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Cyclical Fluctuations on the Global Sugar Market in the Context of the War in Ukraine

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Abstract:

Purpose: *Economic activity is subject to business cycle fluctuations. Business cycles can affect the entire economy as well as specific sectors. This is the main aim of this article.*
Design/Methodology/Approach: *In the economic history of the world, sugar is recognized as one of the first global products, and this was determined by foreign trade turnover. The world sugar market has always been subject to cyclical economic fluctuations, which have been determined by the political situation or the situation in the energy commodity market.*
Findings: *Between 2019 and 2023, situation on the world sugar market showed high volatility, and this was determined by the COVID-19 pandemic and the war in Ukraine. Changes in the global sugar market climate, as reflected in price volatility, have a major impact on regional markets.*
Practical implications: *The sugar sector is economically and strategically important, as sugar remains the primary sweetener in households and the food industry. In addition, sugar cane and sugar beet can be processed into bioethanol, and by-products can be used for feed or biogas production.*
Originality/Value: *Consequently, the analysis of economic fluctuations in the world market has huge implications for sugar companies and trading companies in the context of strategic decision-making. Between 1990 and 2024, the business cycle on the world sugar market shortened to two to three years compared to earlier periods and production and trade risks have increased as a result.*

Keywords: *Global sugar market, Cyclical fluctuations, War in Ukraine, Commodity prices Supply chain disruption.*

JEL codes: *F14, Q13, Q17, E32, D74.*

Paper type: *Research article.*

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1. Introduction

The sugar sector is of great economic, social and environmental importance in the global food and energy economy. Sugar is produced from sugar cane and sugar beet, which can also be processed into bioethanol, which is used as a fuel additive (Martinelli *et al.*, 2011; Langeveld *et al.*, 2014; Grandis et *al.*, 2024). Sugar cane is grown in subtropical climates and sugar beet in temperate climates (Falkowski, Kstrowicki, 2001; Starczewski, 2006).

In the long term, the cultivated area and yield of sugar cane has shown an upward trend. The area used for sugar beet has been decreasing, but this decrease has been counterbalanced by increasing yields (Szajner, 2015). There has been strong competition between cane and beet sugar on the world market for many years (Smith, 1978; Merki, 1993; Sturrock, 2008).

The great importance of sugar in the economic development of the world is evidenced by the fact that sugar cane is listed among the six crops that have changed the face of the world (Hobhouse, 2001). Due to its commercial importance, sugar is considered one of the top global products.

Sugar is produced in about 100 countries, and 25-37% of global production is exported (Voora *et al.*, 2020). Sugar accounts for a large share of trading on commodity exchanges, as sugar accounts for the largest share of futures contracts (around 35%) in the agri-food group (Jerzak, 2013).

The strategic importance of the sugar sector is evidenced by the fact that sugar remains the primary sweetener in households and the food industry, despite the growth of the market for substitute sweeteners: high-fructose corn syrup (HFCS), honey, aspartame, and K-acesulfame (European Commission, 2024).

In most regions of the world, the sugar sector is a classic oligopoly, as a small number of large concerns produce a homogeneous product (sucrose) and the market is subject to protectionist policies that significantly intervene in market rights (OECD, 2007; CEFS, 2023; Gudoshnikov *et al.*, 2024). The social importance of the sugar sector stems from the fact that the cultivation of sugar cane and sugar beet and the sugar industry and service companies generate numerous jobs, particularly in economically developing countries.

The sugar sector is also of great environmental importance, as sugar cane and sugar beet cultivation is an important component of ecosystems. In many regions of the world, the sugar sector operates on a circular economy model, as sugar cane and sugar beet, as well as molasses and pulp, are raw materials for bioethanol and biogas production. In addition, the by-products of sugar production can be used as feed and lime as a mineral fertilizer.

Historically, the world sugar market has been highly volatile and this has been determined by both political events and cyclical economic fluctuations (Joshi, 1973; Batie, 1976). A historical analysis of the world market showed a strong correlation between a large increase in sugar prices and major political events: the Napoleonic Wars, the Civil War, the Great Economic Crisis of the 1920s, the Cuban Missile Crisis, and the energy crisis of the 1970s (Winton, 2007).

From 2019 to 2023, the global sugar market climate was highly volatile, and this was determined by the effects of the COVID-19 pandemic and the war in Ukraine (Kotyza *et al.*, 2021). The COID-19 pandemic triggered an economic recession in 2020, and the war in Ukraine triggered a crisis in the global agricultural and energy commodity market, resulting in high price volatility in 2022-2023 (Aizenman *et al.*, 2024; Chishti *et al.*, 2019).

Globalization processes in Ukraine, which is a large exporter of agricultural raw materials (cereals, oilseeds), and is a transit country in the export of energy raw materials from Russia, played an important role in this regard (Balian *et al.*, 2010). Consequently, the analysis of the business cycle in the global sugar industry has huge implications in situations of increasing production and trade risks.

The identification of the various elements of the business cycle, including in particular the identification of the causes of these changes, the length of the cycle and the amplitude of price changes, is crucial for exporters and importers, as prices in local markets are strongly integrated with world prices. Knowledge of the morphology of the business cycle is useful in drawing up forecasts and making strategic business decisions, which are the basis for building competitive advantages.

2. Literature Review

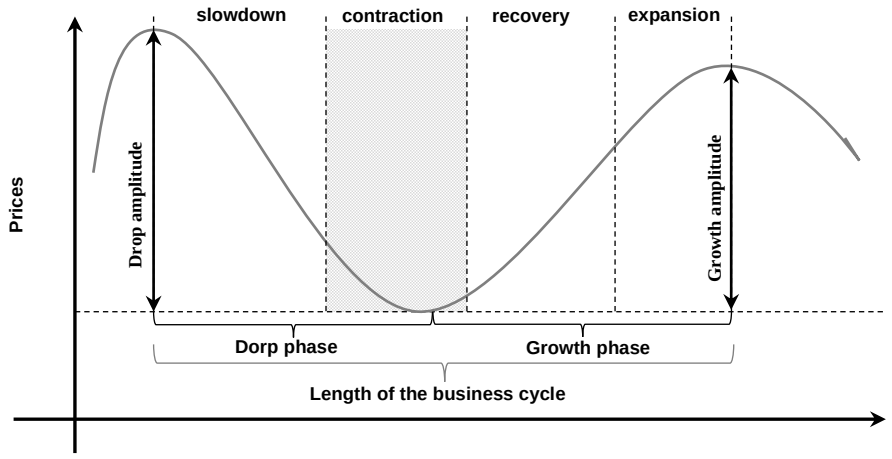
The market is a mechanism through which buyers and sellers interact to determine the price and quantity of products or services (Rembisz and Kowalski, 2007). Prices are the determinant of demand-supply relations, reflect the state of market equilibrium, and determine the competitiveness of economic agents. In the agri-food market, protectionist market policies have a strong impact on prices.

The main objective of interventionism is to make the market less volatile, which can have undesirable consequences for market participants. The main effect of volatility is an increase in production and trade risks, which hinders the decision-making processes of producers and traders and the administration of the preparation of effective market and intervention policy instruments.

However, volatility is a characteristic of the market economy and it is defined as business cycles, which have long been the subject of theoretical consideration (Peltoniemi, 2011). Business cycle theory identifies four phases: crisis, depression, recovery and growth (Gabisch, Lorenz, 1989) (Figure 1). In contemporary analyses,

there have been significant modifications to the morphological characteristics of business cycles, and this is determined by globalization and regional integration processes. These processes have resulted in the growing importance of foreign trade and capital flows, including foreign direct investment. Consequently, many research works distinguish between two phases of the business cycle: recession and expansion (Hodrick and Prescott, 1997).

Figure 1. *Business cycle*



Source: *Own work.*

The analysis and assessment of cyclical fluctuations enables market players to prepare for changing supply-demand and price conditions. On this basis, market participants can implement risk management instruments that can improve financial performance and market efficiency. In this context, knowledge of the causes of price volatility and, above all, anticipation of development trends, is an element of building sustainable competitive advantages (Figiel and Hamulczuk 2012).

Globalization and regional integration are tightening economic ties and determining the geographical scope of markets (Szymanski 2002; Pietrzak and Roman, 2018). The situation in large integrated markets can have an impact on regional and national markets. A particularly important factor in this context is price volatility, which illustrates two tendencies: the extent and direction of changes in observed values, and the variation in their intensity over time (Figiel and Hamulczuk 2012).

In theoretical terms, this problem is described by the law of one price and, consequently, the issues of price sensitivity, transmission and asymmetry (Lamont and Thaler, 2003). The means of assessment and interpretation of cyclical fluctuations include analysis of time series and, in particular, their decomposition into individual components (Bonizzi *et al.*, 2014).

The agri-food sector is subject to cyclical fluctuations, which can be determined by both natural and socio-economic conditions. The cyclicality of pig livestock production (the so-called *pig cycle*) is primarily determined by natural conditions, which are illustrated by changes in the pig population (Moore, 2003; Holst and von Cramon-Taubadel, 2012). Cyclical fluctuations in the world sugar market are determined primarily by economic factors and to a lesser extent by weather conditions during the growing season (Batie, 1976; Isermeyer and Kleinhanβ, 2005).

The cyclical nature of sugarcane production, which is a perennial crop, was determined by profitability, including primarily sugar prices. When sugar prices are falling, farms that show high costs and are uncompetitive are the first to abandon the crop. When prices are rising, there is a successive increase in the acreage under cultivation. Seasonal fluctuations during the year, which are caused by the nature of agricultural production (e.g., milk, fruit and vegetables), also play an important role in the agri-food economy.

Seasonal fluctuations in the sugar sector play a marginal role, despite the campaign nature of production, as sugar is stored by producers and successively sold. Prices in food markets are determined by many different factors. The strength and direction of the impact of all these factors is impossible to predict in practice. Many factors interact in different directions and, moreover, most of them have a varied impact over time.

The development of statistical and econometric methods of analysis makes it possible to use tools that, depending on research needs and available empirical data, are based on correlation (correlation and regression) analysis, time series analysis, or the construction of sophisticated econometric models (Aczel, 2000). The regularities that determine price volatility are embodied in the structure of the time series, which consists of the following elements: trend, cyclical fluctuations, seasonal fluctuations and random fluctuations (Bonizzi, 2014).

3. Materials and Methods

The time series analysis of world white sugar and raw sugar prices was carried out using two methods. The first method was based on the statistical decomposition of the individual multiplicative components of the time series (Aczel, 2000). The components $T\ C_t$ were selected using a centered moving average (12 months), and the component S_t was calculated based on the geometric mean of the same months, which were then adjusted so that their combined mean value was 100.

The business fluctuation indices C_t were then determined by cleaning the values of the time series Y_t from the trend T_t, seasonal fluctuations S_t and random events I_t. The second method was the decomposition of the X-12 ARIMA time series, which was preceded by an assessment of its stationarity using the ADF Dickey-Fuller test (Figiel and Hamulczuk 2012).

Long-term trends in sugar prices were determined using exponential and linear regression functions, of which the exponential regression function enabled the determination of the average annual dynamics of world sugar production and consumption (Aizenman *et al.*, 2024).

$$Y_t = T_t \cdot S_t \cdot C_t \cdot I_t \Leftrightarrow \; C_t = \frac{Y_t}{S_t \cdot T_t \cdot I_t} \tag{1}$$

Where:

Y_t - time series values,
T_t - long term trend (trend),
S_t - seasonal fluctuations,
C_t - cyclical (business cycle) fluctuations,
I_t - random fluctuations.

$$T_t = at + b \qquad T_t = be^{at} \tag{2}$$

Y_t - time series values,
t - years,
b - free word.

The empirical dataset consisted of monthly world prices for white sugar on the London Stock Exchange (Contract No. 5) and raw sugar on the New York Stock Exchange (Contract No. 11), and monthly FAO food price indices that covered the period 1990-2024 (USDA ERS, 2024; FAO, 2024). The study also used annual statistics for the world sugar balance (USDA FAS, 2024).

4. Research Results and Discussion

Between 1990 and 2024, growth rates on the world sugar market were moderate. An analysis of the exponential trend function showed that world production grew at an average annual rate of 1.6% to 183 million t (Figure 2). There were major changes in the production structure, as the share of sugar from sugar beet decreased from 50 to 20%, and this was determined by a large increase in sugar beet acreage.

Sugar from sugar beet is mainly produced in Europe, the USA, China and Turkey. In South and Central America, Africa and South Asia, sugar is produced from sugar cane. From year to year, production showed greater variability than consumption, and this was determined by the weather conditions during the growing season, which influenced the harvest of sugar cane and sugar beet.

Sugar production was also influenced by the fuel situation, as many countries (e.g., Brazil) increased the processing of sugar cane into bioethanol under conditions of high fuel prices (Langeveld *et al.*, 2014; Grandis *et al.*, 2024.). Changes in sugar beet production in were determined by market policies in the EU and the USA, including until 2017 by the EU production quota system (Haß, 2022).

Geographically, sugar production is concentrated in the following regions: Brazil (41.0 million t), India (36.0 million t), the EU (15.5 million t), China (10.0 million t), Thailand (9.4 million t) and the USA (8.4 million t). Ukraine, despite its very favorable soil and climatic conditions, is not a major world producer and exporter of sugar, with production of around 1.8 million t. Therefore, the war in Ukraine has an indirect impact on the world sugar market, mainly through the prices of cereals, oilseeds and above all fuel prices.

Between 1990 and 2024, world sugar consumption increased at an average annual rate of 1.6% to 179.5 million t. Sugar consumption showed less volatility than production. The systematic increase in consumption was a consequence of a growing world population, which reached 8.1 billion people (Worldometers, 2024) and an improved income situation in economically developing countries (World Bank, 2024).

Income growth has also affected changes in consumption patterns, including an increasing share of processed sweetened foods and beverages (Pingali, 2007). The largest demand for sugar is generated by markets with high population potential: India (30.5 million t), the EU (17.0 million t), China (15.5 million t), the USA (11.5 million t) and Brazil (8.8 million t). The large regional differences relate to the balance sugar consumption per capita, which are a consequence of differences in income levels and food consumption patterns.

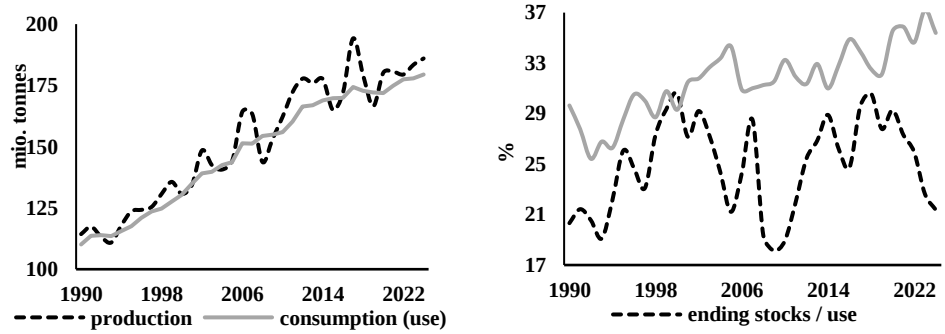
High sugar consumption is found in South America (36.7 kg/per capita), North America (34.5 kg/per capita) and Europe (31.8 kg/per capita). Significantly lower sugar consumption is found in Africa (14.5 kg/per capita), Asia (18.9 kg/person), and in Oceania (26.4 kg/per capita).

However, across continents, there are large differences in consumption levels between countries. One example is Asia, where consumption in China is 10.9 kg/per capita and in Thailand 44.5 kg, per capita. An analogous situation exists in South America, as sugar consumption in Brazil and Peru is around 42 kg/per capita, and in Paraguay only 10.9 kg/per capita.

The large regional variation in sugar production and consumption means that foreign trade plays an important role in the world balance. Between 1990 and 2024, foreign trade accounted for 25-37% of world production. Among the world's major producers, the large exporters are: Brazil (about 26.5 million t), India (10.0 million t), Thailand (9.0 million t) and Australia (3, 0 million t).

China imports about 6.5 million t, the USA 3.5 million t, and the EU 1.5 million t. Large global importers are countries with large populations and low production due to unfavorable soil and climatic conditions: Indonesia (5.5 million t) and Japan, Malaysia, South Korea, Algeria and Nigeria, which import 2.0-2.5 million t.

Figure 2. *World sugar market*

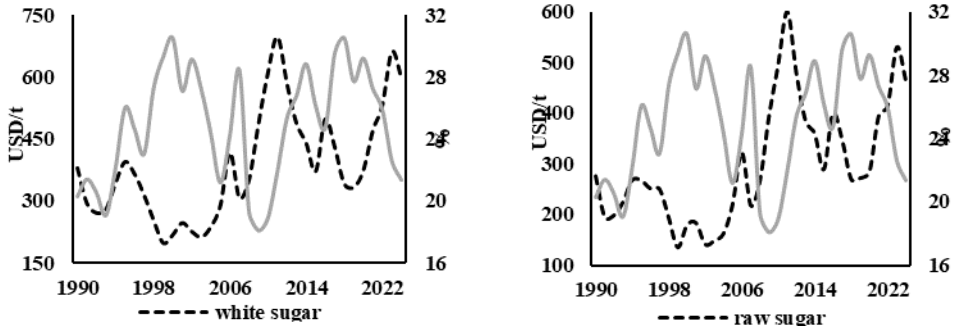


Source: *USDA FAS, own calculations.*

A key indicator for assessing supply and demand and the situation on the world sugar market is the ratio of ending stocks to consumption. Between 1990 and 2024, world sugar production usually exceeded consumption, but there were years when production was below consumption. Consequently, there were significant year-to-year changes in ending stocks, which accounted for 20-30% of world consumption.

Changes in the level of ending stocks were therefore an important determinant of world sugar prices. A comparative analysis showed that the increase in world prices of white sugar and cheese sugar occurred in years of decreasing levels of ending stocks in relation to consumption (Figure 3).

Figure 3. *World sugar prices and ratio of ending stocks to consumption*



Source: *USDA FAS, own calculations.*

From 1990 to 2024, world sugar prices exhibited high volatility, which was a consequence of a number of very different factors from year to year: weather conditions, ending stock levels, fuel and bioethanol prices, market policies at large producers, foreign trade flows and exchange rates of the US dollar and Brazilian real, and market shocks (e.g., COVID-19 pandemic, war in Ukraine) (de Souza Rolim *et al.*, 2015; Maitah and Smutka, 2018; Amrouk and Heckelei, 2020;).

World sugar prices are also determined by the situation in the substitute sweetener market and aspects of health policy (Rumánková and Smutka, 2013). Sugar prices reached record levels in two periods, 2010-2012 and 2022-2023. In the first period, the main reason for the large increase in prices was lower cane sugar production and a decrease in ending stocks.

In the second period, the increase in sugar prices was a consequence of the war in Ukraine, which caused a large increase in energy and agricultural commodity prices. There was a threat to energy and food security in many regions of the world. A characteristic feature of the world sugar market is the large fluctuations in the economy, which are illustrated by the high price volatility.

Consequently, a period of very high prices is followed by a large price correction (Figure 4). A comparative analysis of the FAO indices of world food prices and sugar prices showed that between 1990 and 2024, the directions of change of total food and sugar prices were analogous, but their dynamics were significantly different.

White sugar prices are higher than raw sugar prices, and the difference reflects the so-called *refining margin*. In many economically developing countries, the sugar industry does not have the technology to produce white sugar, and produces mostly raw sugar, which is refined in specialized companies in Europe, North America and Asia.

The refining margin shows significant variability from year to year, but its level does not reflect changes in the global market climate. Refining margins can be high when sugar prices are both high and low. Therefore, the main determinants and refining levels are the supply of raw sugar and the marketability of white sugar.

Analysis of descriptive statistics of world prices showed that over a long period, monthly white sugar prices fluctuated between USD 168-784/t, and raw sugar prices between USD 103-707/t. Confirmation of the high volatility of prices, which showed an upward trend, is provided by the high values of the coefficients of variation. The coefficient of variation was 0.365 for world white sugar prices and 0.417 for raw sugar. A consequence of the high volatility of white and raw sugar prices was the high volatility of the refining margin (0.339).

The presence of a trend in the time series is confirmed by the positive values of the arithmetic mean and median. The values of skewness greater than zero confirm the right-sided asymmetry of the time series high values of kurtosis indicate a concentration of the time series values around central values. The kurtosis and skewness values, as well as the Jarque-Bera test, confirmed that the time series of world sugar prices are not close to normal distribution (Table 1).

Table 1. *Descriptive statistics of world sugar prices*

Specification	White sugar	Raw sugar	Refining margin
Number of observations	414	414	414
Average	384.39	297.09	87.299
Median	353.41	262.55	85.127
Minimum	167.62	102.55	14.030
Maximum	783.70	706.83	220.16
Standard deviation	136.72	123.75	29.622
Coefficient of variation	0.35570	0.41655	0.33931
Skewness	0.80569	0.92986	0.51192
Kurtosis	0.03431	0.47163	1.04210
Jarque-Bera test of normality of distribution	44.8105 $p=1.86004e^{-010}$	63.4968 $p=1.62867e^{-014}$	36,8142 $p=1,02368e^{-08}$

Source: *USDA ERS, Sugar and Sweeteners Yearbook Tables, own calculations.*

The decomposition of the time series of world market prices for white and raw sugar was carried out using the multiplicative model Y_t and a centered 12-month moving average, which corresponds to the trend-cycle time series components TC_t. The seasonal component S_t was determined as the quotient of the empirical data Y_t and the corresponding moving average TC_t, and was then averaged across months. World sugar prices showed little seasonal variation.

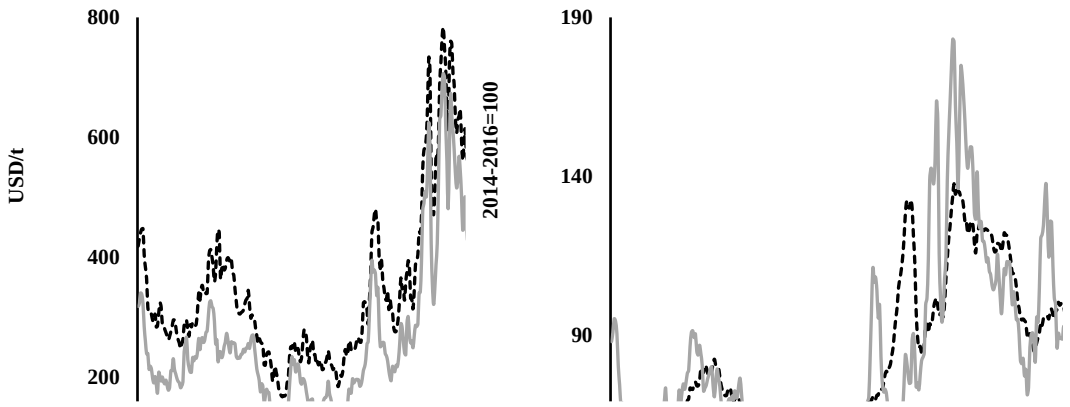
The highest prices in seasonal terms occurred in July and August, and were four p.p. above the long-term trend. The lowest prices occurred in November and December, and were two p.p. below the prices set by the long-term trend. Seasonal fluctuations mainly reflect the campaign nature of sugar beet production in Europe. The sugar season is from 1 October to 30 September, and the seasonal price increase in the months leading up to the campaign is the result of a decrease in supply (reduction in stocks). In November and December, sugar companies bring sugar from the campaign that has started, or finish selling stocks from the previous season to the market.

The determination of cyclical fluctuations began with the estimation of the trend function using simple linear regression for white sugar prices T_t=0.6461t+250.30 and raw sugar prices T_t =0.5963t+173.35. The graphs of the trend function show a low slope, which is for white sugar prices $33°=tg\alpha=0.646$ and for raw sugar prices $31°=tg\alpha=0.596$, and a poor fit to empirical data (R^2 =0.32).

The cyclical fluctuation of prices C_t was determined as the quotient of the moving average value TC_t and the value of the development trend T_t. The cyclical fluctuation indices confirm that the price changes were large, which in some periods increased almost twice as much as the long-term trend.

Furthermore, the research showed that business cycles had shortened to two to three years, and were irregular, resulting in a significant increase in production and trade risks (Figure 4).

Figure 4. *World sugar prices*



Source: *USDA ERS, Sugar and Sweeteners Yearbook Tables, FAO Food Price Index.*

Previous studies have shown that in the world sugar market, business cycles involved periods of five to six years, with an exceptionally long (11-year) cycle occurring between 1980 and 1990 (Isermayer and Kleinhanß, 2005). The volatility of world prices was the result of cyclical changes in the production of sugar cane, which is grown in a subtropical climate, and this variability in production cannot be mitigated by stable sugar production from sugar beet.

Sugar cane is grown on perennial plantations whose area decreases during periods of low sugar prices. If world sugar prices remain low for a prolonged period, producers in more economically developing countries, where prices do not cover production costs, abandon production. Subsequently, a large decrease in the supply of sugar from economically developing countries results in an increase in prices and a change of phase in the world market cycle.

World sugar prices have exhibited high volatility over the long term, as confirmed by descriptive statistics and time series decomposition. Economic variables are characterized by a dominant trend overlaid by seasonal fluctuations. Therefore, a key element in time series analysis is the assessment of stationarity, the assumption of which is essential in hypothesis testing. A variable is considered stationary if its properties do not change over time. The presence of non-stationary variables in the model may lead to erroneous results of statistical inference (Gruszczyński and Podgórska, 2004).

The assessment of stationarity starts with a graphical analysis of the time series (raw data). If a clear long-term development trend can be read from the graph, the series can be assumed to be non-stationary. World sugar prices show a long-term upward trend, which was identified in the time series decomposition.

In order to confirm the predictions, a Dickey-Fuller unit root test (ADF) was carried out, where hypothesis H0 assumes non-stationarity of the series. The test results clearly showed that the time series of world sugar prices could not be considered stationary.

Therefore, in order to be able to conduct further analyses of price volatility, it was necessary to transform the time series to make them stationary. For this purpose, the natural logarithms of the prices and their first differences were used and subjected to ADF tests for stationarity. The values of the DF statistics, much lower than the critical value and the low *p-values*, provide a basis for rejecting the hypothesis of non-stationarity, and it can be assumed that the series were integrated in degree one $Y_t \sim I(1)$ (Table 2).

Subsequently, the time series of the first differences of the logarithms of world sugar prices were subjected to decomposition using the X12-ARIMA method and all component components were identified, including in particular the cyclical fluctuations of C_t. The results of the study confirmed the results obtained from the time series decomposition, and thus that the business cycle in the world sugar market was shortened to two to three years.

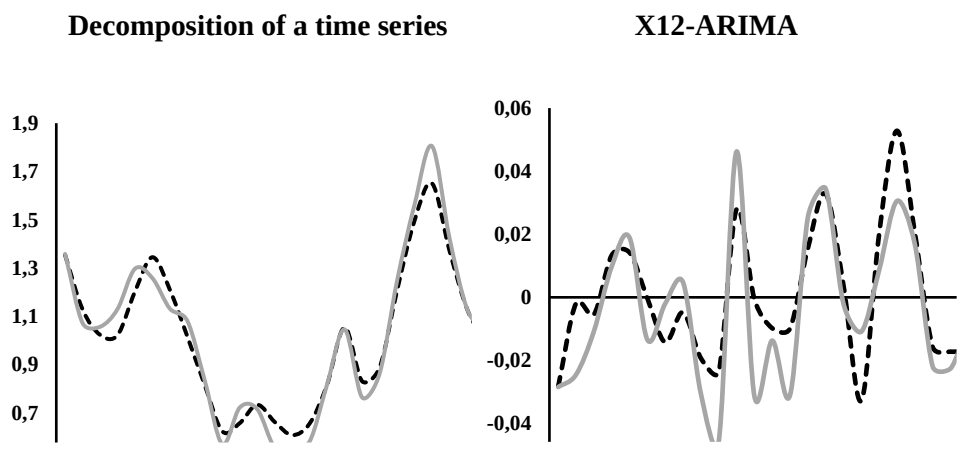
The cyclical fluctuations of raw and white sugar prices were analogous in terms of cycle length, but the amplitude of fluctuations varied from period to period. In the case of raw sugar prices, the variation of monthly prices from the long-term trend was ±4.6%, while white sugar prices ranged from -3.3% to 5.3% (Figure 5).

Table 2. *Results of the ADF test of world sugar prices*

	Type of test	The estimated value of a-1= δ	Tau test statistics	The p-value	Decision
White sugar	Expressionless free	-0.798188	-5.39085	$1.095e^{-007}$	I(1)
	With free expression	-0.803532	-5.40664	$2.794e^{-006}$	I(1)
	With free expression and linear trend	-0.809730	-5.37914	$3.049\ e^{-005}$	I(1)
Raw sugar	Expressionless free	-0.78443	-12.8117	$6.12e^{-027}$	I(1)
	With free expression	-0.78452	-12.7965	$2.72e^{-028}$	I(1)
	With free expression and linear trend	-0.78607	-12.7999	$3.85\ e^{-032}$	I(1)

Source: *USDA ERS, Sugar and Sweeteners Yearbook Tables, own calculations.*

Figure 5. *Indicators of economic fluctuations in world sugar prices*



Source: *USDA ERS, Sugar and Sweeteners Yearbook Tables, own calculations*.

5. Conclusions

The sugar sector is of great economic and social importance. In most countries of the world, sugar is the primary sweetener in households and the food industry. In addition, the sugar sector is strongly integrated into the energy feedstock market, as large quantities of sugar cane and molasses are processed into bioethanol, and other by-products are converted into biogas. Consequently, the sugar sector is of strategic importance in most countries.

The world sugar market, which is considered one of the first global products, has historically been subject to cyclical fluctuations and high price volatility. The main determinants of this have been political events (e.g., wars), economic crises, changes in market regulations, and the cyclical nature of sugarcane production, which has been conditioned by profitability. In most regions of the world, the sugar sector is a classic oligopoly, as a small group of concerns produce a homogeneous product - sucrose. Sugar concerns are predominantly global in scope, as foreign direct investment and foreign trade play an important role.

Between 1990 and 2024, the rate of growth of world sugar production and consumption was moderate, increasing by an average of 1.6% per year. Production showed more volatility than consumption, and this was determined by weather conditions, the cyclical nature of sugar cane production, and market regulations in sugar beet production.

Sugar consumption increased steadily, and this was determined by a growing population and improving incomes in economically developing countries. The volatility of production when consumption was systematically increasing resulted in

volatility of ending stocks, whose relation to consumption is one of the main determinants of the economic situation and price. Sugar production and consumption are highly concentrated geographically and, as a result, foreign trade accounts for a large share of the world balance (27-35%). Cyclical changes in the world market are reflected in the volatility of white sugar and raw sugar prices and the refining margin.

From 1990 to 2024, world prices for raw and white sugar showed high cyclical volatility. From 2019 to 2024, economic and price volatility was strongly influenced by the effects of the COVID-19 pandemic and the war in Ukraine. Although Ukraine is not a major world sugar producer and exporter, the world sugar market was highly integrated with the market for other agricultural commodities (cereals, oilseeds) and energy resources.

Statistical analysis and decomposition of the time series showed that the business cycle on the world sugar market was 2-3 years, and shorter than in the earlier period (5-6 years). The analysis of cyclical fluctuations revealed that the prices of white sugar and raw sugar showed analogous directions of change, but their amplitude varied.

In the analysis of business cycles, determining their morphology, including in particular the length and amplitude of changes, plays a key role. Knowledge of cyclical fluctuations helps to anticipate development trends and strategic decision-making by producers and traders.

Therefore, research on business cycles in the world sugar market should be continued and conducted more extensively, as regional markets (e.g., the EU) are highly integrated with the international market. Foreign trade accounts for a large share of market balance sheets, and sugar companies are global companies. Furthermore, sugar has a large share of trading on global commodity exchanges and its prices are strongly integrated with energy prices.

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