Effect of the 2008–2009 economic crisis on the results of agricultural foreign trade of the Czech Republic

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Abstract: After accession of the Czech Republic to the EU in 2004, the volume of agricultural foreign trade (AFT) in the CR increased significantly. In the past two years, the trend has changed under the influence of the global economic crisis affecting the European area. The first part of the paper is focused on the overall development in the period of 2004–2009. To assess the competitiveness of agrarian commodities in foreign markets in 2008–2009, an analysis was carried out with the use of the Balassa RCA Indicator (Revealed Comparative Advantage) and also Michaely Index, which indicates a certain degree of specialization in exports. A logarithmic method, which allows determining the influence of prices and quantities on the change in net exports during these years, has also been used.

Key words: agrarian foreign trade, competitiveness, competitive advantage, Balass RCA indicator, Michaely index

The Czech Republic's accession to the EU was accompanied by a significant opening up of the national economy and a strong growth of both exports and imports. Its foreign trade was assisted by a much larger market area without customs restrictions. However, it also became exposed to a much tougher competition (Svatoš and Smutka 2009). In the agrarian foreign trade during 2004–2009, the period under observation, these influences have been reflected in a significant change in the volume, but gradually also in the change in the structure of net exports. Some commodities had begun to assert more strongly in foreign markets while some, even the "traditional" ones, gradually lost their position. The positive trend has changed during the years of 2008 and 2009. The changes can be attributed to the impact of global economic crisis, which has affected the European area as well.

In the recent years, increasing attention has been paid to the issues of competitiveness, both at the national and supranational levels. Success in foreign trade activity is one measure of the success of an industry as well as of the entire national economy. Competitiveness assessments are generally carried out for a given commodity on the basis of easily observable, quantified data using specific recommended indicators (Svatoš et al. 2010).

MATERIAL AND METHODS

Use of RCA and MI indicators

Measure of competitiveness of the individual commodities of the Czech Republic's foreign trade could be expressed in the net exports of the commodity in relation to the total turnover of the commodity or the total turnover of agrarian trade.

The whole complex of economic and non-economic factors that affect the competitiveness of the individual commodities cannot be determined statistically, but it is possible to use a supplementary RCA indicator – an indicator of the Revealed Comparative Advantage. To calculate this indicator, the following calculation method was selected.

The RCA concept was expressed by Balassa (1965, 1985) as follows:

$$RCA_j = [(EX_j - IM_j) / (EX_j + IM_j)] \times 100$$

EX_j and IM_j are the values of exports and imports of the agrarian foreign trade of a j-th commodity in a given area. We can consider as competitive those commodities which have attained balanced high positive values of the RCA index during a period under observation. As commodities with an uncompetitive position in the

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market, we can consider those the long term RCA index values of which move in highly negative numbers.

The Michaely Index (Michaely 1965, 1977) is used in the form of

$$MI_j = EX_j/EX - IM_j/IM$$

where EX and IM are the values of total exports and imports. The index shows the degree of specialization of exports or the lack of specialization in specific commodity groups. For $0 < MI_j < 1$ the index indicates a certain degree of specialization in the commodity, for $-1 < MI_j < 0$ the index indicates an insufficient pro-export specialization in the commodity.

Logarithmic decomposition

If we mark export as EX, import as IM, net exports as $X = EX - IM$, P the price, Q quantity, with the indices E and I as export and import, and Δ as a change in quantity and IN as an index value (share), then IN_{EX} is an index of export value between the years, IN_{PE} is an in-between-the-years index of export price, IN_{QE} – in-between-the-years index of export quantity and, by analogy, the same is true for import (IN_{IM}, IN_{PI}, IN_{QI}). Then the synthetic model analysis of net export is based on the logarithmic decomposition scheme as follows:

$$\Delta X = \Delta EX - \Delta IM \quad \text{for } EX = P_E \times Q_E \qquad IM = P_I \times Q_I$$

$$\Delta EX = \Delta EX_{PE} + \Delta EX_{QE}$$

and by analogy for import

$$\Delta IM = \Delta IM_{PI} + \Delta IM_{QI}$$

and in the total equation

$$\Delta X = \frac{\ln IN_{PE}}{\ln IN_{EX}} \times \Delta EX + \frac{\ln IN_{QE}}{\ln IN_{EX}} \times \Delta EX - \frac{\ln IN_{PI}}{\ln IN_{IM}} \times$$

$$\times \Delta IM - \frac{\ln IN_{QI}}{\ln IN_{IM}} \times \Delta IM$$

the individual members on the right side indicate progressively the effect of export prices and quantities and of import prices and quantities on the change in net exports. Then logically:

- the expression $\Delta EX_{PE} - \Delta IM_{PI}$ determines the effect of export and import prices on net exports and
- the expression $\Delta EX_{QE} - \Delta IM_{QI}$ determines the effect of export and import quantities on net exports.

The effects can be summed up for each comparable commodity into larger aggregates of net agricultural and food export. For the use of the method, see also Burianová (2005, 2008).

RESULTS AND DISCUSSION

Development of agricultural foreign trade (AFT) in the Czech Republic

Following the accession of the Czech Republic to the EU in 2004, there was a significant growth in both exports and imports of agricultural commodities. The situation is documented in Table 1, which outlines the main characteristics of the AFT in the years of 2004 to 2009. It quantifies the proportion of the AFT turnover in the total foreign trade turnover and the percentage of coverage of agricultural import by export.

During the 2004–2009 period, the AFT turnover grew by 54.4%, export increased by 72% and import rose by 42.8%. The balance was negative in all years; although at the end of the period it improved slightly (by 12.8%). The AFT share in the total foreign trade turnover ranged from 4.5 to 4.9%; in 2009 it was higher (5.9%). The percentage of the cover of agricultural import by export ranged from 65.6 to 81.6%.

In the early years of the period, the growth trend was higher than in the years of 2008–2009. This is clear from the graph in Figure 1. The lower effect (for exports even an absolute decrease) could be attributed to the impact of the global economic crisis which has

Table 1. Main characteristics of AFT in the years of 2004–2009 (in million CZK)

Indicator	2004	2005	2006	2007	2008	2009
AFT Turnover	155 348	182 042	191 279	226 213	237 978	239 852
Agricultural export	61 526	78 520	78 542	96 880	106 930	105 842
Agricultural import	93 822	103 522	112 737	129 333	131 048	134 010
AFT balance	–32 296	–25 002	–34 195	–32 453	–24 118	–28 168
Proportion of AFT in total turnover (%)	4.5	4.9	4.5	4.6	4.9	5.9
Percentage of cover of agricultural import by export	65.6	75.8	69.7	74.9	81.6	79.0

Source: Czech Statistical Institute and author's data

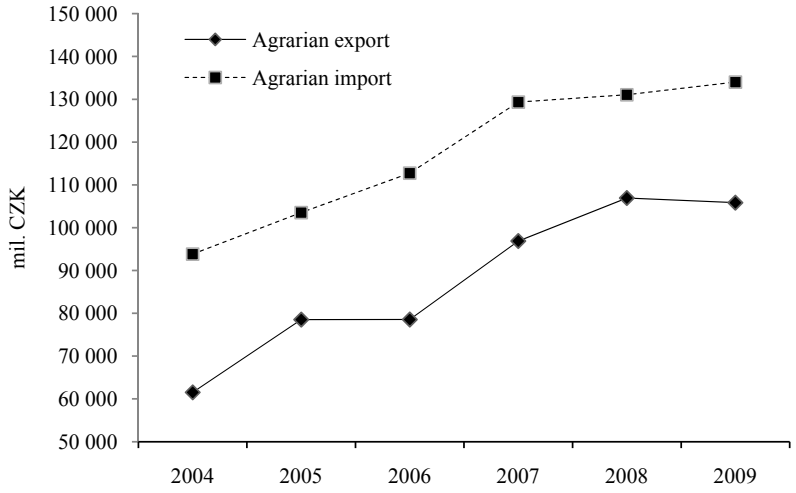

Figure1. Agricultural exports and imports from 2004 to 2009

not escaped the European market area. While until 2007 exports grew an average of 19.15% per year and imports by 12.6%, the year on year results for 2008–2009 show a growth in imports of only 2.26% and exports actually declined by 1.01%.

Let us try to follow the balance of trade in agricultural commodities under different chapters (EU Combined Nomenclature, CN in the two-digit code). Six chapters play a crucial role in the financial valuation of exports, as documented in Figure 2 (Vostálková 2010).

A dominant position is held by the commodity CN 04 (milk) – its export in 2007 reached almost 16 billion CZK. In the past two years, it shows a decrease. In the second place with a growing trend, there is the CN 22 (drinks) with the value of over 10 billion CZK a year. The CN 10 (cereals) and CN 21 (food products) also got close to 10 billion CZK in value. A downward trend was shown in the commodity CN 17 (sugar and sweets) while, by contrast, there was a growing tendency in the CN 12 (oil seeds). In the 2004–2007 period, the mentioned chapters provided nearly 54% of the total agricultural exports. For the financial evaluation of imports, it is also important to monitor the first six chapters. Graphically, the situation in import is described in Figure 3 (Vostálková 2010).

Import of the commodity CN 02 (meat) is a decisive factor. It shows a steep increase, reaching the value of 16 billion CZK last year. In the second place, there is the CN 08 (fruits) with a constant progress. A slight increase is shown in the commodities CN 21 (food products), CN 04 (milk), CN 22 (drinks) and CN 07 (vegetables).

The use of the RCA and MI Indicators

According to the definition, the RCA indicator measures the achieved net exports (balance) for a given commodity that had been reached by the total

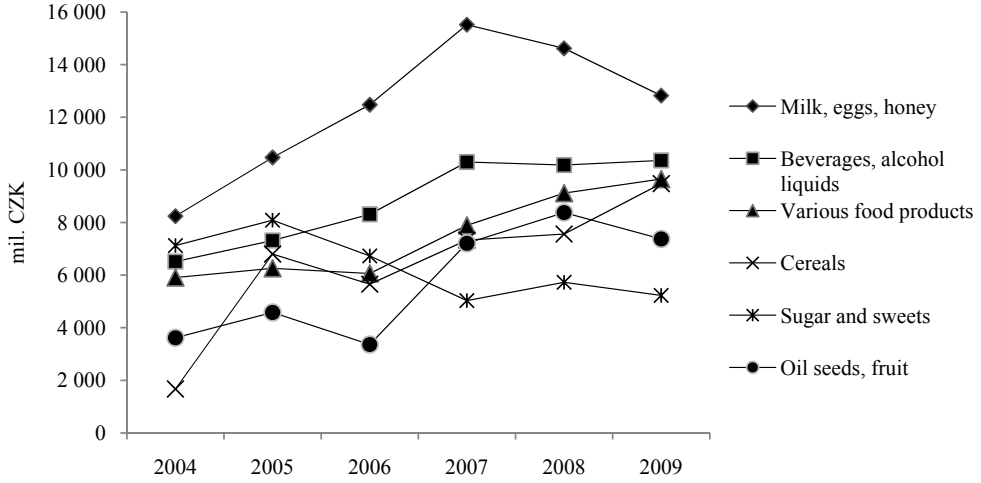

Figure 2. Commodity composition of AFT – exports by the first six critical chapters

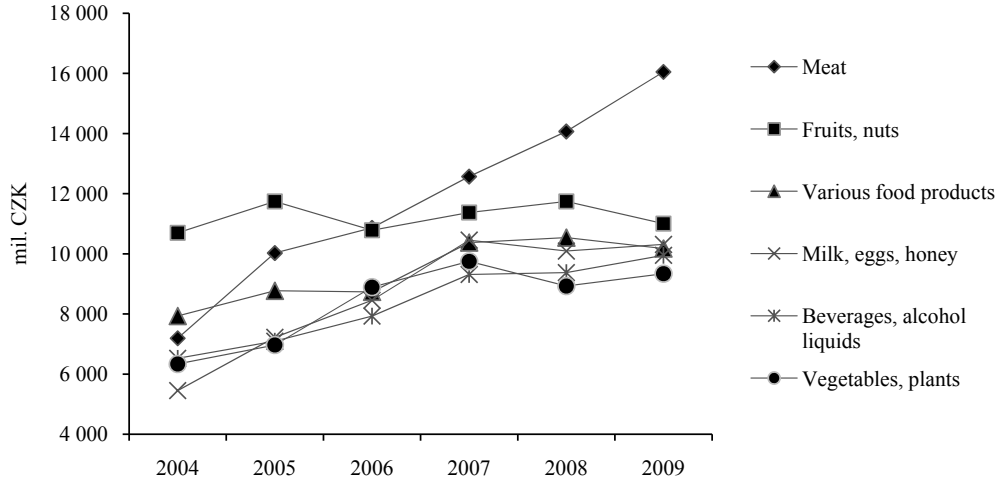

Figure 3. Commodity composition of the AFT – imports according to the first six critical chapters

turnover of the commodity. Those commodities that have reached a level of high positive RCA index values in the monitored period can be considered as having been successful in exports.

The RCA values have been specified for all 24 chapters of agricultural products for the years of 2008 and 2009. For those chapters which show positive RCA values, the results are summarized sequentially in Table 2 for 2009.

From the viewpoint of the dominance of exports over imports, the aggregations of commodities CN 10 (cereals), CN 12 (oil seeds) and CN 11 (flour mill products) were the most successful.

For the MI indicator, it is important that the export share of a given commodity in the overall export was greater than the share of this commodity in the overall import. We then obtain a positive value of the MI and the index shows a certain measure of export specialization.

The Michaely Index (MI) has been calculated for all 24 chapters of agricultural commodities. The results for the chapters that have shown a positive value of the MI have been compiled in Table 3.

Only 10 out of 24 aggregations of commodities showed positive values of the MI Index in 2009. This indicates that these commodities have a certain pro-export specialization. The leading positions have been taken up by the chapters CN 10 (cereals), CN 12 (oil seeds) and CN 4 (milk). In the other chapters, the preferences are gradually declining.

Logarithmic decomposition

The use of the logarithmic decomposition method is demonstrated in the selected commodities (CN in a four-digit code), CN 0401 (milk, unsweetened condensed cream), CN 1701 (beet sugar, cane sugar, sucrose) and CN 2203 (beer) Table 4.

Table 2. RCA Indicator for 2008 and 2009

CN	Commodity name	RCA 2008	Sequential number	RCA 2009	Sequential number
10	Cereals	51.33	2	66.45	1
12	Oil seeds, fruits, medicinal plants, industrial straw, etc	50.55	3	51.67	2
11	Flower mill products, malt, starch, inulin, wheat gluten	48.64	4	48.62	3
1	Live animals	53.75	1	44.34	4
24	Tobacco, produced tobacco substitutes	34.89	5	21.46	5
17	Sugar and sweets	20.00	6	15.95	6
4	Milk, eggs, honey, edible products of animal origin	18.73	7	10.86	7
13	Shellac, rubber, resins etc, juices, plant extracts	–14.84	10	8.80	8
22	Drinks, alcohol based liquids, vinegar	2.74	8	2.01	9

Table 3. MI indicator in the years of 2008–2009

CN	Commodity name	MI 2008	Sequential number	MI 2009	Sequential number
10	Cereals	0.0520	3	0.0756	1
12	Oil seeds, fruits, medicinal plants, industrial straw, etc	0.0574	2	0.0524	2
4	Milk, eggs, honey, edible products of animal origin	0.0600	1	0.0444	3
1	Live animals	0.0349	5	0.0330	4
24	Tobacco, tobacco substitutes products	0.0398	4	0.0319	5
22	Drinks, alcohol based liquids, vinegar	0.0213	8	0.0237	6
11	Flour mill products, malt, starches, inulin, wheat	0.0217	7	0.0221	7
17	Sugar and sweets	0.0240	6	0.0212	8
21	Various food preparations	0.0029	9	0.0158	9
13	Shellac, rubbers, resins and similar, juices, plant extracts	–0.0008	11	0.0027	10

Source: Research Institute of Agricultural Economics and data processed by author

It is interesting to observe to what extent the changes in export and import quantities affect the overall changes and to what extent this concerns the price changes.

During the period of 2008–2009, the CN 0401 export declined by 1272.47 million CZK, while import decreased by 297.44 million CZK, i.e. the net export dropped by 975.03 million CZK. There was

Table 4. Logarithmic decomposition of the item 0401 (milk, unsweetened condensed cream)

	Value of export EX	Quantity of export Q_E	Price of export P_E	Value of import IM	Quantity of import Q_I	Price of import P_I	Net export X ($EX - IM$)
	(mill. CZK)	(t)	(CZK/t)	(mill. CZK)	(t)	(CZK/t)	(mill. CZK)
Basic data							
0401 (milk, unsweetened condensed cream)							
2008	6 293.44	643 722.72	9 776.63	1 484.11	122 959.68	12 069.91	4 809.33
2009	5 020.97	645 972.18	7 772.74	1 186.67	109 267.96	10 860.23	3 834.30
1701 (beet sugar, cane sugar, sucrose)							
2008	2 315.56	182 881.03	12 661.57	1 225.95	82 421.27	14 874.20	1 089.61
2009	2 069.14	165 269.40	12 519.78	1 310.26	89 151.30	14 697.02	758.88
2203 (beer)							
2008	4 350.19	3 729 872.48	1 166.31	368.56	322 130.06	1 144.14	3 981.63
2009	4 175.42	3 421 106.04	1 220.49	597.85	599 190.54	997.76	3 577.57
Results of decomposition (in million CZK)							
	change X	change EX	change IM	effect of change	effect of change	effect of change	effect of change
	ΔX	ΔEX	ΔIM	ΔQ_E to X	ΔP_E to X	ΔQ_I to X	ΔP_I to X
0401 (milk, unsweetened condensed cream)							
2008–2009	–975.03	–1 272.47	–297.44	19.65	–1 292.12	–156.99	–140.44
1701 (beet sugar, cane sugar, sucrose)							
2008–2009	–330.73	–246.42	84.31	–221.76	–24.66	99.50	–15.19
2203 (beer)							
2008–2009	–404.06	–174.77	229.29	–368.30	193.53	294.17	–64.89

Source: Research Institute of Agricultural Economics and author's calculations

a slight positive effect on this value by a negligibly higher quantity of export (19.65 million CZK), while the lower export prices had a decisive effect on the final balance (–1292.12 million CZK). The lower imported quantities affected the balance positively (156.99 million CZK), just like the lower prices of imports (140.44 million CZK).

During the years of 2008–2009, the CN 1701 exports declined by 246.42 million CZK, while imports grew by 84.31 million CZK. The reduced exported quantities (–221.76 million CZK) had the greatest effect on the final value of net export (–330.73 million CZK) and the lower export prices also had a negative influence. Larger imported quantities had a negative effect (–99.50 million CZK) and imports at lower prices meant a positive effect (15.19 million CZK).

During the period of 2008–2009, export of the CN 2203 declined by 174.77 million CZK, while import, which was higher by 229.29 million CZK, caused a negative value of net export at –404.06 million CZK. A smaller exported quantity (–368.30 million CZK) had markedly contributed to this result. Due to exports at higher prices, this effect was positive (193.53 million CZK). Higher imported quantities resulted in a negative effect (–294.17 million CZK). Lower prices of imports resulted in a positive effect of 64.89 million CZK.

CONCLUSION

After the accession of the Czech Republic to the EU, the value of agricultural export grew markedly. This shows that the Czech agricultural products are able to be successful in this challenging market. By 2007, exports grew by the average of 19.15% per year and imports by 12.6%. In the past two years, the situation has changed; the inter-annual results for 2008–2009 show a growth in imports of only 2.26% and exports actually declined by 1.01%. This change could be attributed to the impact of the global economic crisis affecting the European area as well as the agrarian sector. The logarithmic decomposition applied to three selected commodities has shown to what extent the total changes were affected by the changes in the export and import quantities and to what extent the changes in prices have been involved.

Selected indicators and the method of logarithmic decomposition can serve as suitable tools for analyzing net exports. These analyses may provide useful information in respect of applying the agricultural production of the Czech Republic in foreign markets.

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