	2.96	2.28	74.2	−25.9	−16.9
Portugal	0.02	0.09	0.4	3.8	1.2
Slovakia	5.30	4.87	48.1	−4.0	−3.9
Slovenia	10.75	7.36	58.2	−29.1	−18.3
Spain	0.43	0.30	43.0	−23.5	−13.4
Sweden	0.63	0.49	23.2	−7.3	−5.2
United Kingdom	0.14	0.25	19.8	36.2	16.5
EU-25	0.70	0.79	738.7	203.2	91.7

NOTES Column headings are as follows: (1) export share (the share of Hungarian agri-food export in the EU agri-food imports), 1999–2001 (%), (2) Export share (the share of Hungarian agri-food export in the EU agri-food imports), 2003–2005 (%), (3) structural effect (million USD), (4) residual effect (million USD), (4) second-order effect (million USD). Source: author's calculations based on SITC data.

to the European Union has also risen from 0.19 to 0.22 per cent as the market share has increased in twelve export destination countries: Belgium, Cyprus, Estonia, France, Greece, Italy, Luxembourg, Portugal, Slovakia, Slovenia, Spain and the United Kingdom. The share of these countries has been 37 per cent of Romanian total agricultural exports in 2005.

The structural effects are positive for all member states and they are especially high for Austria, Germany, Greece, Hungary and Italy. The share of these countries in the total structural effects is about

TABLE 5 Results of Romanian disaggregated CMS analysis by member states

Country	(1)	(2)	(3)	(4)	(5)
Austria	0.56	0.40	16.90	–8.21	–4.65
Belgium	0.02	0.04	1.77	3.79	1.62
Cyprus	0.41	0.55	0.91	1.04	0.32
Czech Republic	0.18	0.17	3.56	–0.27	–0.24
Denmark	0.03	0.02	0.88	–0.36	–0.17
Estonia	0.06	0.17	0.23	0.74	0.44
Finland	0.04	0.03	0.54	–0.12	–0.07
France	0.07	0.08	7.97	2.89	1.13
Germany	0.15	0.14	21.65	–4.15	–1.42
Greece	1.26	1.76	30.58	19.92	62.70
Hungary	4.33	3.37	60.54	–12.46	–13.35
Ireland	0.02	0.01	0.32	–0.23	–0.11
Italy	0.48	0.54	53.55	17.21	6.78
Latvia	0.07	0.02	0.36	–0.24	–0.28
Lithuania	0.03	0.01	0.19	–0.14	–0.12
Luxembourg	0.01	0.03	0.07	0.30	0.18
Malta	0.07	0.06	0.09	–0.02	–0.01
Netherlands	0.10	0.08	9.07	–4.16	–1.88
Poland	0.46	0.40	11.62	–2.46	–1.61
Portugal	0.12	0.21	2.19	4.85	1.52
Slovakia	0.14	0.20	1.31	0.54	0.52
Slovenia	0.71	0.78	3.83	0.61	0.39
Spain	0.12	0.22	11.60	18.54	10.53
Sweden	0.03	0.02	1.02	–0.33	–0.23
United Kingdom	0.02	0.03	3.44	0.60	0.26
EU-25	0.19	0.22	204.61	61.45	27.43

NOTES Column headings are as follows: (1) export share (the share of Romanian agri-food export in the EU agri-food imports), 1999–2001 (%), (2) Export share (the share of Romanian agri-food export in the EU agri-food imports), 2003–2005 (%), (3) structural effect (million USD), (4) residual effect (million USD), (4) second-order effect (million USD). Source: author's calculations based on SITC data.

75 per cent. Consequently, similarly to the Hungarian agri-food export increase, the growth of export from Romania to the European Union can be attributed to the increase of imports of these products in the EU.

The residual effects and second order effects are positive in almost half of the member states, with higher values in Greece, Italy and Spain, but in the first two countries the residual effects are lower than the structural effects.

The export share of Romanian agricultural products has decreased in the Hungarian agri-food import between 1999 and 2005, although the export of these products to Hungary has increased in a considerable amount as the structural effect indicates. However the negative sign of residual and second order effects reveals the competitiveness worsening of Romanian agricultural products in the Hungarian market.

It can be concluded that, for all product-groups, the structural effects are positive, except for the three less important product-groups for both countries, while the residual effects are negative in the case of six product-groups and eight product-groups for Hungary and Romania respectively, and the values of positive residual effects exceed the structural effects in the case of twelve product-groups and nine product-groups for Hungary and Romania, respectively.

Hungarian agri-food exports become more competitive in Denmark, Greece, Ireland, Malta, the Netherlands, Portugal and the United Kingdom, as the residual effects are higher than the structural effects, while export competitiveness decreased in eleven member states, of which the more important are Poland, Slovenia and Spain since the residual effects are negative.

The competitiveness of Romanian agricultural export has improved in Belgium, Cyprus, Estonia, Luxembourg, Portugal and Spain, while it decreased in thirteen member states, of which the more important are Austria, Germany, Hungary and the Netherlands.

Conclusion

The competitiveness of Hungarian and Romanian agri-food export to European Union (EU-25) markets has been investigated. The Constant Market Share analysis results indicate that the increase of agri-food export from Hungary and Romania to the European Union may be attributed mainly to import increase of these products in the EU and not to competitiveness improvement.

Both Hungary and Romania have improved competitiveness for several product-groups, as is indicated by the positive residual effects, but the competitiveness worsened in case of the Hungarian meat and meat preparations, vegetables and fruit, beverages, cork and wood, and crude animal and vegetable exports, and in the case of Romanian fish and crustaceans, animal feed stuff, beverages, and fixed animal fats and oils. Disaggregated CMS analysis by member states revealed the worsening of Hungarian agri-food products com-

petitiveness in Poland, Slovenia and Spain, and an important competitiveness decline of Romanian agri-food export to Hungary.

Previous studies (Fertő 2004; Fogarasi 2003) have shown that Hungarian agri-food export competitiveness declined in the EU during the transition period, while our analysis focused mainly on the preaccession period, indicating the increase of agri-food products competitiveness in the EU markets even though the export expansion driving force is not that of competitiveness increase. Further investigations are needed by extending the analysed period to test the sensibility of the CMS method to the starting point of the analysis.

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