LONDON POLITICA

Projected risks and trends for wheat in a de-globalising world

7th October 2022

A research paper by London Politica's Global Commodities Watch

Research Director: Noah Trowbridge

Senior Analyst: Jonas Nepozitek

Research Analysts: Arthur Ddamulira, Azaria Kidane, Dhruv Nilkanth, Ruy Scalamandré, Frank Stengs

Table of Contents

Overview

By Ruy Scalamandré

Humankind has been cultivating and harvesting wheat for ten millennia, spanning various cultures and geographical terrain. Wheat is required to produce a variety of food products like bread, breakfast cereal, cakes, pastries, pasta, noodles, among various other derivative products. Wheat is also used for some types of animal feed, as well as in the production of biofuels.

Trade and taxonomy

The standard for trading wheat is set by the Chicago Mercantile Exchange (CME) Group – a merger between the Chicago Board of Trade (CBOT) and the CME. As a commodity asset class, wheat is traded in futures contracts, option contracts, and exchange-traded funds (ETFs). Futures and options offered by CME Group are based on five geographic areas: Chicago Wheat, Kansas City Wheat, Canadian Wheat, Australian Wheat, and Black Sea Wheat. Some of the biggest Wheat ETFs – which may sometimes contain futures or options of other cereal grains – are the Teucrium Wheat Fund ($WEAT:NYSE Arca), ELEMENTSSM commodity index, GRains ($GRU.IV:NYSE Arca), and the Barclays-issued JJG index ($JJG.IV:NYSE Arca).

Charles Schwab, a financial services company, explains that Chicago hard winter wheat and Kansas soft winter wheat (types of common wheat, *Triticum aestivum*) "set the global industry standards for wheat price risk management". This is because an overwhelming majority of harvested wheat is winter wheat, whereas spring wheat makes up only a fifth of global wheat production. The reasoning for this is that winter wheat has higher protein yields compared to spring wheat, and is therefore more versatile to make a wider variety of food products.

Major stakeholders

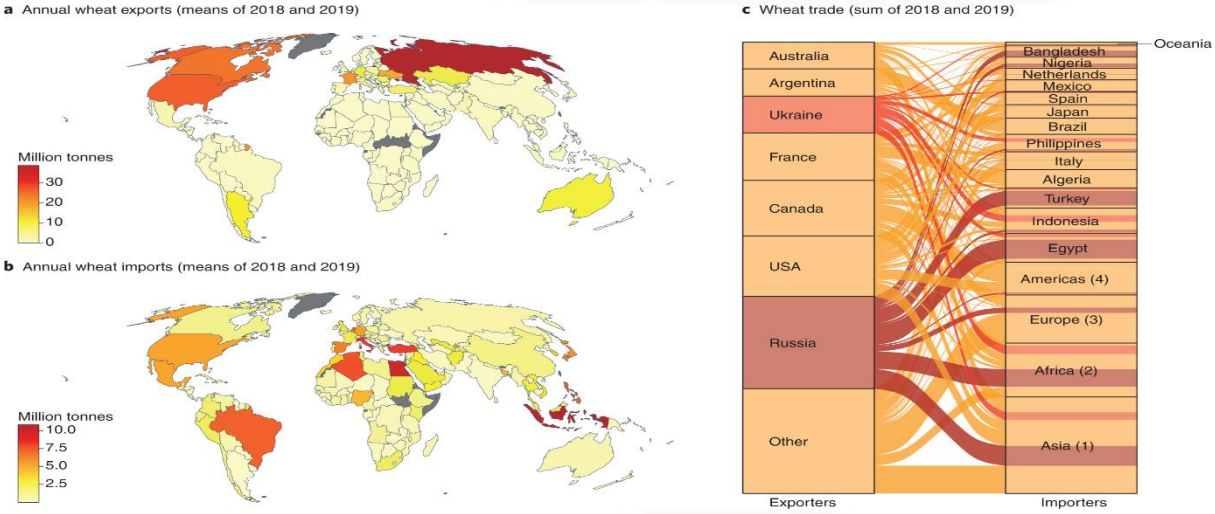
By Arthur Ddamulira

Winter wheat typically thrives in the longitudinal range between the Tropic of Cancer and the Arctic Circle in the northern hemisphere and between the Tropic of Capricorn and the Antarctic Circle in the southern hemisphere. Indeed, the leading exporters of wheat are situated within these longitudinal ranges and the countries that import the most wheat are within the tropics, as highlighted by The Observatory Economic Complexity. The major wheat producing regions include the European Union, China, India, Russia, and the United States.

Ukraine is a major supplier of wheat accounting for nearly 40% of the World Food Program's wheat supplies. This means those who depend on the WFP for food, wherever they are in the

world, will feel the effect of the war on their own reserves. The war has left approximately 22 million tons of grain stranded in Ukrainian ports. According to the United States Department of Agriculture, global production for the marketing year 2022/2023 is estimated to be 771.64 million metric tons, down 7.4 million tons (-1%) from last year because of the war in Ukraine. The European Union accounts for a fifth of the total global wheat output. The output level especially in Russia and the European Union is rising due to consumption growth and low harvest in the United States. Russia accounts for nearly 18.5% of the total global exports of the crop. The European Union accounts for nearly 45% of the global consumption and imports wheat to meet the regional demand.

Figure 1: Dynamics of the global wheat trade



Source: Bentley, A.R., Donovan, J., Sonder, K. *et al.* "Near- to long-term measures to stabilize global wheat supplies and food security," *Nat Food* 3, 483–486 (2022).

Other major consumers of wheat include China, India, Russia, the United States, Egypt, Indonesia, Brazil, and Algeria. The growing end-use sectors in Southeast Asia and potential export growth in Russia are providing a push to the production growth and boosting the supply share globally.

The major drivers of the market include the rising disposable incomes, increasing population, and rising demand for low-calorie sweeteners and gluten-free food. The main end-use sectors include sweeteners, fuel, paper and textiles, and food, among others. The leading players in the global wheat starch market are Cargill Incorporated, ADM, Roquette Freres, Tereos, AGRANA Beteiligungs-AG, and Tate and Lyle, among others.

Supply chain

By Frank Stengs

In order to analyse the critical infrastructure of wheat, we have divided the supply chain into multiple sections: 1) production, 2) transport, trade, and distributions, and 3) storage & processing.

Production

The critical infrastructure of wheat production depends heavily on the region where the wheat is grown. Irrigation, for example, may be less critical for regions that have predictable rainfall. Another example is mechanized farming, which is widely used, but less common in some regions. Fertilizer, seeds, and pesticides, on the other hand, are common types of infrastructure found across different regions.

1. *Irrigation (and the availability of water)*

With global warmth ramping up, weather patterns will become more disturbed, exacerbating droughts and rainfall. The effects of climate change will not be distributed equally, with some countries being more likely to be affected by droughts and floods. In circumventing drought, irrigation will be critical in sustaining wheat production. Especially in tropical monsoon regions where rainfall is uncertain, unreliable, and erratic, irrigation has an important role to play. But even in other countries, irrigation will be necessary to avoid lower production yield, due to drought.

Irrigation, however, will not only be affected by climate change. In the Nile-Basin, Egyptian farmers are likely to face limitations on water usage if Ethiopia continues its filling of the Grand Renaissance Dam, which will result in decreased Nile-river flows. Hence, the availability of water and irrigation will also depend on political factors.

2. *Mechanized farming*

Combine harvesters play an important role in global wheat production. They are critical in maintaining the efficiency and viability of the sector.

The global market of farm machinery is dominated by brands such as AGCO, Case IH, KS Group, John Deere, Mahindra & Mahindra, New Holland and Claas, and CNH Industrial. AGCO and John Deere hold over 35% of global combine harvester market share alone.

The supply chains of agricultural equipment were disrupted by the Covid-19 pandemic. As a result, the combine harvester market declined by 7.9% in 2020. The compound annual growth rate (CAGR), however, is expected to be 3.9% between 2022-2030, based on a report from 2021. Considering the current labour shortages and decreased supply, as a consequence

of the Russo-Ukrainian war, CAGR may even be higher as farmers try to expand operations, while using sparse labour resources.

Increasingly, farmers are also using agrotechnology to increase crop quality and quantity. This technology may include sensors, forecast modelling, robotics, and automation. While their importance is currently limited, this may become critical in maintaining future supplies.

3. *Fertiliser*

An overview of the supply chain of fertilisers is available in London Politica's research paper on potash.

4. *Seeds*

Seeds are the most basic input for wheat production. Hence, the distribution of quality seeds is a critical component of the wheat supply chain.

The global market of wheat seeds is dominated by companies such as Bayer AG, Corteva Agriscience, Syngenta International AG, Groupe Limagrain, and KWS Saat SE & Co. KGaA. Bayer AG has the biggest market share, currently sitting at 19.9%.

Supplies of quality seeds, however, are unequally distributed. Bighaat, a leading agrodigital platform from India, writes: "*Unfortunately, good quality seeds are out of reach of the majority of farmers, especially small and marginal farmers mainly because of exorbitant prices of better seeds*". Moreover, buyers are usually required to sign a contract that prevents them from resowing or exchanging the seeds the following year. It marks the challenges of seed distribution in the global wheat supply chain.

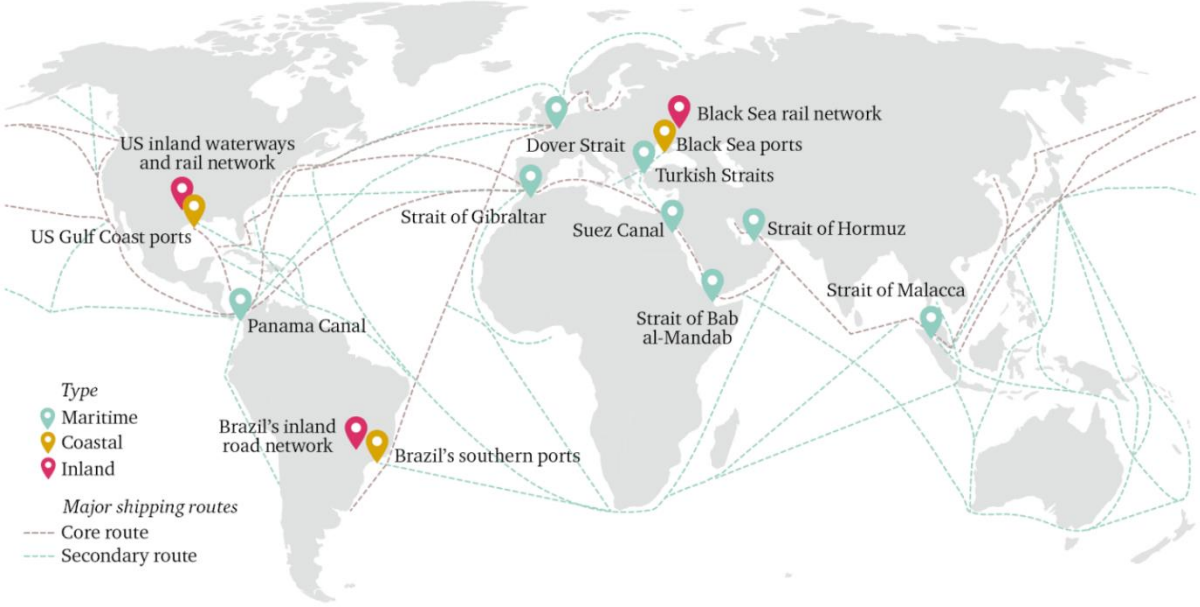
5. *Pesticides*

Pesticides have played a crucial role in doubling the average global wheat yield between 1960 and 1990. Decreasing pesticide use would mean a decrease in wheat production. A study found that halving pesticide use in France would lead to a 13% decrease in wheat production. It also argued that decreasing the usage of pesticides may not be profitable for farmers. Pesticides, however, have been controversial, due to their impact on human health and biodiversity. Although pesticides remain critical for production, biotechnological developments could make current pesticides less critical and relevant in the future. With the development of so-called biopesticides, similar yields could be obtained, while limiting the impact on the environment and food quality.

Transport, trade, and distributions

Moving wheat from point A to point B is vital, but some points in the global transport system prove more critical than others. These points are transport junctures through which exceptionally large volumes of trade pass – also known as chokepoints. The global food system is reliant on several of these chokepoints, which are outlined in Figure 2. Disruption to these points could drive up food prices and threaten food security. The blockage of the Suez Canal and the more recent Russo-Ukrainian war highlight the importance of these chokepoints to our global food trade system.

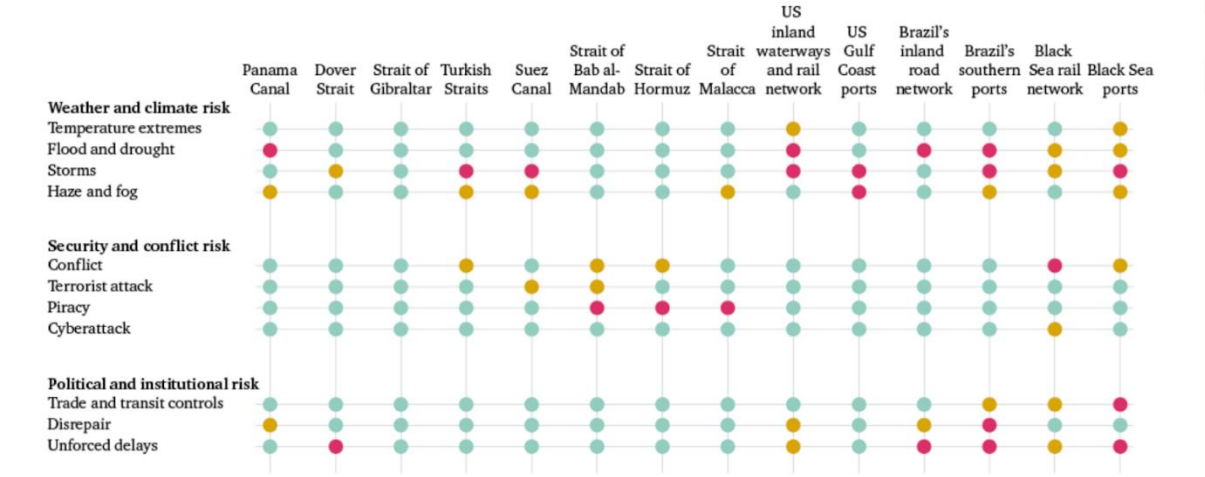
Figure 2: Chokepoints in the global food trade



Source: "Chokepoints and vulnerabilities in global food trade," Chatham House (2017), https://www.chathamhouse.org/2017/06/chokepoints-and-vulnerabilities-global-food-trade.

According to Chatham House, there are a variety of threats that could impact these chokepoints, namely: 1) weather and climate risk, 2) security and conflict risk, and 3) political and institutional risk. It is also argued that climate change will act as a hazard multiplier, likely to amplify all the above risks. The relative disruption risk to chokepoints, as analysed in 2017, is outlined in Figure 3. It is important to bear in mind that the security risks regarding the Black Sea rail network and ports have currently increased.

Figure 3: Relative disruption risk of food trade chokepoints



Source: "Chokepoints and vulnerabilities in global food trade, Chatham House (2017)," https://www.chathamhouse.org/2017/06/chokepoints-and-vulnerabilities-global-food-trade.

Not all chokepoints, however, are as important to the global wheat trade. Some transport junctures account for more of the global wheat trade than others. 40% of global wheat trade travels through three important straits: the Turkish Straits (15%), the Suez Canal (13%), and the Panama Canal (12%). Some countries are more reliant on a choke point than others. 85% of Egypt's wheat imports, for example, comes from Russia and Ukraine, hence the Turkish straits account approximately for 85% of Egypt's wheat imports.

Storage and processing

Wheat supplies are usually stored in wheat silos near farms or ports. There are a handful of risks involved with this section of the value chain. Security may be one of them but is rather uncommon. Ukraine, however, is now facing damage and loss of wheat, due to bombing and shelling. More common risks associated with storage may be fire and insects. Nevertheless, these threats constitute minor risks to the global trade.

The milling industry, on the other hand, which is also a critical part of the global wheat trade, is experiencing more serious problems. Like other sectors, across the global economy, the milling industry is facing inflation and rising energy costs. Together with price competition these are putting a strong focus on efficiency and automation.

Key risks

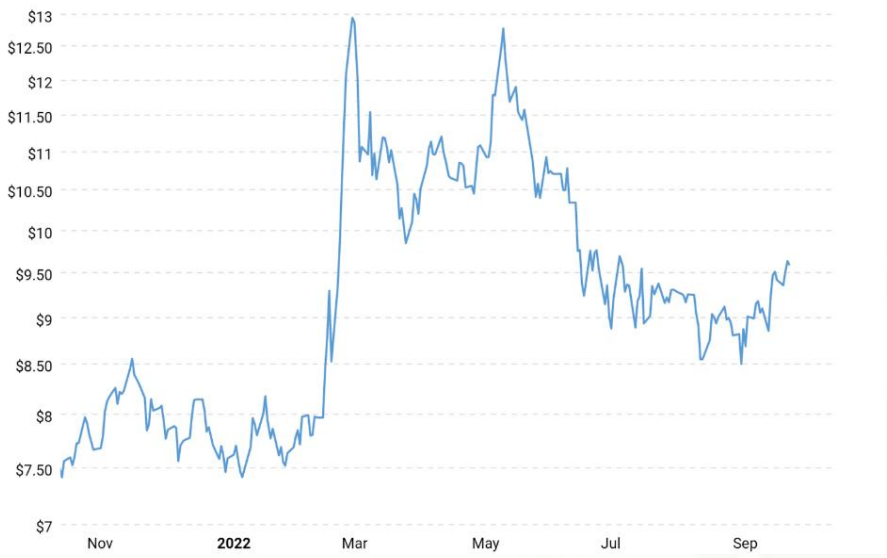
By Azaria Kidane

Despite being one of the most grown crops, the global wheat supply is not as risk-free as you would think and has especially been under threat given current geopolitical events. In addition to this, climate change has led to many scientists worrying about the uncertainty of wheat yields in already unstable regions. These two factors coupled with an already volatile market has many economic experts both intrigued and worried about the future of the commodity.

Geopolitical risk

The elephant in the room is of course the on-going conflict in Ukraine. With Russia and Ukraine accounting for 30% of global trade, wheat prices shot up markedly during the initial months of the war. Despite a recent return to pre-war prices, we have begun to see a rise again as shortages begin to take hold in regions particularly dependent on wheat from Ukraine and Russia, such as Sudan and Egypt. While farmers from other countries could and are being encouraged to plant more wheat to make up for shortfalls, it is doubtful that they can make up the difference. Most farmers usually know which crops they are going to grow for the coming season, so abruptly asking them to start growing wheat is an unrealistic solution to this problem. Furthermore, with supply costs rising, it is not financially feasible for them to suddenly buy the necessary amounts of seeds and fertiliser. The WFP has described the impending food shortages as a "worldwide catastrophe" and it shows how sensitive the wheat industry is to geopolitical events. With relations between the major powers of China, India, Russia, and the United States becoming less cordial, great power relations is a factor that investors must keep in mind when analysing the market and could even be used to their advantage. Any future tensions between the nations will most likely affect wheat prices, which is why there is a growing interest in wheat growth in developing countries. As the crop does not require much water or labour, it is ideal for these countries, but this does not consider other factors which, developing nations especially, will have to deal with.

Figure 4: Wheat prices at the Chicago Board of Trade in USD/bushel (September 2021-2022)



Source: "Wheat Prices - 40 Year Historical Chart," Macrotrends, https://www.macrotrends.net/2534/wheat-prices-historical-chart-data.

Climate risks

NASA reports predicted a potential 17% rise in wheat yields by 2030 due to a combination of increasing temperatures, higher carbon dioxide levels, and changing rainfall patterns. This could expand the growing range of wheat to areas in the Northern United States, Canada, the North China plains, East Africa, Southern Australia, and Central Asia, while also accelerating crop maturity and the length of growing seasons. However, the issue for developing nations is that the price changes that come with these developments could negatively affect them, and this is due to the droughts that come with rising temperature. Prolonged droughts in the Global South could lead to yields decreasing in the region and more volatile prices. Other studies have predicted that these droughts could affect 60% of wheat-growing areas meaning that any benefits gained from rising carbon dioxide and temperatures would be for naught. While irrigation could be used to solve this issue, many of these nations lack the capital to carry out widescale infrastructure projects themselves.

These factors have led to an increased attention by economists in the wheat industry. Even without the aforementioned factors, wheat's wide use means that it can experience massive fluctuations in the market. While it is available to be traded through a variety of financial assets, such as ETFs, futures, CFDs, and shares, wheat requires some technical knowledge for traders to be successful. Wheat futures can be used to hedge against rising inflation, as the contracts are priced in dollars meaning high inflation can help wheat prices. However, while keeping an eye on storage costs and interest rates, investors must also factor in the size and timing of their order. Although CFDs allow one to speculate on just the price, making them more appealing to less knowledgeable investors, the leverage increases the risk (a problem CFDs and futures share), with 74% of retail investors losing money trading CFDs. While one could buy shares of a company that produces wheat, no companies exclusively produce wheat which exposes one to the fluctuations of other products. Similarly, there is only one ETF that only exposes investors to wheat and that is the Teucrium Wheat Fund. While it may be a safer option, economists worry that China's growing gain stockpile could be a threat to the market. If China ever decides to release their reserves to alleviate food shortages, prices would decline (or not increase to sufficient levels for futures traders) but there is also an argument to be made that the markets have already factored this in.

Forecasted trends

By Dhruv Nilkanth

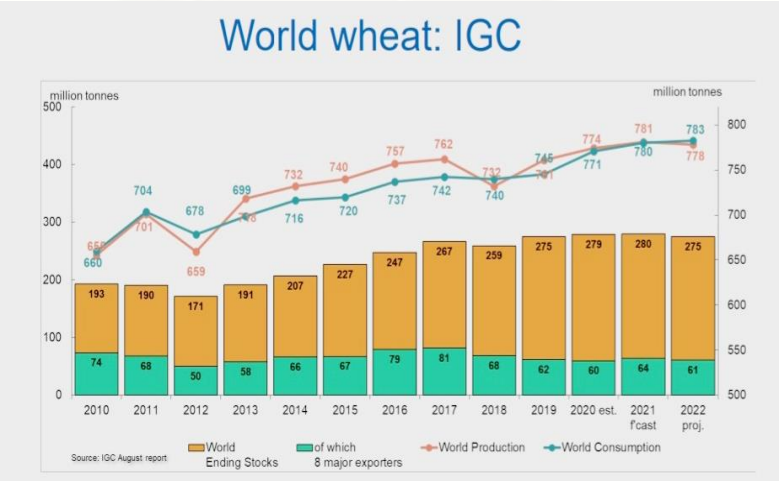
Wheat is one of the most important agricultural commodities in the world with an estimated 781 Mt (Megaton/million metric tonnes) being produced and almost entirely consumed in 2021/22 according to the International Grains Council (IGC). Wheat is also a highly traded commodity with global wheat trade amounting to 197 Mt for the same period.

Wheat has been one of the most affected commodities due to the Russia-Ukraine crisis that began in late February 2022. Since then, the prices and trade of wheat have seen high short-term volatility depending on several factors.

Demand

The annual consumption forecast for wheat in 2022/23 is 785 Mt, up from the estimated 780 Mt in 2021/22 according to IGC. Compared to 2013/14, global wheat consumption has increased 12% in the past decade, however the year-on-year growth between 2021/22 and 2022/23 is forecasted to be only 0.3%. The United States Department of Agriculture (USDA) has a similar forecast at 786 Mt, expecting an increase in feed and residual use. Consumption from unaccounted trade is forecasted to be less than 1% at 4.8 Mt in September.

Figure 5: Annual global production and consumption of wheat from 2010-11 to 2022-23 (forecasted)



Source: International Grains Council and European Commission.

Supply

The global wheat supply has been majorly affected by the Russia-Ukraine crisis. Russia is the third largest producer and the largest exporter of wheat in the world. Ukraine was the fifth largest exporter in 2020/21. The ongoing conflict that has lasted more than seven months now has affected the production and export capacities of both countries. Ukraine's production is forecasted to fall by more than 40% in 2022-23. Ukrainian exports were also affected due to the Russian blockade of its ports. While the Black Sea Grain Initiative brokered by the United Nations and Turkey saw Ukrainian exports return in late July, they remain susceptible to any further developments in the conflict.

Furthermore, climate related events such as the droughts in Europe mean that the European Union's production is forecasted to drop by 4-5%. Australia is also forecasted to see a 14% drop in produce compared to its record 2021/22 figures. However, Canada's and Russia's wheat yields increasing by 52% and 17% respectively mean that global wheat production could end at 792 Mt in 2022/23, growing almost 2% year-on-year. International trade of wheat is still forecasted to fall by more than 2% from 2021/22 estimates to 193 Mt in 2022/23.

Prices and futures

The biggest impact of the Russia-Ukraine crisis has been on the prices of wheat during the last seven months. Wheat prices have been highly volatile, fluctuating between 7 USD to almost 13 USD per bushel ($/bu.). Prices reached a record high of $12.94/bu. on March 7th and almost repeated this by rising to $12.78/bu. in mid-May at the Chicago Board of Trade. While the prices have fallen again since June, the average closing price in 2022 is approximately $9.6/bu. compared to $7/bu. in 2021. The annual change in prices is estimated to be around 24% between 2021-2022. Furthermore, the recent Russian troop mobilisation could significantly affect wheat prices and index futures in the short and medium terms. Similarly, any further escalations could lead to sudden price rises.

Conclusion

The Russia-Ukraine crisis has significantly affected wheat trade, and any developments could have big implications for the supply and trade of the commodity in both the short and medium term. While the demand of wheat is not as volatile as exports and prices due to it being highly inelastic, continued high prices and further rises caused by the continuation or escalation of the conflict could lead to change in demand. A fall in demand and a preference for alternatives could be seen, especially in the more price-sensitive markets of Africa, Asia, and South America.

In the long-term, the production and consumption of wheat is expected to increase by almost 10% by 2025/26 while trade is expected to increase by 5% and ending stocks by almost 12% according to five year projections made by the IGC in 2020-21. The most important factors that could affect these forecasts include the developments in the Russia-Ukraine crisis as well as climate events which may positively or adversely affect wheat production. ■