ANALYSIS OF THE DEVELOPMENT OF EXPORT PRICES OF SELECTED AGRICULTURAL AND FOOD COMMODITIES IN THE CZECH REPUBLIC

M. Palát, E. Maca

Abstract

PALÁT, M., MACA, E.: *Analysis of the development of export prices of selected agricultural and food commodities in the Czech Republic*. Acta univ. agric. et silvic. Mendel. Brun., 2005, LIII, No. 3, pp. 127-144

The paper is focused on the description of average level, variability and developmental trends the export prices of selected agricultural and food commodities in the Czech Republic with differentiation according to particular countries within the defined reference period 1993–2002. Thre is also presented the short-time point and interval extrapolation prediction of studied events. Methods of regression and correlation analysis and developmental trends were applied for the mathematical-statistical analysis.

agricultural and food commodities, export prices, Czech Republic, variability, average level, developmental trends, prediction

The goods export volume ranks among factors shaping the achieved gross domestic product (GDP) volume as the indicator of a total flow of the financial value of final production produced for a certain period. It is documented by the percentage (42.9%) (determined also by our analytical activities) of the average volume of the total goods export from the Czech Republic to abroad amounting to CZK 729.8 milliard of the gross domestic product (GDP) volume amounting to CZK 1 700.8 mld. according to SITC classification for the period 1993 to 2002. With respect to a fact that the volume of exports of the every kind of goods is dependent (in financial expression) not only on the quantity but also on the unit price, in addition to the average level and fluctuation it appears to be useful and inevitable to analyse developmental trends of the given event. The conception of presented paper aimed at the evaluation of trends and the extrapolation point and interval prediction of export prices of agricultural and food commodities participating in the exports of food and living animals, animal and plant oils, fats and waxes by 41.52% starts from the aspect mentioned above.

The specification of a proportion of the total volume of exports in GDP for the assessed reference period (in %) "A" and the proportion of selected agricultural and food commodities in the exports of food and living animals, animal and plant oils, fats and waxes "B" is made possible by the following values:

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
37.73	34.68	41.62	37.95	43.00	46.23	47.77	58.48	40.24	37.59	"A"
47.46	52.91	50.65	48.38	38.04	33.51	39.53	37.77	37.69	30.76	"B"

In this context, it is not possible to omit the continual decrease of food and living animals, animal and plant oils, fats and waxes in the total volume of exports quantified by trend functions in the defined reference period:

$$y' = 6.3547 - 0.3616\,t$$
$$r_{yt} = 0.7667{+}{+}$$
$$b'_{yt} = -13.20\%.$$

Decreasing trend of proportion of the commodities to GDP in the defined reference period:

$$y' = 2.3927 - 0.1136\,t$$
$$r_{yt} = -0.7195{+}$$
$$b'_{yt} = -9.03\%.$$

where correlation coefficient ryt significant on the level: $+ \alpha = 0.05$, $++ \alpha = 0.01$; b'_{yt} = mean year relative decrease.

MATERIAL A METHODS

The volume data of exports of selected commodities from Czech Republic according to particular countries in the reference period 1993–2002 were obtained from Czech statistical office and average unit export prices were calculated.

Methodical procedures of processing and evaluating the studied indicators of export prices were aimed according to set objectives of the analysis (in addition to the description of the average level and variability) at the evaluation of dynamics and trends of assessed phenomena including their short-term extrapolation prediction.

Analysis of the trend of assessed time series is based on the application of models of developmental tendencies of the following type:

$$y' = a_{yt} + b_{yt} \cdot t \qquad (1)$$

$$y' = a_{yt} + b_{yt} \cdot t + c_{yt} \cdot t^2 \qquad (2)$$

$$y' = a_{yt} \cdot e^{b_{yt}} \cdot t \qquad (3)$$

$$y' = a_{yt} + b_{yt} \cdot \ln t \qquad (4)$$

$$y' = a_{yt} \cdot t^{b_{yt}} \qquad (5)$$

$$y' = a_{yt} + b_{yt} \cdot \frac{1}{t} \qquad (6)$$

Informative abilities and accuracy of applied analytical functions were tested by means of correlation indices I_{yt}. Significance of correlation indeces were tested on the level: $+ \alpha = 0.05$ and $++ \alpha = 0.05$.

The following papers can be considered to be fundamental from the aspect of the conception of examination proper: ŽÁK and PLCHOVÁ (1999). Data processing and evaluation from point of view average level and variability were based on methods of descriptive statistics presented in papers of CYHELSKÝ, KAHOUNOVÁ and HINDLS (2001). Methodical procedures of processing the factual data of analysed time series are based on the methods presented in papers of CYHELSKÝ, KAŇOKOVÁ and NOVÁK (1979) and DUFEK (1982), absolute and relative growth of indicators and suitable type of development functions in paper of MALYPETR (1973).

RESULTS AND DISCUSSION

Based on one-dimensional characteristics describing the average level and variability of selected commodities included in Tab. I for the period 1993 to 2002, it is possible to conclude that from the viewpoint of a defined territorial unit milk and milk products are dominant commodities (40.9%) representing exports in the assessed reference period. The descending order of commodities is as follows: beer (14.91%), butter and other fats (12.87%), vegetable (10.60%), wheat (6.62%), hops (6.09%), sugar (5.10%), beef (1.23%), eggs (1.13%) and honey (0.55%). The immense variability of the assessed event has been proved in wheat (111.05%) and then in the following descending order: beef (71.48%), honey (50.64%), hops (45.03%), sugar (42.45%), eggs (38.40%), vegetable (27.52%) and beer 12.48%).

I: *Export characteristics of selected commodities from the Czech Republic (CZK mil.) in the period 1993–2002*

Commodity	Period	Characteristics		Proportion (%)
		$\bar{y}$	V_v (%)	
Wheat	1993–2002	1 119.5	111.05	6.62
Milk	1993–1994	3 827.0	x	22.65
Vegetables	1993–2002	1 790.9	27.52	10.60
Butter and other fats	1993–1994	1 034.0	x	6.12
Sugar	1993–2002	861.4	42.45	5.10
Eggs	1993–2002	190.3	38.40	1.13
Honey	1993–2002	92.8	50.65	0.55
Beef	1993–2002	207.8	71.48	1.23
Beer	1993–2002	2 518.9	12.48	14.91
Hops	1993–2002	1 028.5	45.03	6.09
Milk and milk products	1995–2002	3 083.6	22.22	18.25
Butter	1995–2002	1 142.1	13.77	6.75

Results of the study of an average level, variability and variation areas of export prices of selected agricultural and food kinds of goods quantifying their realization according to particular countries can be considered to be in agreement with the conception of the presented paper. Results of this stage of examination are given in Tab. II. In evaluating differences between average unit prices in the period under study, it is not possible to omit a marked 36.23% difference in wheat exported to Austria and, on the other hand, an 8.58% negative difference in the compared commodity exported to Germany. The most advantageous export prices of milk were achieved in trading with the commodity with the Lebanon in the period 1993 and 1994 (CZK 5.34 per litre). In milk and milk products, the most advantageous realization was achieved in trading with Thailand in the period 1995 to 2002 (CZK 52.97 per kg), viz 28.58% above the average export price. The most advantageous realization of vegetable was achieved through its export to other countries in the period 1993 to 2002. Considering the unspecified structure in the proportion of particular kinds of products of goods the findings obtained cannot be generalized. The same situation occurs in butter and other fats due to their short-term presentation. Data on the unit prices of butter amounting to CZK 69.12 per kg as against the average price CZK 46.88 per kg (difference 47.44%) exported to Slovakia in the period 1995 – 2002 belong to more reliable results. Objective evaluation of the given event in the unit price of sugar is excluded by heterogeneous time intervals of the studied event. Exports of consumer eggs reaching CZK 1.67 per pcs above the average export price was carried out to Slovakia and other countries in the period 1995 to 2000(by –21.56 or 11.38%, respectively). In the period 1993 to 2002, the average export price of honey amounting to CZK 46.77 per kg is exceeded by exports to Austria (by 24.07%) and Germany (by 2.63%). On the other hand, exports of beef were realized below the average unit price (by –2.31%) to other countries in 1993 to 2002. In the same period, exports of beer to the United Kingdom were realized above the average export price CZK 1 417.4 per hl (CZK 1 990.9 per hl – as against the average price higher by 40.88%), to other countries CZK 1 663.4 per hl (by 17.35%). Exports to Slovakia were realized markedly below the average level (–40.48%, –4.6%). As for presented average unit export prices of hops for the period 1993 to 2002 it is possible to conclude that the lowest values were achieved in trading with Germany (–18.23% as against the average value CZK 188 276 per t) and –5.22% other countries. The highest unit export prices were achieved in exporting hops to Japan (CZK 250 997 per t) and the United Kingdom (CZK 235 023 per t).

II: *Characteristics of the average level (ȳ) and variability (V_y) of export prices of selected agricultural and food commodities from the Czech Republic according to particular countries in the period 1993–2002*

Commodity, country		Period	Measured unit	Variation obor		Statistics	
				ymin	ymax	$\bar{y}$	Vy (%)
WHEAT				3 055 1995	5 662 1997	3 506.8	21.26
to	Slovakia			3 626 1995	7 143 1999	4 354	28.21
	Poland			2 158 1993	5 677 2002	3 364.3	45.92
	Germany	1993–2002	CZK/tonne	2 692 1998	11 173 1994	3 205.9	70.98
	Austria			3 383 2002	9 178 1994	4 777.4	27.61
	other countries			2 699 1998	14 925 1994	3 645.8	69.11
MILK				3.00 1994	3.73 1993	3.36	x
to	Slovakia			3.39 1994	3.41 1993	3.41	x
	Netherlands			3.73 1994	4.01 1993	3.85	x
	Lebanon	1993–1994	CZK/litre	5.18 1994	5.45 1993	5.34	x
	Thailand			2.76 1994	4.36 1993	3.48	x
	other countries			2.11 1994	3.42 1993	2.77	x
MILK AND MILK PRODUCTS				33.96 1997	52.64 2001	41.21	14.30
to	Slovakia			27.63 1996	63.83 1998	43.38	27.34
	Netherlands			39.68 1999	71.13 2001	48.22	20.52
	Lebanon	1995–2002	CZK/kg	48.85 2002	72.04 2001	49.73	14.11
	Thailand			40.63 1999	72.08 2001	52.97	22.52
	other countries			25.16 1997	46.87 2000	35.64	22.18

Commodity, country		Period	Measured unit	Variation obor		Statistics	
				ymin	ymax	$\bar{y}$	Vy (%)
VEGETABLES				9 478	28 199	15 560	36.19
				1994	2002		
to	Slovakia			2 369	18 926	5 360	60.37
				1993	2001		
	Germany	1993–2002	CZK/tonne	7 761	34 776	11 460	59.63
				1999	2001		
	other countries			10 298	58 701	36 830	39.68
				1999	2001		
BUTTER AND OTHER FATS				38.95	39.47	39.15	x
				1993	1994		
to	Slovakia			60.33	63.51	60.73	x
				1993	1994		
	Netherlands			35.46	35.82	35.69	x
				1994	1993		
	Russian	1993–1994	CZK/kg	36.48	43.48	40.12	x
				1993	1994		
	Austria			38.35	39.55	38.26	x
				1993	1994		
	other countries			35.58	36.86	35.98	x
				1993	1994		
BUTTER		1995–2002		36.15	53.36	46.88	12.13
				2002	1998		
to	Slovakia	1995–2000		65.22	76.30	69.12	5.79
				2000	1998		
	Netherlands	1995–2002		35.71	54.70	47.25	12.94
				2002	1998		
	Russian	1995–2002	CZK/kg	34.44	51.83	45.21	14.28
				1995	2002		
	Austria	1995–2000		48.12	58.82	51.30	7.60
				1996	1997		
	other countries	1995–2002		37.27	55.90	48.00	11.58
				2002	1998		
SUGAR		1993–2002		8.80	10.74	9.64	6.03
				2002	1996		
to	Slovakia	1993–2000		10.24	16.46	12.83	16.57
				1994	2000		
	Austria	1993–2000	CZK/kg	3.15	12.00	8.01	42.20
				1995	1994		
	Russian	1993–2000		8.95	31.60	17.42	90.32
				1993	1995		
	other countries	1993–2002		8.20	13.15	6.62	20.99
				1993	1996		

Commodity, country		Period	Measured unit	Variation obor		Statistics	
				ymin	ymax	$\bar{y}$	Vy (%)
EGGS[1]				1.31 1996	2.37 2000	1.67	22.28
to	Slovakia			0.66 1995	3.00 2000	2.03	70.15
	Germany	1995–2000	CZK/pcs	1.44 2000	2.12 1995	1.65	18.98
	Poland			0.81 1998	3.14 2000	1.44	60.66
	other countries			1.53 1996	2.19 2000	1.86	14.38
HONEY				34.70 1993	70.78 1998	46.77	21.86
to	Germany			37.73 1997	63.37 2002	48.00	17.76
	Austria	1993–2002	CZK/kg	33.33 2001	71.43 2002	58.03	24.50
	other countries			10.41 1993	131.36 2000	37.50	67.08
BEEF				46.52 2001	98.32 1994	56.87	25.44
to	Slovakia	1993–2002	CZK/kg	42.97 1993	78.54 1998	61.55	16.79
	other countries			44.23 2001	107.26 1996	55.56	35.07
BEER				1 300 2002	1 592 1999	1 417.4	7.08
to	Slovakia			647 1995	973 1999	843.6	12.69
	Germany	1993–2002	CZK/hl	1 207 2002	1 762 1993	1 352.1	35.23
	United Kingdom			1 520 1997	2 382 2000	1 996.9	12.82
	other countries			1 404 2002	1 820 1998	1 663.4	9.35
HOPS				162 488 2002	209 315 1994	188 276	7.69
to	Germany			122 515 2002	203 510 1993	153 961	18.12
	Japan	1993–2002	CZK/tonne	199 622 2002	276 207 1996	250 997	9.58
	United Kingdom			173 516 1993	325 943 1997	235 023	58.63
	other countries			113 798 1998	215 159 1994	178 459	17.69

[1] In years 1993, 1994, 2001 a 2002 v CZK/tonne

In evaluating the informative potential of arithmetic averages of assessed indicators by means of values of variation coefficients (Vy in %) it is possible to note a marked variability decreasing the representative character of unit export prices of wheat exported to Germany and other countries, milk and milk products to Thailand, vegetable to Slovakia and Germany, butter and eggs to Slovakia, honey to other countries, beef to all territorial units under study and hops to the United Kingdom. Analytical functions and their parameters with the highest informative potentials (Tabs. III to XII) make possible the description of developmental trends of analysed time series of unit export prices of selected agricultural and food kinds of goods differentiated according to particular countries for the examined time interval. Their selection carried out on the basis of the comparison of intensity/degree/dependence between assessed endogenous variables and explaining (exogenous) time variable "t" stemming (in all variants of examination) from applied analytical functions of a linear, quadratic, exponential, logarithmic, power and inversion type makes possible (in addition to the quantification of average annual relative changes of events assessed by means of parameters of elementary trend functions) to realize extrapolation short-term point and interval predictions. Results of this stage of investigation are given in Tabs. XIII and XIV.

Selected developmental trends of export prices of selected commodities from Czech Republic according to particular countries in the reference period are given in graphical form in Figs. 1–10.

III: *Parameters of development functions of time series of export prices of wheat (CZK/tonne) from the Czech Republic according to particular countries in the period 1993–2002*

Country	f	Model parameters of developmental trends			I_{yt}
		a_{yt}	b_{yt}	c_{yt}	
TOTAL	2	3 198	302.19393939	−27.21212121	0.2574
of this to: Slovakia	2	2 787.616667	858.09772730	−74.63257576	0.4456
Poland	2	3 302.916667	−489.51893940	70.10227273	0.6629[+]
Germany	2	9 873.283330	−2 223.362879	166.125	0.6522[+]
Austria	2	5 287.233333	982.95	−107.3106066	0.5610
other countries	2	9 630.416667	−1 513.608333	100.5643939	0.4064

f(2) – parabolic trend; correlation index I_{yt} significant on the level: + α = 0.05

IV: *Parameters of development functions of time series of export prices of milk and milk products (CZK/kg) from the Czech Republic according to particular countries in the period 1995–2002*

Country	f	Model parameters of developmental trends			I_{yt}
		a_{yt}	b_{yt}	c_{yt}	
TOTAL	2	35.545	1.256666667	−0.031666666	0.4129
of this to: Slovakia	2	38.70732143	4.69827381	−0.431011904	0.2153
Netherlands	2	42.21571429	1.999166667	−0.056547619	0.3585
Lebanon	2	47.17892857	3.393333333	−0.246428571	0.3941
Thailand	2	42.45767857	2.627678571	−0.124940476	0.3243
other countries	2	21.45607143	5.147738095	−0.374642857	0.6070

V: *Parameters of development functions of time series of export prices of vegetables (CZK/ tonne) from the Czech Republic according to particular countries in the period 1993–2002*

Country	f	Model parameters of developmental trends			I_{yt}
		a_{yt}	b_{yt}	c_{yt}	
TOTAL	3	9 884.510331	0.106742659	–	0.8543[++]
of this to: Germany	2	17 040.15	–4 335.529	574.9886364	0.8161[++]
Slovakia	2	–2 729.55	3 708.32954	–155.1704545	0.8957[++]
other countries	2	24 969.75	5 537.70984	–428.8143939	0.2670

f(3) – exponential trend; correlation index I_{yt} significant on the level: ++ α = 0.01

VI: *Parameters of development functions of time series of export prices of butter (CZK/kg) from the Czech Republic according to particular countries in the period 1995–2002*

Country	f	Model parameters of developmental trends			I_{yt}
		a_{yt}	b_{yt}	c_{yt}	
TOTAL	2	44.24	3.820595238	–0.570595238	0.7497[+]
of this to: Netherlands	2	41.19303571	5.782916667	–0.783035714	0.8061[+]
Russian Federation	2	45.92928571	2.396904762	–0.451190476	0.5482
Slovakia[1]	2	60.476	6.333999999	–0.891428571	0.6103
Austria[1]	2	47.331	3.135249998	–0.455874999	0.3235
other countries	2	43.91303571	4.623988095	–0.655773809	0.8066[+]

[1] period 1995–2000

VII: *Parameters of development functions of time series of export prices of sugar (CZK/kg) from the Czech Republic according to particular countries in the period 1993–2002*

Country	f	Model parameters of developmental trends			I_{yt}
		a_{yt}	b_{yt}	c_{yt}	
TOTAL	2	8.918	0.607424242	–0.057424242	0.7364[+]
of this to: Austria[2]	2	7.261071429	–0.523809523	0.121904761	0.4537
Russian Federation [3]	2	–2.267678571	13.9885119	1.69625	0.5642
Slovakia[4]	2	11.96910714	–0.158988095	0.061964285	0.5000
other countries	2	9.755333333	0.6946666666	–0.086363636	0.7641[++]

[2] period 1995–2002; [3] period 1993–2000; [4] period 1993–2000

VIII: *Parameters of development functions of time series of export prices of eggs (CZK/pcs) from the Czech Republic according to particular countries in the period 1995–2002*

Country	f	Model parameters of developmental trends			I_{yt}
		a_{yt}	b_{yt}	c_{yt}	
TOTAL	2	1.632	–0.242	0.058571428	0.9459[++]
of this to: Germany	2	2.150255046	–0.170703453	0.004900654	0.8156[+]
Poland	2	2.61	–1.35	0.234285714	0.9634[++]
Slovakia	3	0.422390536	0.385801114	–	0.9421[++]
other countries	2	1.771	–0.024392857	0.011607142	0.4147

IX: *Parameters of development functions of time series of export prices of honey (CZK/kg) from the Czech Republic according to particular countries in the period 1993–2002*

Country	f	Model parameters of developmental trends			I_{yt}
		a_{yt}	b_{yt}	c_{yt}	
TOTAL	5	35.972346685	0.180715832	–	0.6520[+]
of this to: Germany	2	42.33133333	–0.717727272	0.24439393939	0.7268[+]
Austria	2	30.84166667	7.253772727	–0.496893939	0.4771
other countries	5	13.79724056	0.754977805	–	0.8058[++]

f(5) – power trend

X: *Parameters of development functions of time series of export prices of beef (CZK/kg) from the Czech Republic according to particular countries in the period 1993–2002*

Country	f	Model parameters of developmental trends			I_{yt}
		a_{yt}	b_{yt}	c_{yt}	
TOTAL	2	57.515	10.43959091	–1.206590909	0.7238[+]
of this to: Slovakia	2	35.927	11.24171212	–0.92780303	0.7455[+]
other countries	2	61.9665	15.89253788	–1.862765152	0.7319[+]

XI: *Parameters of development functions of time series of export prices of beer (CZK/hl) from the Czech Republic according to particular countries in the period 1993–2002*

Country	f	Model parameters of developmental trends			I_{yt}
		a_{yt}	b_{yt}	c_{yt}	
TOTAL	2	1 165.55	100.1522727	–8.056818182	0.7076[+]
of this to: Germany	2	1 756.5	–53.48030303	0.78030303	0.9180[++]
Slovakia	2	771.1	6.565151515	–0.083333333	0.2019
United Kingdom	3	1 903.9	15.18636364	1.175	0.4173
other countries	2	1 450.45	109.944697	–13.36742424	0.9839[++]

XII: *Parameters of development functions of time series of export prices of hops (CZK/tonne) from the Czech Republic according to particular countries in the period 1993–2002*

Country	f	Model parameters of developmental trends			I_{yt}
		a_{yt}	b_{yt}	c_{yt}	
TOTAL	2	208 920.6	–5 957.718182	248.1363636	0.6445[+]
of this to: Germany	2	222 475.3333	–24 149.4	1 511.030303	0.9541[++]
Japan	2	224 046.8333	21 748.39849	–2 384.731818	0.9465[++]
United Kingdom	2	228 661.6	2 893.99697	–1 278.469697	0.8594[++]
other countries	2	220 749.75	–19 592.87197	1 636.458333	0.4314

XIII: *Charakteristics of mean year changes of export prices of selected commodities from the Czech Republic in the period 1993–2002*

Commodity, country	Period	Relative growth (%)	Commodity, country	Period	Relative growth (%)
WHEAT		0.07	EGGS		8.02
of this to: Slovakia		0.77	of this to: Germany		−8.63
Poland	1993–2002	6.15	Poland	1955–2000	13.40
Germany		−17.53	Slovakia		18.83
Austria		−3.48	other countries		2.84
other countries		−12.18	HONEY		3.46
MILK AND MILK PRODUCTS		2.22	of this to: Germany		3.48
of this to: Slovakia		1.58	Austria	19993–2002	−0.60
Netherlands	1955–2002	2.71	other countries		7.95
Lebanon		1.95	BEEF		−5.08
Thailand		2.67	of this to: Slovakia		1.55
other countries		4.30	other countries		−8.07
VEGETABLES		6.50	BEER		−0.79
of this to: Germany	1993–2002	8.19	of this to: Germany		−3.48
Slovakia		9.67	Slovakia		0.80
other countries		1.93	United Kingdom	1993–2002	0.73
BUTTER		−3.11	other countries		−0.42
of this to: Netherlands	1995–2002	−2.95	HOPS		−1.62
Russian		−2.41	of this to: Germany		6.61
Slovakia	1995–2000	0.13	Japan		−1.95
Austria		0.15	United Kingdom		−9.57
other countries	1995–2002	−2.94	other countries		−0.94
SUGAR	1993–2002	1.16			
of this to: Austria	1995–2002	5.72			
Russian	1995–2000	−11.92			
Slovakia	1993–2002	2.80			
other countries		−2.74			

XIV: *Point and interval prediction of unit export prices of selected agricultural and food commodities of the Czech Republic for year 2005*

Commodity	Measured unit	Theoretical value for year 2005	Limits for actual value with 95% probability		Mean of years	
			min	max		
Wheat	CZK/tonne	2 528	767	4 289	1993–2002	3 506.8
Milk and milk products	CZK/kg	45.54	0.77	60.31	1995–2002	41.21
Vegetables	CZK/tonne	39 592	30 472	48 712	1993–2002	15 560
Butter	CZK/kg	17.22	7.59	26.85	1995–2002	46.88
Sugar		7.11	6.11	8.11		9.64
Honey		57.18	36.10	78.26		46.77
Beef		41.25	31.85	50.65	1993–2002	56.87
Beer	CZK/hl	1 106	932	1 280		1 417.4
Hops	CZK/tonne	179 489	91 652	267 326		188 276
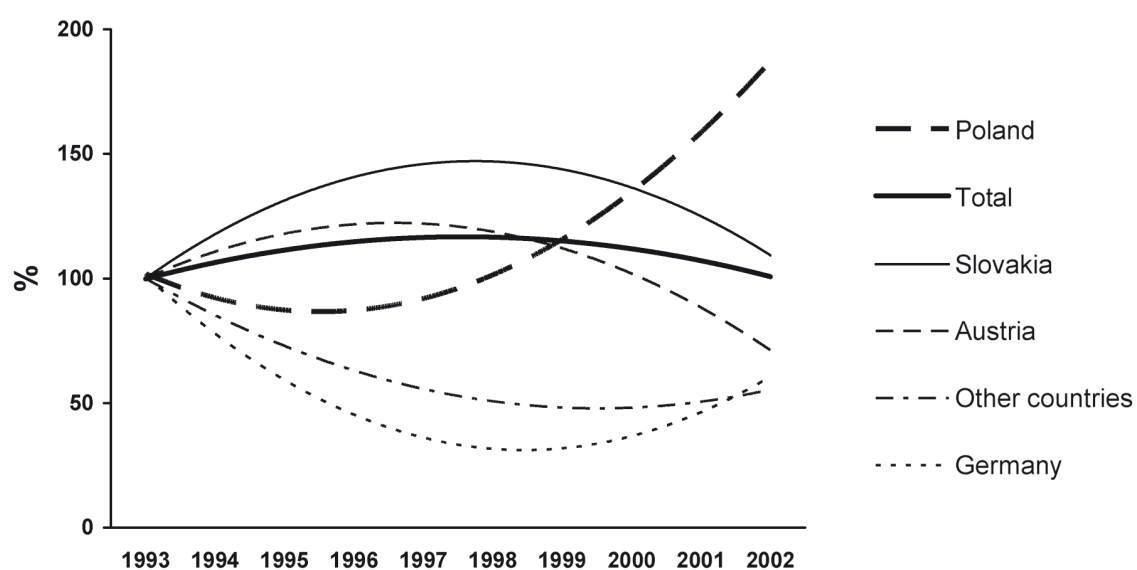
1: *Development functions of export prices of wheat from Czech Republic according to particular countries in the period 1993–2002*
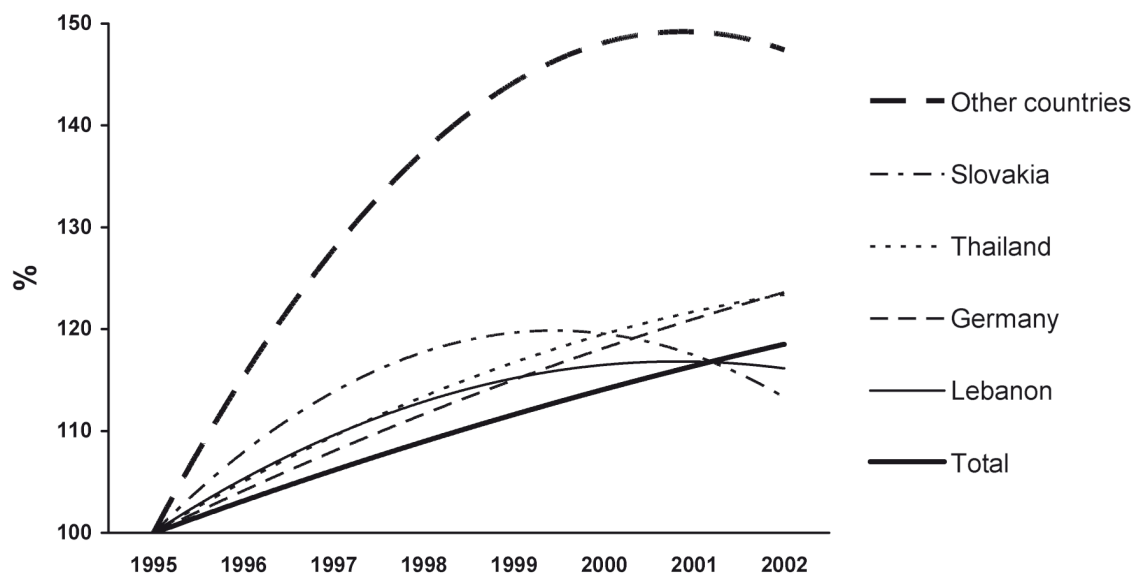
2: *Development functions of export prices of milk and milk products from Czech Republic according to particular countries in the period 1993–2002*
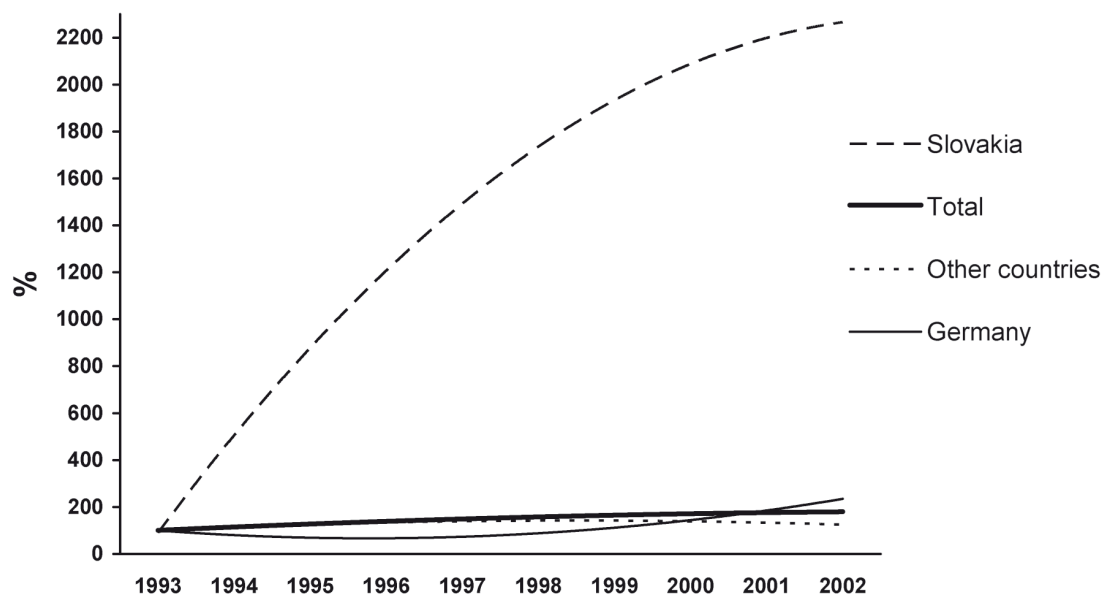
3: *Development functions of export prices of vegetables from Czech Republic according to particular countries in the period 1993–2002*
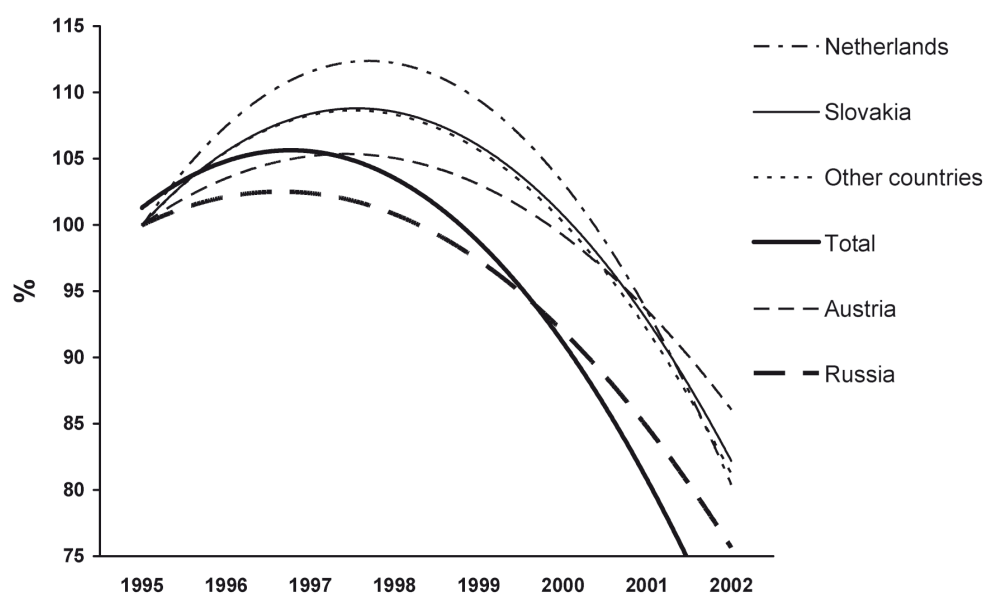
4: *Development functions of export prices of butter from Czech Republic according to particular countries in the period 1993–2002*
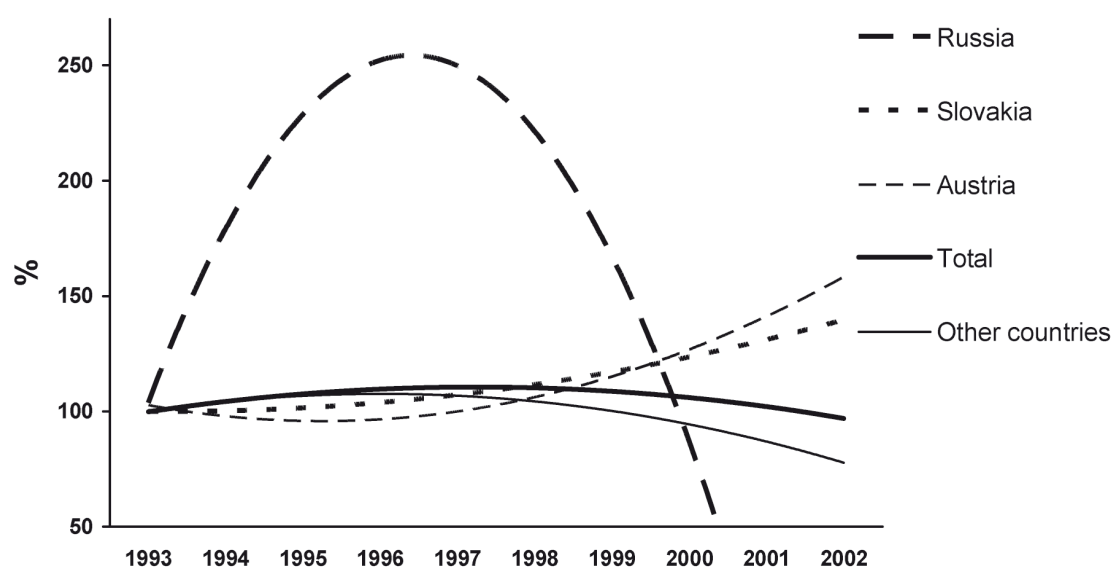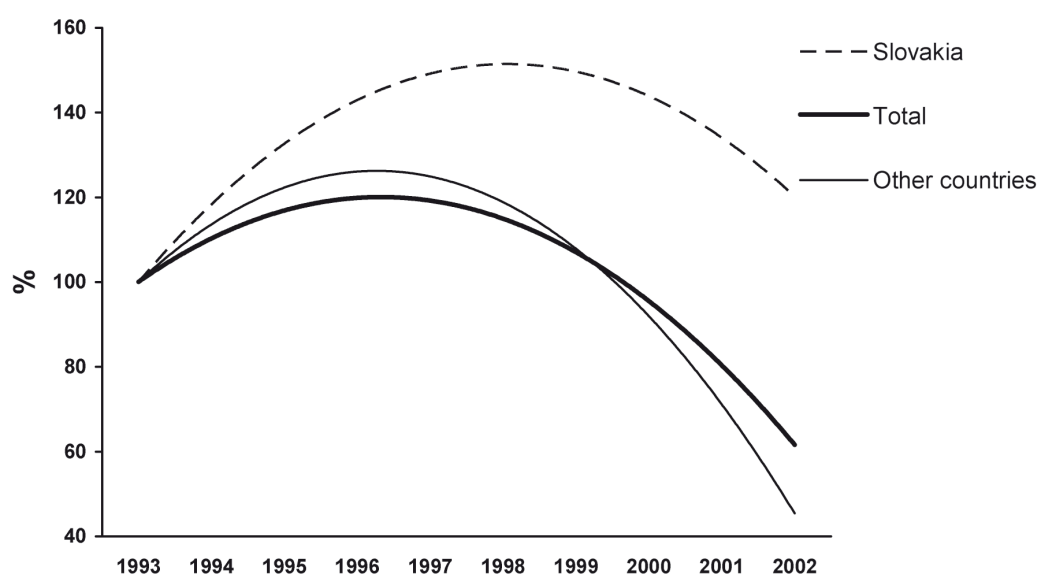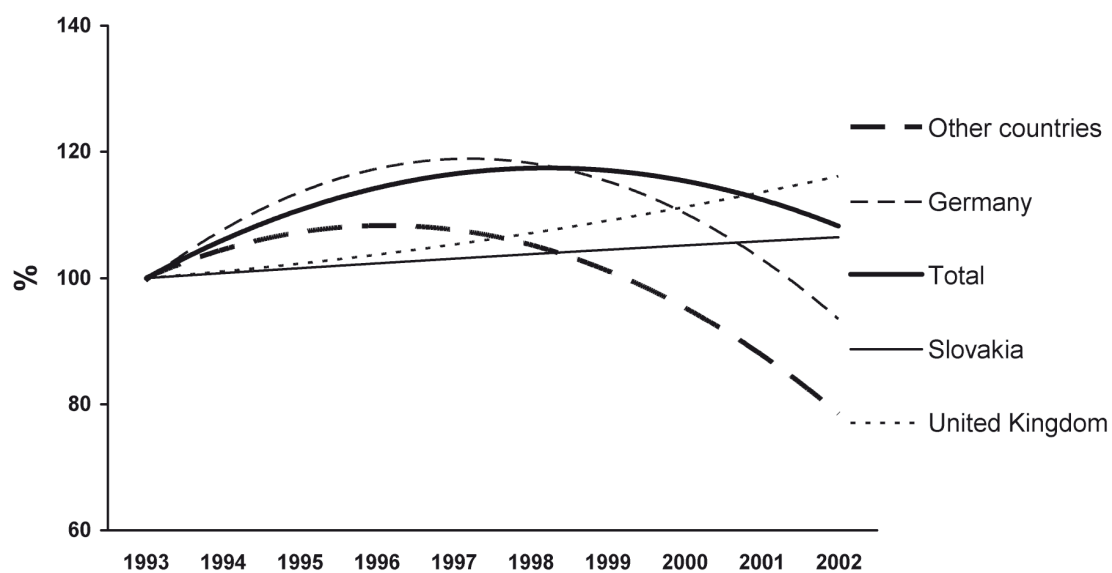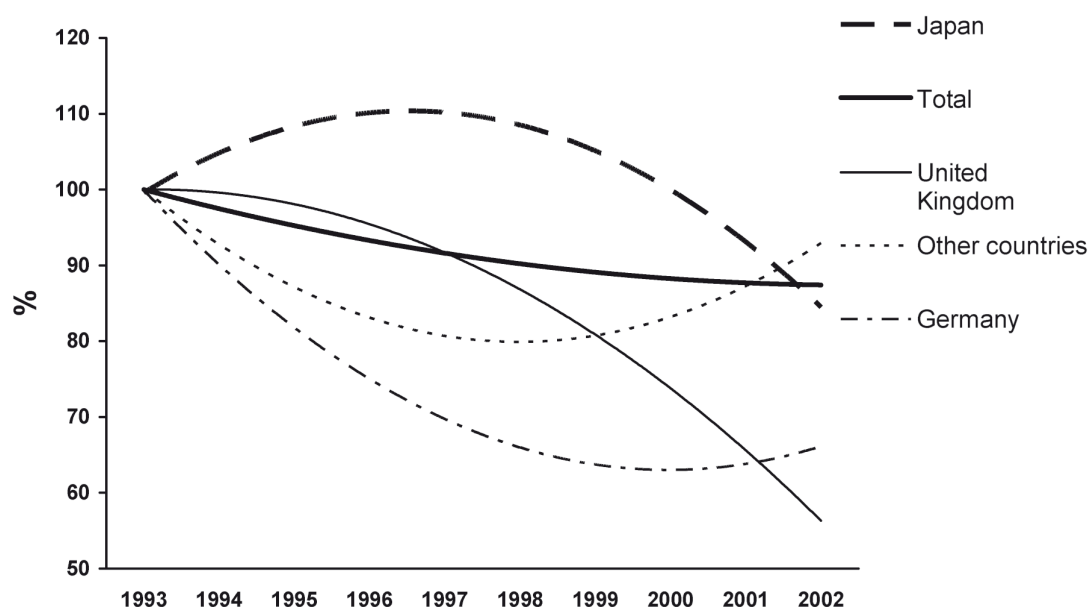

5: *Development functions of export prices of sugar from Czech Republic according to particular countries in the period 1993–2002*
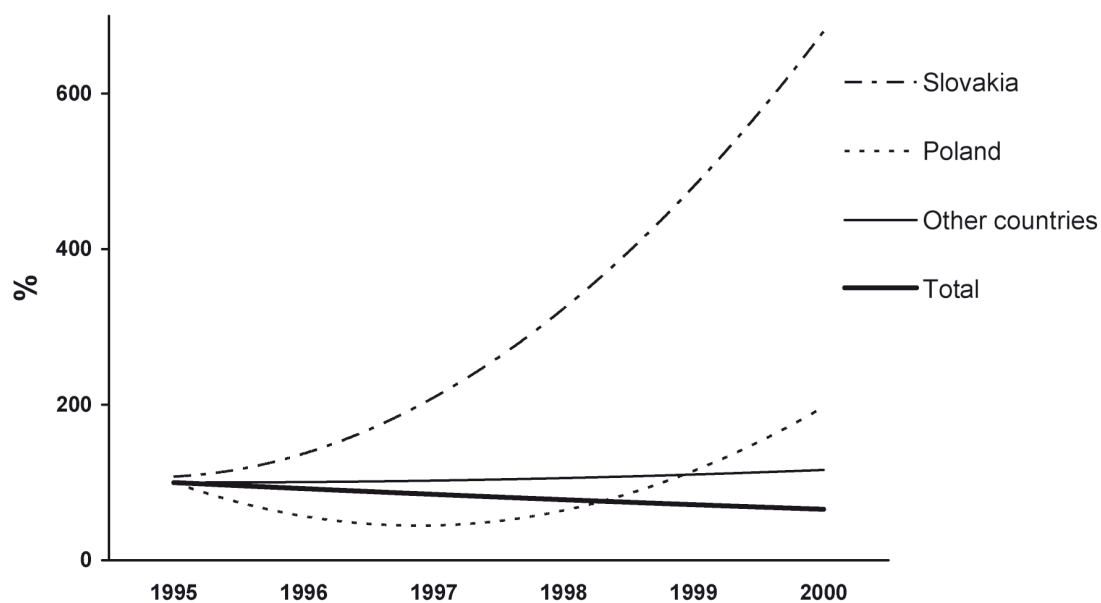
6: *Development functions of export prices of eggs from Czech Republic according to particular countries in the period 1993–2002*
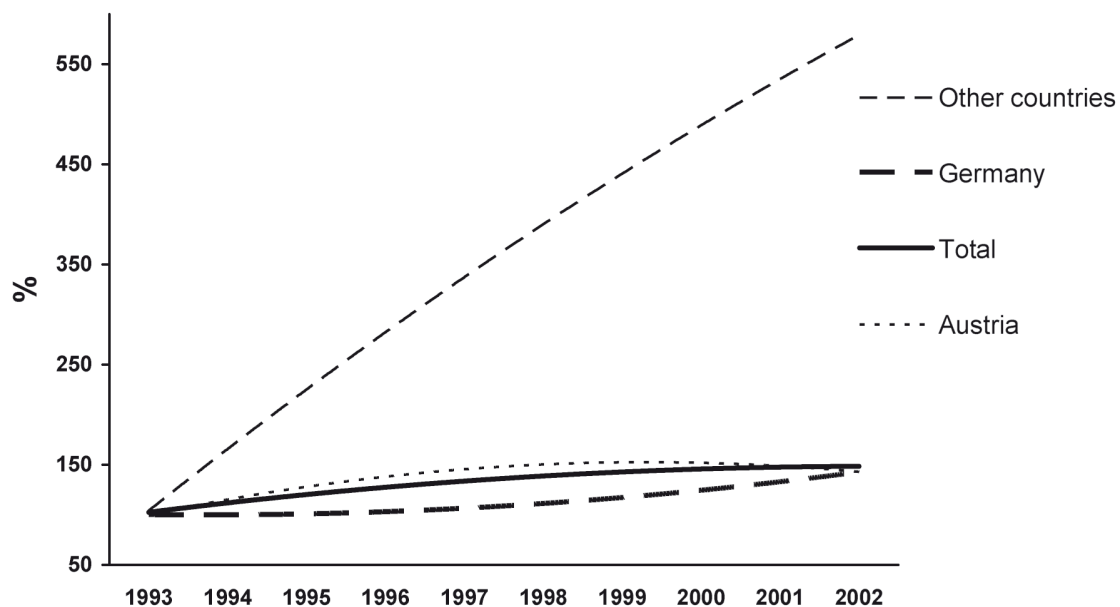
7: *Development functions of export prices of honey from Czech Republic according to particular countries in the period 1993–2002*

8: *Development functions of export prices of beef from Czech Republic according to particular countries in the period 1993–2002*

9: *Development functions of export prices of beer from Czech Republic according to particular countries in the period 1993–2002*

10: *Development functions of export prices of hops from Czech Republic according to particular countries in the period 1993–2002*

Based on the comparison of the percentage of average annual changes of export prices of analysed products included in Tab. XIII it is possible to notice their marked relative decrease in wheat exported to Germany in the period 1993–2002 and negligible relative increase (6.15%) in export to Poland. On the other hand, there is an unambiguous differentiated relative growth of export prices for the product unit in milk and milk products in 1995–2002 as well as in vegetable for the period 1903 to 2002.

An indispensable average annual per cent decrease of unit export prices in the period 1995–2002 was demonstrated in butter to the Netherlands, Russia and other countries. In addition to the average annual increase of export unit prices, it was proved in sugar in the interval 1993–2002 including Slovakia (l.16 or 2.80%) with their decrease in exports to other countries. The positive relative growth of unit prices of the export of eggs amounting to 8.02% in the period 1995 to 2000 was affected to a great extent by the average annual decrease (by 6.63%) of exports to Germany. Effect of Austria on shaping the relative growth of export prices of honey into all selected countries

(3.46%) in the period 1993–2002 was insignificant with its relative decrease amounting to –0.60%. In the same period, the highest relative decrease in export prices of beef was demonstrated in other countries (–8.07%) under the total average annual decrease amounting to 5.08%. The proved average annual decrease of export unit prices of beer to Germany and hops to the United Kingdom in the period 1993–2002 is not, however, negligible.

On the basis of point and interval predictions of unit export prices of agricultural and food kinds of goods presented in Tab. XIV, it is possible to expect the upper limit of a stochastic increase (significance level P = 0.05) by means of extrapolation estimates in 2005 as against the achieved level of the period 1993–2002 in wheat by 36.86%%, in vegetable by 213.0%, in honey by 67.5l% and in hops by 42.0%. With the same probability, a decrease in unit export prices would occur in sugar by 15.87%, in beef by 10.94% and in beer by 9.69%. As against the period 1995 to 2002, an increase would occur in milk and milk products by 46.34% and, on the other hand, a decrease of the unit price of butter by 42.73%.

SUMMARY

The paper is aimed at the presentation of results of the statistical evaluation of the average level, variability and developmental trends of realization of selected agricultural and food kinds of goods of the Czech Republic abroad in the period 1993 to 2002. The analysis of empirical data is directed to the realization of point and interval extrapolation prediction of studied events until 2005. In evaluating differences between average unit export prices with differentiation according to particular countries within

the defined reference period, below-average realization of wheat in Austria was proved (by –36.23%) but, on the other hand, above-average in Germany (36.25%). In milk and milk products, the most favourable realization was achieved in trading with Thailand in the period 1995–2002. Export of vegetable to other countries was realized most favourably in 1993–2002. With respect to the unspecified structure of particular kinds of goods of the commodity it is not possible to generalize given argumentation. It same applies butter and other fats for their short-term presentation. The finding referring the export unit price of butter amounting to CZK 69.12 per kg achieved in Slovakia in the period 1995 až 2002 as against its average price CZK 46.88 per kg is of a higher informative potential. Objective evaluation of the given event in the unit export price of sugar is excluded by heterogeneous time intervals of the studied phenomenon. Export of consumer eggs to Slovakia and other countries was carried out above the average export price of CZK 1.67 per one egg in the period 1995–2000. The average export price of honey amounting to CZK 46.77 per kg was exceeded by export to Austria (by 24.07%) and Germany (by 2.63%) in 1993–2002. In the same period, exports of beef to other countries was realized below the average price (by –2.31%). Exports above the average price of beer were realized to the United Kingdom and other countries, however, below the average price to Slovakia (by –40.48%) and Germany (by –4.61%). Presented average values of unit export prices of hops given in Tab. II show that their highest level was achieved in trading with Japan and the United Kingdom. The description of developmental trends of time series of the export prices of selected commodities as the fundamental stage of investigation is presented in Tabs. III to XII. A graphic picture on the trend of studied indicators is given by diagrams in Figs. l to l0. A marked average annual relative decrease in unit export prices was noticed in wheat in trading with Germany in the period 1993–2002. On the other hand, an unambiguous although differentiated growth of export prices was proved in milk, milk products and vegetable in the period 1995–2002 or 1993–2002 (Tab. XIII). The indispensable average annual per cent decrease of butter realization was proved in trading with the Netherlands, Russia and other countries in the period 1995–2002. In addition to the average annual increase of export unit prices of sugar in 1993–2002, a considerable decrease was proved in trading with other countries. The positive relative average annual increase of unit export prices of eggs in the period 1995 to 2000 was affected to a great extent by the decease of export prices to Germany. Effects of Austria were negligible with its relative decrease (by –0.60%) on shaping the relative growth of unit prices of honey to all countries (by 3.46%) in the period 1993–2002. In the same period, the highest average relative decrease in export prices of beef was proved in other countries (by –8.07%) with the total average annual decrease amounting to 5.08%. The proved average annual relative decrease of unit export prices of beer to Germany and hops to the United Kingdom in the period 1993 to 2002 is not also negligible. Based on values of point extrapolation estimates of the studied event presented in Tab. XIV, it is possible to expect decrease in unit prices as against the average level achieved in the period 1993–2002 in the predicted year 2005, viz in: wheat by 27.9%, beef by 27.5%, sugar by 26.2%, beer by 22.0% and hops by 4.7% and, on the other hand, increase by 154.4% in vegetable and by 22.2% in honey. The similar method of interpretation can be also accepted in interval estimates of realization of selected commodities presented in given tables.

SOUHRN

Analýza vývoje exportních cen vybraných zemědělských a potravinářských komodit
v České republice

Příspěvek je zaměřen na prezentaci výsledků statistického hodnocení průměrné úrovně, kolísavosti a vývojových tendencí zpeněžení vybraných zemědělských a potravinářských druhů zboží České republiky v zahraničí v časovém intervalu let l993 až 2002. Předmětná analýza empirických údajů je cílena i na realizaci bodové a intervalové extrapolační predikce zkoumaných jevů do roku 2005. Při hodnocení rozdílů mezi průměrnými jednotkovými vývozními cenami s diferenciací podle zemí v definovaném referenčním období bylo prokázáno podprůměrné zpeněžení pšenice v Rakousku (o 36,23 %), nadprůměrné naproti tomu v Německu (36,25 %). U mléka a mléčných výrobků bylo nejvýhodnějšího zpeněžení v letech 1995–2002 dosaženo při obchodování s Thajskem. Nejvýhodněji byl v letech 1993–2002 realizován export zeleniny do ostatních zemí. Vzhledem k jednoznačně nespecifikované struktuře vzájemného poměru jednotlivých druhů výrobků této komodity nelze uváděnou argumentaci zobecnit. Shodně je tomu i u másla a ostatních tuků pro jejich krátkodobou prezentaci. Vyšší vypovídací schopnost zaujímá zjištění o exportní jednotkové ceně másla dosažené v letech 1995 až 2002 ve výši 69,12 Kč/kg na Slovensko proti jeho průměrné ceně 46,88 Kč/kg. Objektivní hodnocení daného jevu u jed-

notkové vývozní ceny cukru vylučují heterogenní časové intervaly zkoumaného jevu. Nad průměrnou vývozní cenou 1,67 Kč/ks konzumních vajec byl v intervalu let 1995–2000 realizován jejich export na Slovensko a do ostatních zemí. Průměrnou exportní cenu medu ve výši 46,77 Kč/kg převýšilo v letech 1993–2002 Rakousko (o 24,07 %) a Německo (o 2,63 %). Pod průměrnou cenou byl ve shodném časovém období realizován export hovězího masa do ostatních zemí (o 2,31 %). Nad průměrnou cenou i vývoz piva do Spojeného království a do ostatních zemí. Pod úrovní průměru naproti tomu na Slovensko (o 40,48 %) a do Německa (4,61 %). Z prezentovaných průměrných hodnot jednotkových vývozních cen chmele v tab. II. je zřejmá jejich nejvyšší úroveň při exportu do Japonska a Spojeného království. Popis vývojových tendencí časových řad vývozních cen vybraných komodit jako stěžejní fáze zkoumání je prezentován v tab. III.až XII. Názornou představu o trendu zkoumaných indikátorů podle zemí poskytuje jeho grafické znázornění na obr. l až l0. Výrazný průměrný roční relativní pokles jednotkových vývozních cen v období let 1993–2002 byl u pšenice prokázán při obchodování s Německem. Jednoznačný i když diferencovaný růst exportních cen byl naproti tomu prokázán u mléka a mléčných výrobků a zeleniny za časové období let 1995–2002, resp. l993–2002 (tab. XIII). Nezanedbatelný průměrný roční procentuální pokles zpeněžení másla v intervalu let l995–2002 byl prokázán při vývozu do Nizozemska, Ruska a do ostatních zemí. Prokázán byl vedle průměrného ročního nárůstu exportních jednotkových cen cukru v letech 1993–2002 při jejich nezanedbatelném poklesu do ostatních zemí. Pozitivní relativní průměrný roční růst jednotkových cen vývozu vajec v letech l995 až 2000 byl do značné míry ovlivněn poklesem vývozních cen do Německa. Bezvýznamně se na formování relativního růstu jednotkových cen medu do všech zemí (o 3,46 %) v období let l993–2002 podílelo Rakousko (s relativním poklesem 0,60 %). Ve shodném časovém intervalu byl nejvyšší průměrný relativní pokles vývozní ceny hovězího masa prokázán v ostatních zemích (8,07 %) při celkovém průměrném ročním poklesu ve výši 5,08 %. Zanedbatelný není ani prokázaný průměrný roční relativní pokles jednotkových vývozních cen piva do Německa a chmele do Spojeného království v období let 1993 až 2002. Z hodnot bodových extrapolačních odhadů zkoumaného jevu prezentovaných v tab. XIV lze za předpokladu stejných podmínek jako v období pozorování očekávat snížení jednotkové ceny proti průměrné úrovni dosažené v intervalu let 1993–2002 v predikovaném roce 2005 u pšenice o 27,9 %, u hovězího masa o 27,5 %, u cukru o 26,2 %, u hovězího masa o 27,5 %, u piva o 22,0 % a u chmele o 4,7 % na straně jedné a zvýšení o 154,4 % u zeleniny a o 22,2 % u medu na straně druhé. Obdobný způsob interpretace může být akceptován i u intervalových odhadů zpeněžení vybraných komodit prezentovaných v uváděném tabelárním přehledu.

zemědělské a potravinářské komodity, exportní ceny, Česká republika, průměrná úroveň, variabilita, vývojové tendence, predikce

REFERENCES

CYHELSKÝ, L., KAŇOKOVÁ, J., NOVÁK, I.: Základy teorie statistiky pro ekonomy. Praha: 1979, SNTL/ALFA, 363 s.

CYHELSKÝ, L., KAHOUNOVÁ, J., HINDLS, R.: Elementární statistická analýza. Praha, Management Press, 2001. 319 p. ISBN 80-7261-003-l.

DUFEK, J.: Využití statistických metod při řízení zemědělské výroby. VŠZ Brno, l982, 106 p.

MALYPETR, A.: K analýze časových řad v ekonomice. Academia Praha: 1974, 144 p.

ŽÁK, M., PLCHOVÁ, B.: Velká ekonomická encyklopedie. Praha, Linde a.s., 1999, 806 p. ISBN 80-7201-172-3.

Statistické ročenky České republiky 1994–2003. ČSÚ, Scientia Praha. ISBN 80-202-0524-1; 80-203-0568-3; 80-7183-061-5; 80-7183-105-0; 80-7223-079-2; 80-7123-343-2; 80-7183-250-2; 80-7223-760-8; 80-250-0195-4.

Address

Prof. Ing. Milan Palát, CSc., Ústav statistiky a operačního výzkumu, Mendelova zemědělská a lesnická univerzita v Brně, Zemědělská 1, 613 00 Brno, Česká republika, e-mail: palat@mendelu.cz, Doc. Ing. Erich Maca, CSc., Kotlářská 44, 602 00 Brno, Česká republika