
COVID-19 impact on wheat market in Bulgaria and Black Sea Region

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Abstract

The effects of 2020 COVID-19 pandemic over the social and economic life throughout the globe have no comparison with any other phenomenon of our modern history. Economic activity has been substantially suppressed and even halted across geographical regions and various sectors like transport, tourism, HoReCa, automotive and others. These effects were additionally influenced by authorities' measures for closure of borders and imposing export restrictions.

The pandemic disrupted the food supply chains and affected the food prices. Market analysts reported that the prices of wheat and rice went up, but corn lost market due to less demand for biofuels. There was an urge for stockpiling grains, trade flows reshuffles, and over-purchasing of flour and pasta products. Undoubtedly, the COVID-19 pandemic changed the market dynamics.

The goal of this research is to assess the impact of COVID-19 on grain markets as the most sensitive and dynamic food markets. This paper will focus on the impact of COVID-19 on the wheat prices in Bulgaria and the Black Sea Region markets, making use of using Dickey Fuller Test for price stationary and comparing the period of the first outbreak (March–May 2020) with the same period of the previous year. In addition, the standard deviation in price is calculated to compare the price volatility in the period of the pandemic with the same period in 2019.

The main hypothesis is that COVID-19 had significant impact on wheat prices in the reviewed markets with different magnitude in terms of price volatility. In addition, the exceptional circumstances have affected the volumes and regularity of exports of wheat from the explored regions.

Key words: price effects; wheat; market; Bulgaria; Black Sea; COVID-19; trade

Въздействието на COVID-19 върху пазара на пшеница в България и Черноморския регион

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Резюме

Ефектите от пандемията COVID-19 през 2020 г. върху социалния и икономическия живот по целия свят не могат да се сравнят с никое друго явление от съвременната ни история. Икономическата активност е значително потисната и дори спряна в географските региони и различни сектори като транспорт, туризъм, HoReCa, автомобилостроене и други. Тези ефекти бяха допълнително повлияни от мерките на властите за затваряне на границите и налагане на ограничения за износ.

Пандемията наруши веригите за доставка на храни и повлия на цените на храните. Пазарните анализатори съобщиха, че цените на пшеницата и ориза са се повишили, а царевичката е загубила пазара си поради по-малкото търсене на биогорива. Прояви се стремглаво желание за складиране на зърнени храни, промени в търговските потоци и прекомерно закупуване на брашно и тестени изделия. Несъмнено пандемията COVID-19 промени пазарната динамика.

Целта на това изследване е да се оцени въздействието на COVID-19 върху пазарите на зърно като най-чувствителните и динамични пазари на храни. Тази статия се съсредоточава върху въздействието на COVID-19 върху цените на пшеницата в България и пазарите на Черноморския регион, използвайки Теста на Дики Фулер за стационарни цени и сравнявайки периода на първото огнище (март–май 2020 г.) със същия период на предходната година. В допълнение, стандартното отклонение в цената се изчислява, за да се сравни нестабилността на цените в периода на пандемията със същия период през 2019 г.

Основната хипотеза е, че COVID-19 оказва значително влияние върху цените на пшеницата на разглежданите пазари, с различна величина по отношение на нестабилността на цените. Освен това, изключителните обстоятелства се отразяват на обема и регулярността на износа на пшеница от изследваните региони.

Ключови думи: ефекти; пшеница; пазар; България; Черноморски регион; търговия; COVID-19

Introduction

Agricultural commodities tend to rank among the assets characterized with relatively higher price volatility due to risks associated with extreme negative weather events (high degree of uncertainty) and market power concentration. Given the socially sensitive nature of food prices from both consumer and producer perspective, the examination of their volatility and its drivers has a key role in public policy making and risk management, regarding issues like food security, market stability, poverty, economic farm sustainability, etc. This role is specifically underlined during sudden market shocks and social and economic crises such as the COVID-19 pandemic.

Wheat is the most widely traded commodity in the world with great number of possible suppliers and buyers. Wheat markets are characterized with great dynamics and sensitivity to external factors.

Bulgaria is among the important exporters of wheat as part of the Black Sea region, which in the last decade became influential player on the world grain market.

The current research comprises a review of COVID-19 related volatility factors and a review of the wheat market behavior in Bulgaria and the Black Sea region's market during the COVID-

19 pandemics. The paper analyzes the price dynamics in Bulgaria and the Black Sea market for price stationery by applying Dickey Fuller Test and Standard Price Deviation method.

The main objective of the current study is to confirm if COVID-19 had significant impact on the Bulgarian wheat export prices. We set as null hypothesis that COVID-19 had NO impact on the prices and as alternative hypothesis that the pandemic had significant influence on the wheat prices in Bulgaria. The studied period of pandemic is March–May 2020.

1. Price volatility factors related to COVID-19

The coronavirus pandemic resulted in many unknowns for the commodity market players. One of which being the extent of the economic damage on global markets. It is becoming increasingly obvious that many countries will face some degree of recession. As countries across the world entered multiple-week shutdowns, ensuring food supply has become a necessity.

1.1. Supply chain disruptions

The novelty of COVID-19 and its health and social-economic implications has put a high degree of uncertainty and divergence between

countries in their policy responses during the first weeks of the pandemic. The Common EU market and its third country trade relations were to large extend practically canceled by advancing border closures, including roads and ports, with no initial timeframe for reorganization and reopening.

The widespread reliance on trade caused serious concerns on food security and availability across countries, fueled in addition by lockdowns and increased demand for durable foods. Concerns of severe macroeconomic difficulties also arose, especially across countries with already preexisting economic and monetary issues, including Russia, where wheat export and prices are among the macro stability “tools”.

On 29th of March 2020 Russia announced¹ a restrictive export quota for grains between 1st of April and 30th of June 2020 valid for all countries except the EurAsian Economic Union members. The quota totaled 7 MT of wheat, barley, rye and corn. On 26th of April, the Russian ministry of Agriculture announced² the export quota has been fulfilled and shipments for non-EAEU buyers have been ceased until July 1, which effectively left Russia out of the global wheat markets for more than a month.

In addition, other key wheat exporters from the Black Sea also raised the concerns over delivery disruptions by signaling potential restrictions during the initial pandemic weeks. On March 16, the Ukrainian president announced possible food export restrictions without initially having a clear items list³. In the end of the same month the Ministry for Development of Economy, Trade and Agriculture of Ukraine banned the buckwheat export until July 1 and agreed (on March 30) with the major grain traders to cap the 2019/2020 season (ending June 30) wheat export to a total of 20,2 MMT in order to secure the domestic demand and prevent bread and cereal price spike⁴.

¹ Rossiyskaya Gazeta № 67(8121) - www.rg.ru/2020/03/29/pochemu-minselhoz-vvodit-kvoty-na-eksport-zerna.html; Decree of the Government of the Russian Federation No. 385 as of March 31, 2020

² Ministry of Agriculture of the Russian Federation – Press office - <https://mcs.gov.ru/en/news/quota-completely-taken-up>

³ Reuters report, “Ukraine plans more lockdowns, IMF talks, food export curbs over coronavirus”.

⁴ Reuters report, “Trade restrictions on food exports due to

On April 15, the Ministry signaled readiness to ban the wheat export if the quota was exceeded⁵. On the 9th of April Romania imposed Non-EEA ban on exports of cereals, flour, sugar and vegetable oil⁶ that was in force until 16th of April.

Kazakhstan initially banned its wheat flour export on March 22, but on April 2 replaced the measure with export quotas for wheat of 200 ThMT and for wheat flour of 70 ThMT valid until the end of the same month⁷.

1.2. Slump in energy demand and prices

Ethanol processing brought substantial negative shock in corn demand and prices. It is so far outlined as the most significant impact channel of COVID-19 over the grain markets. In 2020Q1 the global road transport declined by almost 50% compared to the previous year (up to 75% slump in countries imposing a stricter lockdown). Air traffic in some European countries contracted by approx. 90%. The diminishing mobility led to unprecedented drop in energy demand with oil consumption decreased by 10,8 mb/d annually in March. Gasoline demand shrank 1,7 mb/d and diesel – 1,5 mb/d in 2020Q1/2019Q1 (IEA⁸). Consequently, WTI oil plummeted over 50% in March and corn cash prices decreased 13% throughout March and April according to Bloomberg.

Despite ethanol production marginally involves wheat processing, it still has a potential spillover effect on wheat price volatility throughout the price correlation and substitution effect between corn and wheat.

1.3. Durable foods stockpiling

With lockdowns and other mobility restrictive measures spreading across Europe during the first weeks of the COVID-19 pandemic, people’s food consumption behaviors changed along with their general lifestyle. Uncertainty on mobility regulations, fear of food shortages, retail closures and the

the coronavirus pandemic”.

⁵ Reuters report, “Exclusive: Ukraine ready to ban wheat exports if necessary”.

⁶ Order of the Prime Minister of Romania N8/9.04.2020

⁷ Order of the Kazakh Minister of Agriculture N111/2.04.2020

⁸ International Energy Agency, “Global Energy Review”, April 2020.

general feeling of anxiety from the unknown health threat sparked a mass purchasing and stockpiling of durable foods, including wheat-based foods and ingredients. The empty store shelves became among the symbolic images of the pandemic. In order to replenish their inventories and prepare for eventual prolonged lockdowns, the food industry increased its wheat demand putting also a short-term upward pressure on wheat prices during the researched period of this study.

1.4. Drought concerns

The supply chain disruptions and other COVID-19 related effects took place in times of growing concerns over drought and wheat production in some parts of Central, South-Eastern Europe and Black Sea region⁹. Among the most severely drought affected regions were also some of the largest production areas in Bulgaria, which represents strong price volatility factor mainly on the domestic market, but also to some extent to the European trade. Usually, in spring the markets are predominantly weather driven. The sentiment of positive or negative weather conditions in key growing regions is enough to support or suppress prices. Therefore, it should be taken in consideration that during the research period

⁹ European Commission, *MARS Bulletins 3-6*, 2020.

there is a non-related to COVID-19 fundamental factor that could have impacted substantially the wheat price volatility.

2. Black Sea Grain Market – definition and behavior

The Black Sea grains market includes wheat and corn production and exports from countries bordering the Black Sea.

The Black Sea region plays an increasingly substantial role in the world wheat arena. In the past season 2017/18, the Black Sea countries (Ukraine, Russia, and Kazakhstan) met roughly 35% of the world's demand for wheat¹⁰.

Market analysts are especially interested in the grain harvest estimations and export prices of Russia and Ukraine, because these countries are the largest wheat exporters in the Black Sea region.

During the last two decades, Russia has not only proved itself as a key player on the Black Sea and Mediterranean market, but also has climbed to the world's largest wheat exporter by a margin. Between 2013 and 2018 the country has tripled the volume of its wheat export, reaching share of almost a fourth of the global trade (Fig-

¹⁰ What are Black Sea Grains? UkrAgroConsult.

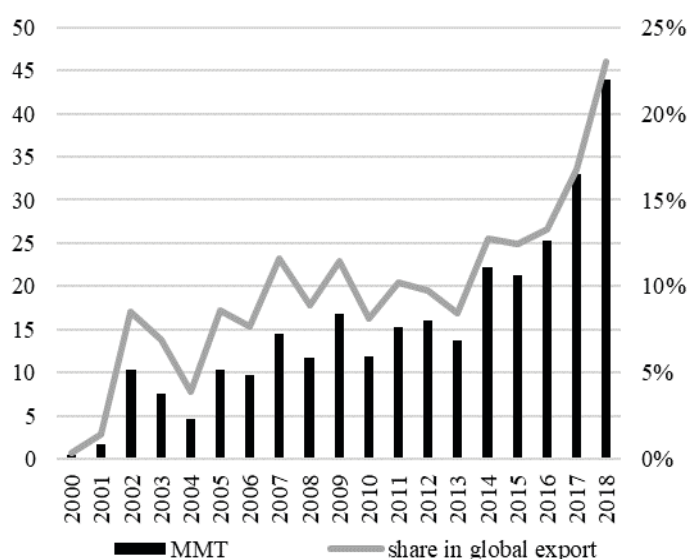


Fig. 1. Russian wheat export – volume and market share
Source: FAO.

ure 1). Volumes of this scale allowed Russia to become a key price volatility driver on the global wheat markets. Abundant Russian harvest nowadays means substantial downward price pressure. Consequently concerns over the export availability in the country lead to upward price effect.

3. Bulgarian wheat export market during COVID-19

Wheat is a major export commodity of Bulgaria with 65–72% of the local production being exported. Depending on the amounts harvested, Bulgaria is ranked 11th or 12th largest exporter worldwide. Traditionally, more than 70% of the Bulgarian wheat goes to EU countries.

In the 2019/2020 marketing year, wheat farm-gate prices were lower than the previous year's. Stable stocks, competitive prices, higher quality, and favorable export demand drove wheat exports. Export growth to non-EU markets tripled compared to the previous year. New markets are Thailand, Indonesia and Iran.

When COVID-19 pandemic hit the market in March 2020 it provoked a short-term panic response, similar to the rest of the Black Sea Region countries. The market expectations were that the demand will grow with 5–10%. Local and EU processors raised their demand for grains¹¹.

¹¹ "Grain demand will grow with 5-10%", article capital.

At the start of the pandemic (March 13), the Bulgarian ministry of Agriculture, Food and Forestry together with representatives of agricultural branch associations came with a joint statement that Bulgaria has sufficient stocks of grains. The Ministry announced that 1.7 MMT of wheat and over 2 MMT of corn are in the Bulgarian grain storages.

In the first months of the pandemic the Bulgarian government refrained from imposing export restrictions. This allowed the business operators to work on market principles and utilize export opportunities. Bulgarian exports in March and April were with 34% and 29% highest compared to the same months of 2019 (Figure 2).

The logistical facilities (ports, railroad and road transport) remained operational during the pandemic crisis with short-term disruptions of the road transport immediately after introducing city check points. That allowed the grain trade to move on without serious obstructions compared to other export countries which experienced much greater restrictions (export bans, closed ports, strikes, etc.)

Looking into the dynamics of Bulgarian wheat export volumes in Jan–May 2020, we can see substantial increase of export in the first months of pandemic March and April and a sharp slowdown in May 2020. Generally, Bulgaria export-
bg from March 23rd, 2020.

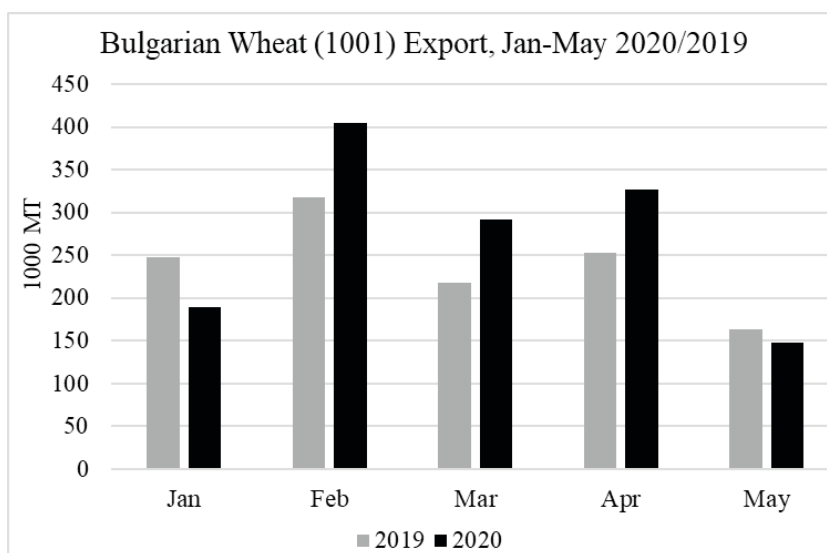


Fig. 2. Bulgarian Wheat Export Jan-May 2020–2019
(Data: ITC TradeMap)

ed 200 thousand tons of wheat more in Jan-May 2020 compared to the same period of 2019.

4. Methodology

Dickey-Fuller test

Co-integration is widely used method for price analyses of specially lined markets. Unit root tests are applied to determine if the variables in the regression are stationary or non-stationary.

The current analysis check for presence of a unit root and if integrity of the examined dynamic series is accomplished by applying (DF) Dickey-Fuller test (with a constant), as expressed in equations (1) and (2).

$$(1) P_t = a_0 + a_1 P_{t-1} + \varepsilon$$

$$(2) P_t = a_0 + a_1 P_{t-1} + a_2 \Delta P_{t-1} + \varepsilon$$

Where P_t is the price basis, and P_{t-1} is the price basis during the period t-1, a_0 is the constant of the regression equation, a_1 and a_2 are the regression coefficients, and ΔP_{t-1} is the difference between the price bases during the period t and t-1.

The DF test, points out the null hypothesis of unit root for each individual time series. The rejection of the null hypothesis indicates that the series is non-stationary and vice-versa (Dickey and Fuller, 1981).

As regards accepting or rejecting the hypothesis for the presence of a unit root error, it is taken into account the critical value of Student's coefficient from the t-statistics a_1 is taken into account. Whenever the critical value of a_1 obtained in the model is less than the standard value from the t-statistics at the level of the covered observations, the null hypothesis (the existence of a unit root error) must be rejected. It implies that the changes in the data series and the dynamics in the dependent variable are stationary (see Nestorov, 2015).

Standard deviation of price

The standard deviation in this analysis is the statistical measure of market volatility; measuring how widely prices are dispersed from the average price. Standard deviation rises as prices be-

come more volatile. As price action calms, standard deviation decreases.

5. Econometric model and results estimation

Aiming to assess if COVID-19 had significant impact on the wheat market in Bulgaria the current analyses applied Dickey Fuller Test for price stationary. The used data set included weekly FOB prices of milling wheat in Bulgaria, Russia and Ukraine. Data from two periods was collected: March–May 2020 and March–May 2019. Russian and Ukrainian prices were used since those two markets can be considered a reliable benchmark for the Black Sea Region grains market.

Price integration is a broadly used method for analyzing spatially linked markets. In the current paper three steps were made to identify the presence of unit root price (Table 1).

In addition a standard price deviation was calculated to compare price volatility in the two studied periods for the three studied markets (Table 2).

Step one was to check for internal market integration of wheat prices within the studied markets: Russia, Ukraine and Bulgaria during the COVID-19 pandemic in March–May 2020 (Table 1, Step 1). The results of the DF Test showed that the prices in the studies period were non-stationary.

Step two was to look for price integration between the two periods for the studied markets, COVID-19 lockdown and the same months in 2019. The test result again showed that prices were non-stationary (Table 1, Step 2).

In step three we compared the Bulgarian prices during COVID-19 lockdown with the price dynamics of the Russian and Ukrainian market. Expectedly, the results show high degree of price integration of the Bulgarian market with the two studied markets (Table 1, Step 3).

Following the DF test, we calculated the standard price deviation for March–May 2020 and March–May 2019 periods in order to compare the level of price volatility during corona pandemic and the same period of the previous year. The calculations showed similar and even lower price

Table 1. Results from the analysis for the presence of a unit root error in the derived dynamic series

Step	Dickey Fuller Tests by markets 27 February – 29 May (13 weeks)	DF	p-value	Standard critical values for a dynamic series of 100 observations at a significance level of 0.05 (Enders, 2010)
1	Price integration wheat FOB Russia in March–May 2020	-1.16	0.27	-2.89
1	Price integration wheat FOB Ukraine in March–May 2020	-1.19	0.26	-2.89
1	Price integration wheat FOB Bulgaria in March–May 2020	-1.29	0.22	-2.89
2	Difference of wheat price March–May 2020/2019 in Russia	-1.03	0.33	-2.89
2	Difference of wheat price March–May 2020/2019 in Ukraine	-0.99	0.34	-2.89
2	Difference of wheat price March – May 2020/2019 in Bulgaria	-1.24	0.23	-2.89
3	Difference between Russian and Bulgarian wheat price March–May 2020	-4.83	0.00	-2.89
3	Difference between Ukrainian and Bulgarian wheat price March–May 2020	-4.75	0.00	-2.89

Table 2. Results of the calculation of standard deviation of the FOB wheat prices by markets

Standard price deviation Weekly FOB prices	March–May 2020	March–May 2019
Russian FOB wheat	3.80%	4.11%
Ukrainian FOB Wheat	3.85%	4.25%
Bulgaria FOB Wheat	4.51%	3.13%

volatility in 2020 for the Russian and Ukrainian market. (Table 2)

6. Conclusions

The performed three steps of Dickey Fuller tests prove the validity of the null hypothesis, that COVID-19 did not have a statistically significant impact on the Bulgarian wheat export prices. Price dynamics in the three studied markets showed the same degree of disintegration in the compared periods. Moreover the price deviation (volatility) was similar in 2020 and 2019.

Based on the information received from market analysts and media publication and taking into account export statistics, we can conclude that COVID-19 shook the market prices for a very short period in the beginning of the lockdown pe-

riod, but did not cause scientifically measurable disturbance.

The analyses of market integration of Bulgarian into the Black Sea grain market showed very close correlation of the studied markets of Bulgaria, Russia and Ukraine and showed clearly that Bulgaria wheat prices are depended and determined by the dynamics of the Black Sea region.

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