Global food crisis and its causes: the EU’s response domestically and globally

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Abstract

In 2022, a global food crisis broke out due to three main factors. The first is climate change, which is related to the harvest, other measures related to the COVID-19 pandemic, which have disrupted the supply chain, and the last decisive one is the ongoing war in Ukraine. These factors primarily caused shortages in the supply of cereals, which we will focus on in our research. The main goal of paper is to evaluate the development of purchase, sales and consumer prices of selected cereals and cereal products in the Slovak Republic. We focus on the prices of food wheat, food rye, wheat-rye bread, fat roll and semi-coarse wheat flour for the period January - July 2022. Based on the research results is evident that the purchase prices of wheat had mostly a rising trend, and they grew the most in April 2022. In May 2022, the price of food wheat had reached its maximum, up to EUR 362.33 per ton. The growing price of food also caused the growth of consumer prices of wheat products. Compared to January 2022, all examined consumer prices were higher in July 2022, the price of selected semi-coarse wheat flour grew the most, by almost 50% during analysed period.

Keywords: global food crisis, grain, inflation, price

JEL Classification: Q02, Q11

1. Introduction

Wars and violent conflicts are a frequent cause of food crises. Even now, we are witnessing the global food crisis, which has fully erupted precisely as a result of the ongoing war in Ukraine. More serious problems with food supplies began already in 2020, when disruptions in the supply chain caused by measures against the spread of the COVID-19 disease were a frequent phenomenon (Esfandabadi, Ranjbari & Scagnelli, 2022). The situation was further aggravated by climate changes, which have had a significant negative impact on agricultural production for several years. The world suffered from economic shocks and economic slowdowns (Yu, Hu, Tong, Xia & Ran, 2022).

Ukraine is an important producer of wheat; it is its fifth largest exporter (Benton et al., 2022). However, Russia's military operations have caused the interruption of a large part of wheat exports, as the export routes are blocked. 20 million tons of cereals are due to the war blocked in ports (Ahmed, Blight, Ford & McMullan, 2022). Even now, when the blockade is over, occur serious problems with wheat supply. The countries of Africa and the Middle East, which depend on Ukrainian wheat, suffer the most (Balma, Heidland, Jävervall, Mahlkow, Mukasa et al., 2022). Africa is the most endangered continent by hunger. According to the Food and Agriculture Organization of the United Nations [FAO] (2022), in 2021, 702-828 million people worldwide suffered from hunger, that is, approximately one tenth of the world's population was undernourished. The greatest prevalence of malnutrition was in Africa, up to 20.2%. The lack
of wheat pushes its price up. The price of wheat on world markets has increased by more than 40% since the beginning of 2022 (Macrobond, 2022).

The countries of European Union, suffer from global food crisis, too. The war in Ukraine caused price shocks for food and fertilizers. The price of fertilizers has doubled from December 2019 to May 2022. Fertilizers are important inputs to agricultural production, so the jump in fertilizer prices was also reflected in the prices of agricultural products (Haller, 2022).

The European Union as well as the governments of its member states are facing two global problems, which are food security and food availability. It is trying to introduce measures aimed at ensuring the availability of food to citizens, especially the most vulnerable groups. Common agricultural policy is provided in the EU and thanks to that, food shortages do not threat the member states, but the low-income families suffer under food inflation. The European Union can take the following measures against inflation: facilitate advance payments to address cash flow challenges; allow temporary derogations on some requirements, such as set-aside land; adopt a crisis framework to provide further support. Also, the member states themselves can do the following things: reduce VAT rates; encourage retailers to keep prices down; use dedicated EU funds to help the most deprived (European Council & Council of the European Union, 2022).

The Slovak Republic is a small country, both in Europe and globally. Slovakia's agri-food foreign trade does not have an important position for these countries. It is therefore important for the Slovak Republic to engage in international trade (Látečková, Trnková, Palkovič & Holúbek, 2021). So, it is not surprising that Slovakia is hit by the embargo of Russian agri-food products (Kaštáková, Žatko & Jarossová, 2022). Slovakia feels the negative impact of the war through commodity supplies from Russia and Ukraine. We mean gas, oil or cereals. Their prices are rising and grain production in Ukraine will be lower. Food prices are growing the fastest in Slovakia and thus contribute the most significantly to inflation. Despite the partial decline in the prices of food commodities in the world Economic and monetary development markets after reaching an agreement on the export of commodities from Ukraine, there are pressures on the growth of food prices enormous. They are supported by other input prices such as for example, fertilizers, fuels, energy and, finally, the weather. (National Bank of Slovakia [NBS], 2022). The inflation rate in Slovakia reached 14% in August 2022, increased by 0.8% month-on-month. The prices of bread and cereals increased by 1.5%. As for food prices, they are more expensive by 21.6% compared to August 2021, while the prices of bread and cereals have increased the most, by 24.5%. Currently, food is the second largest item of expenditure after housing and energy (Statistical Office of Slovak Republic [ŠÚ SR], 2022).

2. Data and Methods

The aim of the paper is to evaluate the development of purchase, sales and consumer prices of selected cereals and cereal products in the Slovak Republic. To reach this main goal, we analyze the average monthly prices of cereals and cereal products in Slovakia for the period January – July 2022. We divide our research into three parts. In the first part we examine the purchase prices of grain. Two commodities were chosen for the research – food wheat and food rye and the values are featured in euros per ton. The second part is devoted to sales prices of cereal products and we analyze there the prices of wheat-rye bread and fat roll. The prices are given in euros per 100 kg. In the final part of research, we evaluate the consumer prices of final products and we focus on four products – semi-coarse wheat flour, bread, cereal bread and fat roll. In this part, the prices are given in euros per kilogram and for fat roll, they were recalculated from price per 40 grams to 1 kilogram. The values originate from the data of the Agricultural Payment Agency [APA] - Agrarian market information of Slovakia [ATIS], which periodically report information about situation on the agricultural markets.
By analyzing the data, the time series method is used. Time series can be defined as a certain grouping of the elements of some statistical sign based on chronological order. The time series are appropriately ordered only when they three conditions:

- the possibility of comparing data over time, i.e., the time periods must be of the same length,
- spatial comparability of data,
- the possibility of comparison based on content (Kirchgässner, Wolters & Hassler, 2013).

Indicators:

- Absolute increase – tells us how the given values change compared to the previous time period, we can express it using the difference between the value of the current and the previous period.

\[ \Delta y_t = y_t - y_{t-1}, \quad t = 2, 3, \ldots, n \]  

where:

- \( y_t \) value in date \( t \)
- \( y_{t-1} \) value in previous date
- \( t \) date
- \( n \) number of dates

The average absolute increase is an arithmetic mean of the absolute increase.

\[ \bar{\Delta} = \frac{1}{n-1} \sum_{t=2}^{n} \Delta y_t = \frac{y_n - y_1}{n-1} \]  

where:

- \( y_n \) value in date \( n \)
- \( y_1 \) value in date 1

- Growth coefficient – represents a multiple of the average growth of the given element compared to the previous period.

\[ k_t = \frac{y_t}{y_{t-1}}, \quad t = 2, 3, \ldots, n \]  

where:

- \( y_t \) value in date \( t \)
- \( y_{t-1} \) value in previous date

The average growth coefficient can be expressed as the geometric mean of the growth coefficient.

\[ \bar{k} = \sqrt[n-1]{k_2 k_3 \ldots k_n} = \sqrt[n-1]{\frac{y_n}{y_1}} \]  

(4)
where:

- $k_{2,3}$ growth coefficients in dates 2 and 3
- $k_n$ growth coefficient in date n

Litschmannová (2010)

A linear trend line is a part of graphs created in our research. Trend can be defined as a change over a period of time. Trend line represents a line which show us a pattern or trend on a graph. Trend lines can be also used to make predictions of the future. We distinguish three types of trend line, a trend line with positive slope, a trend line with negative slope and a horizontal trend line. A trend line with a positive slope indicates a positive relationship between the variables, so when one variable increases, the other increases, too. When a trend line has a negative slope, it indicates a negative relationship between the two variables. When one goes up, the other goes down, and vice versa. A horizontal trend indicates a constant relationship between the two variables. No matter which direction one goes, the other stays the same (Kirchgässner et al., 2013).

3. Results and Discussion

In our research we examine the development of purchase, sales and consumer prices of selected grains and cereal products in Slovakia in the period January – July 2022.

3.1 Purchase prices of selected grains

We begin with the first stage of the product vertical of grains, which are products of primary agricultural production. We selected two products which average monthly prices are available for public in the reports of the APA - ATIS. These products are food wheat and food rye. We have chosen these two grains because they are very important for nutrition of Slovak population. On the shelves in supermarkets in Slovakia, wheat and rye products are the most common. The average monthly purchase prices for food wheat and food rye are shown in the graph below.

**Figure 1:** Purchase prices of selected grains in Slovakia January – July 2022 (EUR/t)

Source: ATIS, own processing
The trend lines shown in the graph show that the purchase prices of both food wheat and food rye in Slovakia followed an upward trend during the period January – July 2022, while the slope of the linear trend line was very similar for both commodities examined. The growth rate of both wheat and rye prices was around 5%, which can be assessed as a significant rise. The price of rye grew slightly faster than the price of wheat. While on average the price of wheat rose by 4.7% month-on-month, for rye this increase was 5.3%.

However, if we look at price developments in individual months, we see a significant difference between commodities. The development of the price of wheat did not experience such significant fluctuations during the period considered as in the evolution of the price of rye. We can also see the differences between the trend in price developments during the months of February-July, that is, since the outbreak of the war in Ukraine. While the price of wheat rose significantly in the months of February – May, the price of rye, on the contrary, fell by 27.78 EUR/t in March and remained at a relatively constant level during April and May, the increase in the price of rye during this period was only minimal. However, the price of wheat recorded the largest month-on-month increase in April, up to 42.35 EUR/t. In June, the situation turned around. The price of wheat fell for the only time in the period under review and a jump of 116.82 EUR/t was recorded in the price of rye. In the last examined month, the trends twisted again, while the price of wheat rose to 371.16 EUR/t, the price of rye decreased to 298.97 EUR/t. The price of food wheat was in July the highest of all examined months.

3.2 Sales prices of selected cereal products

After we have analysed the prices of primary agricultural products, we continue to examine the next stage of cereal products vertical, which are products intended for sale by retail undertakings. So, we examine the sales prices of these products. We have chosen wheat-rye bread and fat roll because these are sold to the retailers in huge amounts.

In the following graph are displayed the sales prices of wheat-rye bread and fat roll in Slovakia in January – July 2022.

**Figure 2:** Sales prices of selected cereal products in Slovakia January – July 2022 (EUR/100kg)

Source: ATIS, own processing
In contrast to the purchase prices of selected grains, the sales prices of cereal products did not change dramatically at all over the period considered. The prices of both wheat-rye bread and fat roll had a slight upward trend. The average month-on-month price increase during the months under review was minimal. On average, the price of wheat-rye bread increased by only 0.84% month-on-month, and with the price of a roll, this growth was even smaller, only 0.69%. The wholesale price of the roll was around EUR 25/100kg higher than the price of wheat-rye bread during the period considered.

The price of the roll did not change in February compared to the previous month, but after the outbreak of the war in Ukraine, it increased slightly by EUR 0.25/100 kg. The crisis did not fully manifest itself in the price of the roll until April, when it jumped by EUR 5/100 kg. In May, the price of the roll remained at a constant level. In June, a reduction of 1.5 euros was noted. It held at a constant level, and in July the price increased by 2.25 euros. In July, 100 kg of fat roll costed 148 euros.

The development of the price of wheat-rye bread had a different course. Even in the period before the war, its price rose slightly by 0.21 euros compared to the previous month. Interestingly, however, in March the price even decreased by more than 1 euro, and in April this decline continued, albeit to a lesser extent. In May, when the price of the roll stabilized, on the contrary, the price of wheat-rye bread soared by almost 5 euros. In both June and July, the development of the price of wheat-rye bread followed the same course as the development of the price of the roll. In July 2022, retailers were able to buy 100 kg of wheat-rye bread for 112.39 euros, which is 5.51 euros more than at the beginning of the year.

### 3.3 Consumer prices of bread and pastry

Finally, we will look at the evolution of the prices of final grain products. We will examine the consumer prices of four selected products, which often appear in the consumer basket of Slovak residents. These include semi-coarse wheat flour, bread, cereal bread, and fat roll. Data on their average monthly prices are shown in the graph.

**Figure 3:** Consumer prices of bread and pastry in Slovakia January – July 2022 (EUR/kg)
The graph shows that all items of bread and pastries selected by us had a slight upward trend during the reporting period. The prices of semi-wheat flour, bread and wholemeal bread were constantly increasing. The prices of fat roll either increased by leaps and bounds during the period under review. All prices rose most strongly compared to the previous month in April, when the food crisis took full effect. On the other hand, prices increased at least in February, in the period before the outbreak of the war in Ukraine.

If we look at the price development of individual items, we find that during the months of January - July 2022, the price of flour rose most significantly, up to three times compared to the other foods analysed. The average month-on-month increase in the price of flour was 6.6%. In absolute terms, the price of flour increased by EUR 0.27/kg in July compared to January, a 47% increase. Most significantly, its price rose in April, by 0.11 euros. In July 2022, consumers were able to buy a package of semi-wheat flour for 0.85 euros.

As for the other items examined, wholemeal bread showed the second largest price increase. On average, its price increased by 2.8% month-on-month. Overall, it increased by EUR 0.62/kg compared to January in July. In July, 1 kg of wholemeal bread cost 4.16 euros/kg. An even smaller increase was shown by the price of bread, averaging 2.2% per month. Also, the April price jump was lower than the previous two items, the price increased by 0.06 EUR/kg at that time. In July, the price of bread stabilised at 1.93 EUR/kg, which is 14% higher than in January.

The price of the fat roll was the least sensitive to the events of the last year. Over the period under review, it grew by an average month-on-month increase by 2.1%. In February and June, even its price did not rise at all, but remained at a constant level. In April, however, the price of the roll reacted more strongly to the war in Ukraine than the price of bread, at that time the price of the fat roll increased by EUR 0.13/kg. The price increase for the entire period under review amounted to EUR 0.28, in relative terms 13%. and during July 2022, consumers were able to buy kg of rolls for 2.38 euros.

3.4 Discussion

On the previous graphs, we could observe a significant increase in the prices of primary agricultural commodities, namely food grade wheat and food grade rye. Peter Močko, chairman of the Slovak Millers Association in the report made by Hilbertová (2022), states that wheat prices in Slovakia are determined by export prices. It is the stock exchanges that determine the price. The high rise in world prices can be attributed to the reduction in grain supply on the world market, mainly due to the mainly due to the war in Ukraine and the related temporary stoppage of wheat exports from Ukraine and Russia and due to the ban on wheat exports from India. The lack of grain supply combined with high demand is pushing up prices.

At the same time, the Food Chamber (2022) notes that Russia is a large importer of fertilizers to Slovakia, especially urea and phosphorous fertilizers, the price of which has increased significantly in the recent period. If the conflict were to last for a longer period, a problem may arise when establishing a new crop, and substitutes will have to be sought, mainly in phosphoric fertilizers.

It is noteworthy, however, that the food crisis did not affect the wholesale prices of wheat-rye bread and fat rolls, nor the consumer prices of baked goods to such a significant degree as the prices of grain. The only exception is the price of flour, which grew even more than grain prices on average month-on-month during the monitored period. In a report made by Hricišinová (2022), Vlada Debnárová, secretary of the Association of Cereal Growers, explains that the costs of buying grain make up only a third of the consumer prices of bread. The rest is made up
mainly of costs for energy, transport, packaging, and other costs, as well as the trade margin of retailers. It is precisely the high trade margin that justifies the much higher growth of retail bakery prices than wholesale prices. Debnárová further states that in the case of flour, grain costs account for up to 70% of its price, and thus the rise in grain prices accelerates the rise in flour prices much more than other grain products.

The uncertainty of future market developments is extremely high. Inflationary pressures weigh on the financial situation households and companies (Saâdaoui, Jabeur & Goodell, 2022). The European Central Bank [ECB] plans a tightening of monetary policy on a global scale dampen consumer demand. Businesses continue to face higher costs and supply chain disruptions, although there are tentative signs of some easing of supply constraints. These factors significantly overshadow the outlook for development in the second half of 2022 and beyond. (Mota & Fernandes, 2022).

In its latest report on economic and monetary development, the NBS (2022) created two different scenarios - positive and negative – of how the macroeconomic situation in Slovakia could develop in the next year. In a positive scenario, energy prices would rise by 50% in 2023, which would affect the development of inflation. It would be at the level of 13.5% and the Slovak economy would avoid recession. Moderate 0.5% economic growth would continue. However, the negative scenario that can occur with a lack of natural gas assumes an inflation rate of up to 22%, which would cause a significant decrease in consumer wealth. As a result, a recession would occur, GDP would fall by more than 4%.

4. Conclusion

We are currently living in turbulent times when it is difficult to predict the future. Institutions at both national and international level face major challenges. In addition to ongoing climate change, they also have to deal with the consequences of pandemic measures and deal with the impact of the Russian-Ukrainian conflict on world markets. One of the most serious consequences of recent events is the food crisis. The world is suffering from food shortages and rising food prices. Food shortages are a problem especially for the countries of Africa and the Middle East, as these countries are dependent on Ukrainian wheat, which is currently in short supply on the world market. The situation is aggravated by the Indian embargo on wheat exports. Thanks to its common agricultural policy, the European Union is protected from food shortages, but its member states are greatly concerned about rising food prices. The EU can take the following measures against inflation: facilitate advance payments to address cash flow challenges; allow temporary derogations on some requirements, such as set-aside land; adopt a crisis framework to provide further support. The dramatic rise in the price level also affects the Slovak economy. We can observe a galloping food inflation. The inflation rate in Slovakia reached 14% in August 2022. Food is by 21.6 % more expensive than it was in August 2021. The prices of bread and cereals have increased the most, nearly by 25%.

The main goal of paper was to evaluate the development of purchase, sales and consumer prices of selected cereals and cereal products in the Slovak Republic. We focus on the prices of food wheat, food rye, wheat-rye bread, fat roll and semi-coarse wheat flour. We examined the average monthly data of individual commodities for the period January – July 2022. The data were drown of the Agricultural Payment Agency - Agrarian market information of Slovakia. We used the method of time series and for each commodity we added a linear trend line in the graph.

Prices of every commodities have been rising during January – July 2022 but the velocity of growth was very different. The purchase prices of both examined grains – food wheat and food rye were increasing on average month-on-month by about 5%. However, by food rye, there was
a bigger volatility than by food wheat. In July 2022 one tonne of food wheat could be bought for 371.16 euros and one tonne of food rye for 298.97 euros. The high growth of grain prices was caused mainly by the ongoing war in Ukraine. The exports from Ukraine and Russia are much lower than before the conflict and India has banned the export of wheat, so there is not enough supply on the world market what has pushed the prices upwards. The second factor is, that the prices of inputs have grown, namely the prices of energy, fuel and fertilizers. The sales prices of wheat-rye bread and fat roll were growing slowly in comparison to food wheat and food rye. On average, the price of wheat-rye bread increased by only 0.84% month-on-month, and the price of fat roll by only 0.69%. In July 2022, retailers were able to buy 100 kg of wheat-rye bread for 112.39 euros, and 100 kg of fat roll for 148 euros. The reason for slower growth is that grain prices make only 30% of total costs of bread and pastry. The consumer prices of bread, cereal bread and fat roll, these were growing every month on average by about 2%. However, the price of semi-coarse wheat flour was growing three times faster, by 6.6%. Total costs of wheat flour consist by 70% of the costs of wheat in comparison to bread and pastry and this is the reason for the greater increase.

It is very difficult to predict the future development of price level and experts have made more scenarios. As for Slovakia, there are two scenarios created by National Bank of Slovakia. In positive scenario the price of natural gas will grow by 50% and there will be a minimal economic growth but in the negative scenario will Slovak economy in 2023 turn into recession and the inflation rate will be more than 20%. Because almost every other prices depend on energy costs, it is recommended that Slovakia and also the European Union focus primarily on problems with gas and electricity supply.

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