GLOBAL SUGAR MARKET – THE ANALYSIS OF FACTORS INFLUENCING SUPPLY AND DEMAND

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Abstract

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This article deals with an analysis of the world sugar market, and specifically focuses on the supply and demand of refined sugar and their main determinants. The article first identifies the main determinants of the world supply of and demand for sugar, and further, their effect on such variables is quantified. Further, the component correlations on the selected market are analyzed. This consists of the identification of the factors affecting the production of refined sugar, as one of the main elements of the supply of sugar, as well as an analysis of the world price of sugar, as one of the significant factors affecting the world sugar market. The said correlations are quantified with the utilization of regression analysis on the basis of time series of the individual variables within the years 1980–2010. On the basis of the conducted analysis, the main determinants of the sugar supply on the world market within the analyzed period, for which an effect has been established both from an economic viewpoint, as well as from a statistical viewpoint, can be considered to be sugar reserves, its price and the acreage of sugarcane. The main determinant of the demand for sugar is, according to the conducted analysis, the global GDP on a new value level, as well as converted to one inhabitant. Further, the analysis also established the effect of the price of sugar and its reserves on the world production of refined sugar, and, last but not least, also the long-term tendency in the development of the world price of sugar. The analysis has proven significant influence of refined sugar supply, reserves of refined sugar, its price and area of sugar cane on sugar supply. Then, the analysis detected GDP as the main determinant of the sugar demand and the long memory in sugar prices. Finally, the influence of delayed price, reserves and delayed reserves on production has been proven.

sugar, world market, supply, demand, production, price, time series, regression analysis

In recent years, the world sugar market represents a very dynamically developing segment of the global market in agricultural and food production. Currently, more than 100 states in the world actively participate in the process of the industrial production of either beet sugar or cane sugar. In this regard, it is important to emphasize the fact that cane sugar currently represents more than four fifths of the world production of sugar. Beet sugar is primarily the domain of Europe, and its growing can also be encountered in some Asian regions (eastern and western Asia) and in North America. Cane sugar dominates production primarily in Latin America and in Asia. These regions have an 85% share of the resulting production. The highest dynamics of growth in the production of cane sugar can be seen in Asia, Oceania and Africa (Pokorná, Smutka, Pulkrábek, 2011). The production of raw sugar in the years 1961–2011 increased from approximately 53 mil. tons/year to almost 172 mil. tons/year in 2011 (FAO, 2012; Reinbergr, 2012). Together with the growth of the global production of sugar, the actual consumption of sugar in the world is also increasing. Within the analyzed period, the global consumption of sugar only for food industry purposes increased from almost 49 mil. tons in 1961 to almost 169 mil. tons at the end of the analyzed period (FAO, 2012; Reinbergr, 2012). In comparing

the level of production and consumption, we then subsequently find that production is higher than consumption and therefore there is a significant accumulation of reserves under way (Čermák, 2009). Just in the years 1980–2010, the level of global reserves of sugar increased from more than 25 mil. tons to almost 60 mil. tons – whereby the peak was reached in 2008 – when the level of global reserves of sugar actually exceeded 70 mil. tons (USDA, 2012). Nevertheless, it is appropriate to state that within recent years, the growth in reserves was significantly restricted, whether by way of reform attempts on the field of sugar production in the case of a number of states, as well as by way of growth in the production of bioethanol, and last but not least, also because of a higher demand for sugar (Reinbergr, 2011; Balat and Balat, 2009). The consumption of sugar in the world is continually increasing together with the growth of the world population (the year-on-year growth rate of the world population is currently at a level exceeding 70 mil. people per year, see Jeníček, 2010), as global production is increasing, and especially the value of the global GDP per capita (Jeníček, 2012). Specifically, the increase in the value of global production is associated with increases in the purchasing power in a number of developed and especially developing regions of the world – where a part of the growth in purchasing power is transformed into an increased demand for food (Barry M. Popkin, 1994) – thus including sugar and products containing sugar. If we analyze the global sugar market, then it is also important to mention that sugar is among the most tradable commodities, not only because of the simple redistribution of surpluses, but also for speculative reasons (Arguea, Harper, 1994). As the production and consumption of sugar in the world increases, the world price of sugar grows as well. That price increased within the years 1961–2010 from 3 US cents per pound of sugar to almost 30 cents. It is important to mention that the global sugar market was, is and probably will be significantly affected not only by standard market factors, but also by political factors, which very significantly affect situations primarily in the area of the volume of production of sugar, as well as in the area of pricing (Nolte *et al.*, 2010; Søren E. Frandsen, Hans G. Jensen, Wusheng Yu and Aage Walter Jørgensen, 2003). The present article deals with the analysis of the development of the demand and supply on the world market in past years, and further, also deals with the effect of individual selected factors on the volume of production and consumption of sugar. Last but not least, the effect of selected factors on the development of the price of sugar is also analyzed.

MATERIALS AND METHODS

The main objective of this article is the identification of the main determinants of the supply and demand on the world sugar market and their quantitative expression, as well as the verification of the suppositions of the law of supply and demand on this market. The main objective is fulfilled by way of the following partial objectives:

i)   the identification of the main determinants of the supply and demand on the world sugar market;

ii) a quantification of the effect of defined determinants on the world supply of and demand for sugar;

iii) the identification of factors determining the component factors of the world sugar market;

iv) a quantification of the component correlations on the world sugar market.

The main determinants and component factors on the world sugar market are identified on the basis of a knowledge of the general principles of the functioning of supply and demand and on the basis of a knowledge of the specific market, i.e. the world sugar market. The quantitative section is elaborated with the utilization of regression analysis. Several types of the models were considered. Finally, single equation regression models in power form were selected as the most suitable in this case; thus, these models are used, i.e. functions in the form of:

$$y = a \times x_1^b \times x_2^c \times x_3^d \times \dots \times x_n^k, \qquad (1.1)$$

where
y .... is the explained variable,
$x_1, \dots, x_n$ .... are the explanatory variables,
$a, \dots, k$ ...... are the estimated parameters.

Explained and explanatory variables were selected based on the identification of the main determinants of supply and demand; the results of one of the partial aims of the paper. The parameters of the models are estimated by way of the standard least squares method. Parameters $b, \dots, k$ simultaneously represent the coefficients of flexibility, which express the percentage change in the explained variable for a one percent change in the relevant explanatory variable. The suppositions of regression models and further methodological associations are set, for example, by Gujarati, 1988; Lucey, 1996; Rawlings *et al.*, 2001; Dougherty, 2002; Lind *et al.*, 2005; Livingstone, 2009.

Supposed relationships among the selected variables are examined on the basis of both statistical and economic viewpoint. Statistical viewpoint is based on the time series examination as well as verification of estimated models. Economic viewpoint represents the concurrence of the estimated model with the reality.

The empirical section is based on an analysis of time series, which contain the annual values of the individual variables within the period of the years 1980–2010. The time series thus contain 31 pieces of data. The data were provided by the FAO and USDA (FAO, 2012; USDA, 2012). The calculations were performed with the utilization of Gretl econometric software.

RESULTS AND DISCUSSION

The analysis itself is divided up into the identification of the main determinants of supply and demand on the world sugar market, and, subsequently, the quantification of their effect. Further, factors affecting the production of refined sugar and the world price of sugar are identified, and their effect on these variables is quantified. The following text is divided up into three sections, those specifically being an analysis of the supply of sugar on the world market (also including an analysis of the production of refined sugar), an analysis of the demand for sugar on the world market, and an analysis of the world price of sugar.

1. Supply of sugar on the world market

The main determinants of the supply of refined sugar on the world market can be considered to be comprised of the following factors (the individual variables are selected on the base of own previous research and on the base of relevant literature sources related to given topic: Reinbergr, 2012; Nolte, Grethe, 2012; Bartens, 2011; Ahlfeld, 2009):

- sugar reserves as one of the elements of the sugar supply;
- the price of sugar, in the current period and especially in the previous period (the law of supply and demand, i.e. the reaction of the supply to the price delayed by the length of the production cycle);
- the production of raw sugar as a raw material for the production of refined sugar;
- the area on which sugar cane and sugar beets are grown;
- the hectare yield of sugar cane and sugar beets;
- sugar consumption.

On the basis of the anticipated correlations and defined determinants of the sugar supply, models were drawn up that describe the effect of the selected determinants on the supply. However, a significant effect of all of the determinants was not established. The best qualities, both from an economic standpoint as well as from a statistical standpoint, is seen for the model that is set out in Tab. I. The coefficient of determination of this model achieves a value of 0.97 and all of the estimated parameters are statistically significant at a significance level of 1%.

Estimated function of the sugar supply:

$$S' = 0.00022 \times St^{0.3997} \times P_{(t-1)}^{-0.0652} \times A^{0.7282}, \tag{2.1}$$

where

S .... is the refined sugar supply on the world market (Mt);

St ...... are the reserves of refined sugar on the world market (Mt);

$P_{(t-1)}$ .. is the world price of refined sugar in the previous period (USc/lb);

A ...... is the area of sugar cane (ha).

As has been stated, the analysis itself only established the effect of some factors, which may be considered to be the main determinants of supply on the world sugar market. A significant effect of reserves was established (the volume of which increases continually within the analyzed period despite certain fluctuations), and so was the effect of the price from the previous period (the price fluctuates significantly in time, but, nevertheless, a significant growth trend predominates), which corresponds to the law of supply and demand and means a delay of one production cycle, and a significant effect was also established for the area on which sugar cane is grown (the area planted with sugar cane increased significantly within the analyzed period; see FAO, 2012 – a share in such growth is also held in recent years by the growth in demand for sugar cane as a source of biofuel; see Martinelli, Filoso, 2008). The effect of changes in the hectare yield on the sugar supply can be anticipated, but, nevertheless, according to the results of the model, its significant effect was not established within the analyzed period. It may thus be stated that the sugar supply is more dependent on fluctuations in the area of sugar cane than its hectare yield. Further, a significant effect of the production of sugar beets on the world sugar supply was not established either. This result corresponds to the actual situation, whereby more than 80% of world sugar production comes from sugar cane (Smrčka, Hönig, Hromádko, 2012). Nevertheless,

I: *Model of sugar supply*

	coefficient	std. error	t-ratio	p-value
const.	−8.42306	1.30559	−6.452	7.76e-07 ***
l_stock	0.399721	0.0518760	7.705	3.55e-08 ***
l_price(t−1)	−0.0651975	0.0192060	−3.395	0.0022 ***
l_area-cane	0.728179	0.0872613	8.345	7.95e-09 ***
Mean dependent var.	5.138237	S.D. dependent var.	0.194446	
Sum squared resid.	0.037672	S.E. of regression	0.038065	
R-squared	0.965642	Adjusted R-squared	0.961678	
F(3, 26)	243.5799	P-value(F)	3.83e-19	
Durbin-Watson	1.681721			

Source: Own calculation

even so, it may be stated that fluctuations in the production of sugar beets certainly have an impact on the world sugar supply. In component models, the total production of raw sugar was established as significant, but reduced the significance of other factors and the quality of the whole model, and thus it was omitted from the final version of the model. However, its effect on the overall supply of refined sugar is evident. The estimated parameters show that the sugar supply reacts more sensitively to changes in reserves and production (area) of sugar cane than to a change in the price of sugar. However, in all cases, the reaction is inflexible.

In general, the supply of a certain commodity is comprised of the production of the given commodity, its reserves and the imported amount. It can certainly be anticipated that the main element of supply is the actual production of the given commodity. Further, production is also determined by other factors. The effect of the world sugar price and its reserves on the production of sugar can primarily be expected on the world sugar market. These suppositions are further quantified in the following component models.

In the case of agricultural-food products, the delay between the requirements on the demand side and the ability to satisfy such requirements on the supply side should not be ignored. Therefore, in such cases, a delay that usually tends to be equal to the length of the production cycle, should not be ignored. This supposition was confirmed on the basis of derivative models; specifically, a reaction of the level of production of refined sugar to its price with a delay of 6 months was established

(Tab. II). The significance of a longer delay was not established in this correlation.

Derivative model:

$$PR' = 77.0119 \times PC_{(t-1)}^{0.1865}, \tag{2.2}$$

where
PR........is the world production of refined sugar (Mt);
$PC_{(t-1)}$..is the world price of refined sugar in the calendar year within the previous period (USc/lb).

The correlation (2.2) shows that if the price of refined sugar (calendar year) within the period $(t-1)$ increases by 1%, the production of sugar within the period t increases by 0.1865%. The above therefore shows an evident inflexible reaction of production to a change in the price. In terms of statistical verification, this correlation can be considered significant, as both estimated parameters are statistically significant at a significance level of 10%. Therefore, it may be stated that the production of sugar reacts to price changes with a delay of 6 months. Nevertheless, further tests show that world sugar production is also determined by other, probably more significant factors than the world price of sugar.

Further, the effect of reserves on world sugar production was modeled. In general, we may anticipate that the level of reserves determines the level of production. In the case of agricultural-food commodities, it is once again appropriate to consider a certain delay in the reaction on the supply side. Therefore, in the following models, the effect of sugar reserves in the given year on production is considered and established (Tab. III), as well as the

II: *Influence of delayed price on production*

	coefficient	std. error	t-ratio	p-value
const.	4.34396	0.258949	16.78	8.33e-016 ***
l_Pc(t–1)	0.186469	0.101473	1.838	0.0771 *
Mean dependent var.	4.816644	S.D. dependent var.	0.167283	
Sum squared resid.	0.696435	S.E. of regression	0.160605	
R-squared	0.111164	Adjusted R-squared	0.078245	
F(1, 27)	3.376821	P-value(F)	0.077148	
Durbin-Watson	0.115743			

Source: own calculation

III: *Influence of reserves on production*

	coefficient	std. error	t-ratio	p-value
const.	2.57073	0.218401	11.77	2.53e-012 ***
l_stock	0.589401	0.0574641	10.26	5.48e-011 ***
Mean dependent var.	4.805598	S.D. dependent var.	0.175154	
Sum squared resid.	0.187018	S.E. of regression	0.081726	
R-squared	0.789794	Adjusted R-squared	0.782287	
F(1, 28)	105.2030	P-value(F)	5.48e-011	
Durbin-Watson	0.731109			

Source: own calculation

IV: *Influence of delayed reserves on production*

	coefficient	std. error	t-ratio	p-value
const.	2.82831	0.256105	11.04	1.62e-011 ***
l_stock(t–1)	0.525538	0.0675320	7.782	2.28e-08 ***
Mean dependent var.	4.816644	S.D. dependent var.	0.167283	
Sum squared resid.	0.241610	S.E. of regression	0.094597	
R-squared	0.691642	Adjusted R-squared	0.680221	
F(1, 27)	60.56050	P-value(F)	2.28e-08	
Durbin-Watson	0.860520			

Source: Own calculation

effect of the level of reserves in the previous year (Tab. IV).

Derivative model:

$$PR'_t = 13.0754 \times St_t^{0.5894}, \tag{2.3}$$

where
PR_t … is the world production of refined sugar (Mt);
St …… are reserves of refined sugar on the world market (Mt).

The correlation (2.3) shows that in the case of an increase in the world reserves of sugar by 1%, an increase in the production of sugar by 0.5894% occurs. Therefore, it is evident that production reacts to changes in reserves in an inflexible manner. This correlation was also confirmed from a statistical standpoint – the estimated parameters are statistically significant at a significance level of 1%. The coefficient of determination achieves a value of 0.7898.

Derivative model:

$$P'_t = 16.9169 \times St_{(t-1)}^{0.5894}, \tag{2.4}$$

where
PR_t … is the world production of refined sugar (Mt);
St …… are reserves of refined sugar on the world market in the previous period (Mt).

The correlation (2.4) shows that if there is an increase in sugar reserves within the period $(t–1)$ by 1%, an increase in its production within the period t by 0.5256% occurs. Once again, there is evidently an inflexible reaction of production. This correlation was once again also confirmed from a statistical standpoint – the estimated parameters

are statistically significant at a significance level of 1%. The coefficient of determination achieves a value of 0.6916. In the case of the inclusion of the level of reserves within the given year and the level of reserves from the previous year into the model, the effect of reserves within the given period was established as more significant. The effect of a delay of more than 1 year was not established.

Further, the analysis also established the validity of inverse correlation. It was established that the level of reserves grows with an increase in production. Therefore, the correlation between world sugar production and its reserves appears to be simultaneous. A similar long-term development in world production and reserves is supported by the pair correlation coefficient, which achieves a value of 0.8957.

2. Demand for sugar on the world market

The main determinants of the demand for sugar on the world market can be considered to include the following factors:
- the price of sugar in the current period (this is once again based on the supposition regarding the functioning of the law of supply and demand);
- GDP, both in the form of overall economic level, as well as in the form of the economic level of the population (i.e. their income); further, GDP can be considered in constant prices or current prices;
- the life expectancy ratio as an indicator of the quality of life.

On the basis of the above, the regression functions describing the effect of individual determinants

V: *Model of sugar demand*

	coefficient	std. error	t-ratio	p-value
const.	–23.3891	2.30109	–10.16	6.71e-011 ***
l_GDP$_{00}$	–0.824380	0.168185	–4.902	3.63e-05 ***
l_GDP$_{00}$/cap.	2.02035	0.333683	6.055	1.58e-06 ***
Mean dependent var.	–3.836753	S.D. dependent var.	0.059547	
Sum squared resid.	0.012488	S.E. of regression	0.021118	
R-squared	0.882607	Adjusted R-squared	0.874221	
F(2, 28)	105.2572	P-value(F)	9.44e-14	
Durbin-Watson	0.733760			

Source: Own calculation

on the demand on the world sugar market were estimated. However, a significant effect of all of the factors was not established. The best results from an economic standpoint, as well as from a statistical standpoint is seen for the model set out in Tab. V. The coefficient of determination of this model achieves a value of 0.88 and all estimated parameters are statistically significant at a significance level of 1%.

Estimated function of sugar demand:

$$D' = 6.95 \times 10^{-11} \times GDP^{-0.8244} \times GDP_{capita}^{2.0204}, \qquad (2.5)$$

where
D .... is the demand for refined sugar on the world market (world sugar consumption per person) (Mt);
P .... is the world price of refined sugar in the fiscal year (USc/lb);
GDP .... is the gross domestic product in prices of the year 2000 (US$);
GDP_{capita} ... is the gross domestic product in prices of the year 2000 per capita (US$).

Quantitative analysis established the effect of GDP on its demand for sugar on the world market (expressed by way of consumption per capita). The effect of GDP on demand was established both in the form of the overall economic level, as well in the form of the economic level of the population, i.e. as their income. The model shows that as GDP grows, the consumption of sugar declines, which indicates the satiation of the world market. However, on component markets, primarily those of developing countries, the situation is most certainly different (demand for sugar in developing countries is currently showing a high growth dynamics – see Pokorná, Smutka, Pulkrábek, 2011). The values of the estimated parameters show that demand reacts the most flexibly to growth in GDP/capita, i.e. that an increase in income is accompanied by an increase in the demand for this commodity. The demand reacts inflexibly to a change in the overall value of the GDP (in this regard, it is appropriate to mention the dominant share of OECD countries in the value of the global GDP. These countries already have a satiated demand for sugar in terms of their own market. The dominant share of OECD countries then distorts the correlation of growth in the global GDP vs. growth in the global demand

for sugar). The price of sugar is undoubtedly a significant determinant of its demand, growth in price is accompanied by a decline in demand (consumption), but a significant effect of this factor on the world demand within the analyzed period was not established.

3. Price of sugar on the world market
The main determinants of the price of sugar on the world market can be considered to consist of the following factors:
● production of refined sugar as the main element of the sugar supply;
● sugar consumption, i.e. the demand for sugar;
● foreign trade in sugar;
● the price of sugar within the previous periods.

On the basis of the anticipated correlations on the world sugar market, certain factors were identified where a significant effect on the creation of the world sugar price can be expected. Nevertheless, the quantitative analysis only established a significant effect of the price from the previous period. The best results, bother from an economic standpoint, as well as from a statistical standpoint, are seen for the model set out in Tab. VI. The coefficient of determination of this model achieves a value of 0.35 and both estimated parameters are statistically significant at a significance level of 1%.

Estimated function of sugar price:

$$P' = 2.5241 \times P_{(t-1)}^{0.6044}, \qquad (2.6)$$

where
P .... is the world price of refined sugar within the fiscal year (USc/lb);
$P_{(t-1)}$ .. is the world price of refined sugar within the fiscal year in the previous period (USc/lb).

The analysis did not confirm the creation of the world price of sugar on the basis of the functioning of the classic law of supply and demand. On the basis of the conducted calculations, the price level within the previous periods appears to be central to the creation of the price of sugar. The analysis established the effect of the price from the previous period as the most significant (i.e. a delay of one production cycle). The effect of other delayed prices was also established, but was not quite as significant. On the basis of the above, it may be stated that for the

VI: *Model of sugar price*

	coefficient	std. error	t-ratio	p-value
const.	0.925880	0.361164	2.564	0.0160 ***
l_P(t–1)	0.604424	0.155899	3.877	0.0006 ***
Mean dependent var.	2.307727	S.D. dependent var.	0.0389364	
Sum squared resid.	2.860767	S.E. of regression	0.319641	
R-squared	0.349313	Adjusted R-squared	0.326074	
F(1, 28)	15.03141	P-value(F)	0.000584	
Durbin-Watson	2.162800			

Source: Own calculation

creation of the world sugar price, primarily the long-term information containing price development is important, which indicates the long-term tendency in the world price of refined sugar. On the basis of the estimated parameters, it may be stated that the price change does not transmit into subsequent periods proportionally (with a price increase within the period (t–1) of 1%, a price increase within the current period of 0.6% occurs).

However, the effect of other factors (not only that of delayed prices), such as, for example, of supply and demand, cannot be ignored, as they also have their substantiation. The results of component models showed that demand is more or less irrelevant for the creation of price, while supply in combination with the price from previous periods can be significant. However, the effect of overall sugar production or reserves as determinants of the sugar supply was not established on the analyzed market. This fact can be attributed to a strong deformation of the world sugar market, which is caused by the intervention and protectionist policies of a great number of countries, e.g. the EU countries (Ribera et al., 2011). However, in general, it may be stated that the level of production, reserves, trade, i.e. the world supply, is crucial for the creation of prices on every market.

Further, it can be anticipated that the world price of refined sugar within the current period is also affected by prices with a delay of less than 1 year (the effect of which was established). However, for this analysis, time series with a periodicity of less than 1 year are necessary. In view of the analyzed period and the consistency of the data used, this supplementary analysis is beyond the scope of this article.

CONCLUSIONS

The objective of this article was to identify the main determinants of the supply of and demand for sugar on the world market, to quantify their effect, as well as to quantify the component correlations on such market. The main determinants were defined on the basis of the laws of agricultural-food verticals (see Tvrdoň, 2006; Peterová, 2010) with a focus specifically on the world sugar market. The empirical section was based on an analysis of time series of individual factors containing annual data within the period of the years 1980–2010. Correlations between the variables were quantified with the utilization of regression analysis, specifically a single equation function in power form. Thus, the results are valid in accordance to the assumption of such dependency.

The article thus presents the main factors determining the supply and demand on the world sugar market, as well as factors affecting sugar production, as one of the main elements of supply, and factors affecting the world sugar price, as a significant factor on the sugar market. Individual factors are selected on the base of long-term research and on the base of relevant literature listed bellow.

The main determinants of the world supply of refined sugar undoubtedly include reserves (their volume is a key factor influencing not only total volume of supply but also the volume of production and price – in nowadays it should be mentioned that the level of reserves in constantly decreasing), the price of sugar (During the last ten years the price of sugar has become extremely volatile – but the general trend is the price growth. The price of sugar is growing especially because of two reasons – the growing demand for sugar and bio-fuels production which is closely related to sugar industry), the production of raw sugar (which is based on the production of sugar cane and sugar beets) and the consumption of sugar (the level of consumption is constantly growing – there are two main reasons – the human population growth and the growth global per capita income). The main determinants of demand for refined sugar on a global level include, among other things, the price of sugar or the gross domestic product, which expresses the economic level of individual states or their populations and has a close correlation with the satiation of consumption. The main determinants of the price of sugar include, for example, the production of refined sugar, sugar consumption, foreign trade in sugar, or sugar prices from previous periods.

After the identification of the main determinants of the supply, demand and price on the world sugar market, the effects of these factors on the selected variables were quantified. Quantitative analysis did not establish a significant effect of all of the defined determinants, but in view of the generally valid laws as well as the reality, it can be stated that the factors defined above have their substantiation in supply-demand correlations. The regression analysis established a significant effect (both from an economic standpoint as well as from a statistical standpoint) of sugar reserves, its price and the acreage of sugar cane on the supply of sugar on the world market. Further, a significant effect of GDP on the demand for, or consumption of, sugar on the world market was established.

Further, a significant effect of the price of sugar on its production was established, specifically with a delay time of 6 months as well as 1 year, and the effect of the level of reserves on the world production of refined sugar was established as well. Last but not least, the significance of the long-term tendency of the price of sugar in its creation on the global level was established. A significant reaction of the price to its values delayed by 1 year was established; a longer delay was not established from a statistical standpoint. Further, it can be expected that the world price of sugar reacts to the price level with a delay of less than 1 year.

The analysis also established that, in the majority of cases, the reaction of supply, demand, as well as other examined factors (i.e. world production of

sugar and its price) reacts inflexibly to changes in the main determinants.

In conclusion, it can be said that the main suppositions of the law of supply and demand function as expected on the world sugar market, i.e. from an economic standpoint, the anticipated effect of the main determinants on the examined variables was established. Nevertheless, the effect of some factors, which undoubtedly affect supply and demand on the world sugar market, proved to be minor when compared to other factors, or insignificant from a statistical standpoint.

SUMMARY

The objective of this article is the identification of the main determinants of supply and demand on the world sugar market and their quantification. The article first, on the basis of a knowledge of the general principles of the functioning of the agricultural-food market and on the basis of knowledge of the specific market, identifies the main determinants affecting the supply and demand on the selected market. Further, factors affecting the production of refined sugar on a global level, i.e. one of the main elements of sugar supply, and factors affecting the world sugar price, i.e. a significant factor affecting supply and demand, are also identified. These component correlations are subsequently also quantified.

The empirical section is conducted with the utilization of regression analysis, specifically single equation functions in power form. The quantification of correlations between the selected variables is conducted on the basis of time series of the individual variables containing annual data from the period of 1980–2010. The data were obtained from FAO and USDA. The calculations are conducted with the utilization of Gretl econometric software.

The analysis itself confirmed the anticipated correlations between the considered factors. Nevertheless, from a statistical standpoint, a significant effect of only some of them was established. Therefore, on the basis of the conducted analysis, the main determinants of the sugar supply on the world market can be identified, both from an economic standpoint as well as from a statistical standpoint, as sugar reserves, its price and acreage (and thus production, in general) of sugar cane. The demand for sugar on a global level is, according to the results of the estimated models, determined primarily by the level of GDP. Further, the analysis itself also established a significant effect of the price of sugar and level of reserves on the production of refined sugar and the long-term tendency in the development of the world price of sugar. It was established that the world price of sugar is created precisely on the basis of the previous price development. Other factors that undoubtedly affect the price, proved to be less significant when compared to its previous development. Further, the analysis also established that in the majority of cases, all of the examined variables (i.e. the sugar supply, its demand, production and price) react inflexibly to changes in their determinants.

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