

Impact of the Ukrainian War and the Global Crisis on Food Security in Egypt

آثار الأزمة الأوكرانية والأزمة العالمية على الأمن الغذائي في مصر

Presented by

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Abstract

The Russian-Ukrainian war drove up the World prices of food products to their highest levels ever. The present study investigates the impact of this global crisis on Egypt using the data descriptive analysis approach. In view of achieving that goal, the study shed the light on the fluctuations of World prices and their reflection on the Egyptian economy. Particular attention was given to the trade movement and stock changes of wheat as the most strategic commodity for Egypt since Egypt stands as the biggest importer of wheat at the global level. The partial equilibrium model was adopted to assess the impact of the current global crisis on food security and poverty in Egypt through a number of indexes including the indexes of economic efficiency, community economic welfare and the realized government's proceeds from wheat import taxes at the national level.

The most important findings obtained by this study were the following:

The impulses of World prices have been reflected on local prices. Moreover, the stock of wheat in Egypt declined from an average of 2.7 million tons over the period 2019 – 2021, to 1.9 million tons in 2022. In addition, the prices of food products in Egypt soared to unprecedented levels immediately after the beginning of the Russian – Ukrainian war reaching an inflation rate of 20% in March 2022 or their highest inflation rate in five years.

The application of the partial equilibrium model also revealed the negative effect of the crisis on the indexes of economic efficiency in Egypt as the net loss of production, the net loss of consumption and the net social loss registered an estimated increase of 23380% between 2021 and 2022, The indexes of community economic welfare were also negatively affected by the global crisis, as the surplus production benefits realized in 2021 turned into a loss with the surplus production dropping by – 760% between 2021 and 2022. Similarly the loss in the consumption surplus rose by 368% in 2022 in comparison to 2021. The negative impact of the crisis was moreover reflected on the realized government's proceeds, turning them from benefits to losses with a declining rate estimated at 631%. In addition, the foreign currency balance registered a deficit in 2022 in comparison to a surplus in 2021, as the bill of wheat imports surged by 996% between 2021 and 2022.

Keywords: Food security, the Ukrainian crisis, Egypt, the partial equilibrium model, the global crisis, Poverty, the indexes of economic efficiency, community economic welfare , the realized government's proceeds, wheat.

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ملخص:

تسببت الحرب الروسية الأوكرانية في وصول أسعار السلع الغذائية الدولية إلى أعلى مستوياتها على الإطلاق، ومن ثم تناولت هذه الدراسة تأثير هذه الأزمة الأوكرانية و العالمية على مصر ، و تم استخدام منهج التحليل الوصفي للبيانات و تتبع تطورها من حيث تغيرات الأسعار العالمية و مدى انتقال آثارها محلياً و تتبع حركة التجارة و المخزونات ، و كل هذا فيما يتعلق بالقمح كونه أهم سلعة استراتيجية و تُعد مصر أكبر مستورداً عالمياً له ، مع استخدام نموذج التوازن الجزئي لبيان أثر هذه الأزمة على الأمن الغذائي و الفقر في مصر من خلال مجموعة من المؤشرات ، و المتمثلة في مؤشرات الكفاءة الاقتصادية و مؤشرات الرفاهية الاقتصادية المجتمعية و مؤشرات العوائد المحققة على المستوى القومي . و من أهم النتائج التي أسفرت عنها الدراسة هي :انتقال أثر صدمات الأسعار العالمية إلى الأسعار المحلية، كما تأثرت مخزونات القمح في مصر ،حيث انخفضت من ٢.٧ مليون طن عن متوسط الفترة (٢٠١٩-٢٠٢١) إلى ١.٩ مليون طن عام ٢٠٢٢. كما شهدت مصر ارتفاعاً كبيراً في أسعار المواد الغذائية بعد اندلاع الحرب مباشرة ، فوصل تضخم أسعار المواد الغذائية إلى أعلى مستوى له في خمس سنوات بنسبة ٢٠٪ في مارس ٢٠٢٢. و أظهرت نتائج تطبيق نموذج التوازن الجزئي ،التأثير السلبي للأزمة على مؤشرات الكفاءة الاقتصادية، حيث ارتفعت صافي الخسارة الاقتصادية للإنتاج و صافي الخسارة الاقتصادية للإستهلاك و صافي الخسارة الاجتماعية بين عامي ٢٠٢٢،٢٠٢١ بمعدل زيادة قُدر بحوالي 23380%. كما أظهرت الدراسة التأثير

السلبى للأزمة على مؤشرات الرفاهية الاقتصادية المجتمعية، حيث تحولت المكاسب في فائض المنتج - المحققة في عام ٢٠٢١ - إلى خسارة و معدل التغير في فائض المنتج بين عامي ٢٠٢١، ٢٠٢٢ إلى -٧٦٠٪ ، و حدثت زيادة في الخسارة في فائض المستهلك في عام ٢٠٢٢ عن نظيرتها في عام ٢٠٢١ بمعدل 368%. كما أسفرت الدراسة عن وجود تأثير سلبي للأزمة على مؤشرات العوائد المحققة على المستوى القومي، فتحققت خسارة في العوائد الحكومية بعدما كانت مكاسب ، بمعدل تغير بين عامي ٢٠٢١، ٢٠٢٢ قدر بحوالي ٦٣١٪. و في عام ٢٠٢٢ تحققت خسارة في حصيلة النقد الأجنبي متمثلة في زيادة مدفوعات النقد الأجنبي بعدما كان هناك وفر في هذه المدفوعات ، ، حيث ارتفعت فاتورة استيراد القمح بمعدل زيادة يساوي ٩٩٦٪ بين عامي ٢٠٢١، ٢٠٢٢ .

الكلمات الدالة: الأمن الغذائي، الأزمة الأوكرانية، مصر، نموذج التوازن الجزئي، الأزمة العالمية، الفقر، مؤشرات الكفاءة الاقتصادية و مؤشرات الرفاهية الاقتصادية المجتمعية و مؤشرات العوائد المحققة على المستوى القومي، القمح.

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1. Introduction

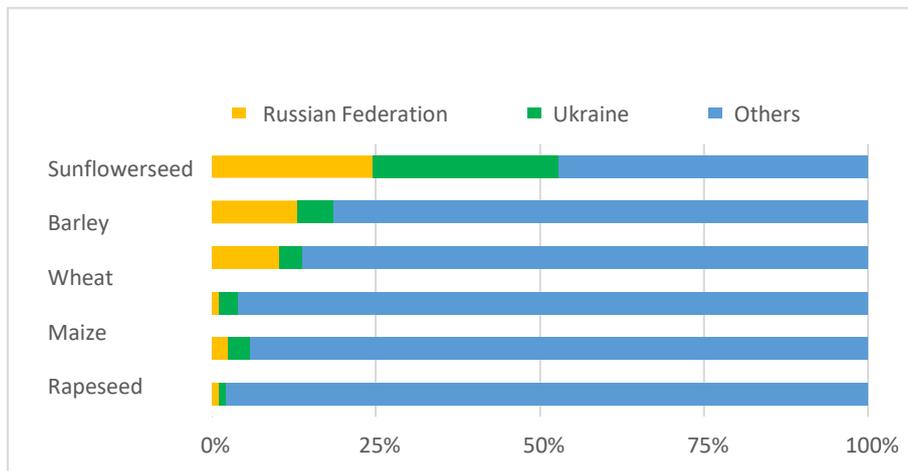
The Russian war launched against Ukraine started on the 24th of February 2022 and caused severe damage to the big cities and heavy losses in the lives of the inhabitants of Ukraine. It further expanded to the countryside, thus obliging more than 3.6 million inhabitants to leave their homes and flee across borders in search of a safe refuge. Millions of others have also left their homes and migrated to other parts of the country. Obviously, economic activities during the agricultural season in Ukraine were disrupted, leading to a serious deterioration of food security in Ukraine and around the World.

Prior to the Ukrainian war, World prices of food products soared to their highest ever peaks. That was probably due to the market conditions, in addition to the rising prices of energy, fertilizers and all other agricultural services. The armed conflict worsened the situation, driving up the FAO index of food products' prices to a new record in March 2022, rising 12.6% over its level in February 2022 and 33.6% in comparison to February of the previous year; and 15.8% higher than the price peak recorded in February 2011.

The Russian Federation and Ukraine are both prominent participants to the global trade of agricultural commodities and food products. In 2021, their wheat exports amounted together to approximately 30% of the global market. The exports of Russian maize were relatively limited accounting for 3% of the global exports of maize during the time period 2016/17 - 2020/21. During that same period, the Ukrainian maize exports accounted for 16% on average of the global exports, marking

Ukraine as the fourth biggest exporter of wheat at the global level. Furthermore, sunflower oil exports of the two countries together represented 73% of the global supply. Moreover, the Russian Federation stands as a major exporter of fertilizers. In 2021, The Russian Federation was the greatest exporter of nitrogen fertilizers, the second largest supplier of potassium, and the third largest exporter of phosphoric fertilizers in the World. About fifty countries rely on the Russian federation and Ukraine for their wheat imports. Out of these countries, twenty-six countries outsource more than 50% of their wheat imports from these two countries. Consequently, it is expected that the Russian – Ukrainian war will severely affect global markets and food supplies in various ways, thus representing a strong challenge to numerous countries, and in particular low income countries with high dependency on food imports, and limited income population categories.

Figure (1): Russian and Ukrainian participation to the global production of selected crops



Source: The Author’s calculations using the FAO database

As a background for the present study, some aspects of the Russian – Ukrainian war and the related global crisis are briefly presented in the following points.

1. The Ukrainian war actually caused great damage and many life losses in the main urban centers. Then it extended to the rural areas, obliging inhabitants to collectively migrate inside and outside the country. Food security was largely affected as it became practically impossible to pursue economic activities or obtain production inputs. Houses, fixed assets of production, agricultural lands, forests, roads and other infrastructure facilities, as well as the environment, have deeply suffered from the war. The ports have been closed and the processing of oil seeds has been suspended. Restrictions were imposed on export licenses. The main cities have been and are still exposed to violent bombing, leading to the isolation of inhabitants, and to their deprivation of water, food, and energy supplies.
2. The Russian Federation and Ukraine are among the most important producers of agricultural commodities in the World (Figure 1). Being both net exporters of agricultural products, they play a vital role in supplying global markets with food products and fertilizers. Exportable goods are usually concentrated in a few countries, and due to such concentration, global markets can be exposed to severe shocks and large price fluctuations.
3. The two countries together contributed on average 19%, 14%, and 4% of the World production of barley, wheat and maize respectively, during the period 2016/2017 to 2020/2021. They occupy an advantageous place in the field of oil seeds production, and particularly sunflower oil; on average, a little more than half the World production of sunflower oil originated from those two countries during the above-mentioned period.

4. In 2021, the Russian Federation, Ukraine, or both of them, were classified among the three biggest global exporters of wheat, maize, turnip seeds, sunflower seeds and sunflower oil. Moreover, the Russian Federation was the biggest exporter at the global level of nitrogen fertilizers; the second biggest exporter of potassium fertilizers; and the third biggest exporter of phosphorus fertilizers.

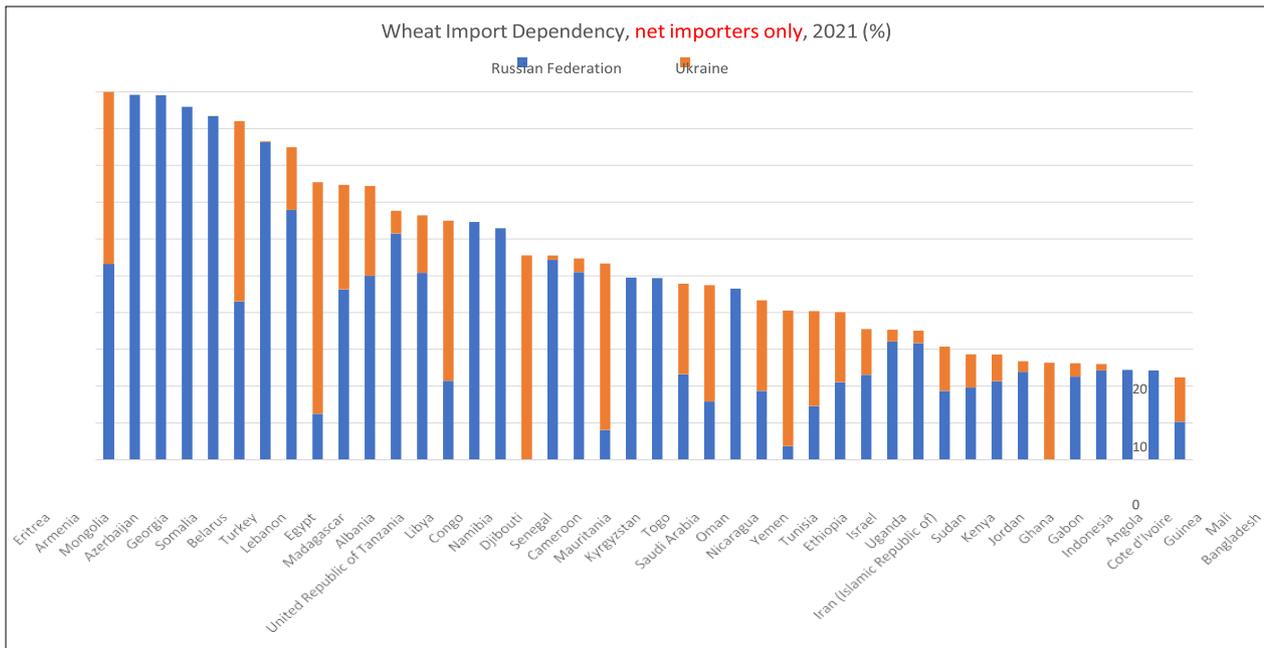
5. As a result, the Russian Ukrainian war caused a terrible shock to the global markets of food products that were already ailing from soaring prices and the consequences of the pandemic COVID -19.

6. Numerous countries that rely on importing fertilizers and food products, including many of the less developed countries (LDC) and the limited income-food deficit countries (LIFDC), were depending on the Russian federation and Ukraine for their imports of food products, in order to cater to their consumption needs. Those countries were already struggling to cope with the rising prices of food products and fertilizers, in addition to the negative effects of the pandemic COVID-19.

7. It is noteworthy that the Russian Federation stood as the biggest exporter of wheat and mycelium in 2021, with its exports of these two commodities amounting to 32.9 million tons or 18% of the global shipments. Ukraine was the sixth largest exporter of wheat and mycelium, with a contribution of 20 million tons or 8% of the World exports in the same year.

8. The Russian federation and Ukraine similarly occupied an outstanding position as major exporters of barley, maize, and turnip seeds; but more importantly, as exporters of sunflower oil. Their large production grounds allowed them to accaparate together a common share of 80% Of the global export market during the last three marketing years (2018/2019 to 2021/2022).

Figure 2: Countries with high dependency on wheat exports from the Russian Federation and Ukraine (2021)



Source: The Author, using the FAO database (www.fao.org)

- Countries are listed in the following order, from left to right: Eritrea, Armenia, Mongolia, Azerbaijan, Georgia, Somalia, Belarus, Turkey, Lebanon, Egypt, Madagascar, Albania, United Republic Of Tanzania, Libya, Congo, Namibia, Djibouti, Senegal, Cameroon, Mauritania, Kyrgyzstan, togo, Saudi arabia, oman, Nicaragua, yemen, Tunisia, Ethiopia, israel, Uganda, iran, sudan, kenia, Jordan, Ghana, gabon, Indonesia, angola, cote divoire, guinea, mali, Bangladesh.

9. Figure 2 above underscores the high dependency of numerous countries on wheat exports from the Russian Federation and Ukraine. These countries include many LDC and LIFDC. For

example, Eritrea outsourced all its wheat imports in 2021 from the Russian Federation (53%) and Ukraine (47%).

10. Figure 2 also shows that many countries in North Africa (and particularly Egypt) and in West and Middle Asia sought a large part of their wheat imports from the Russian Federation and Ukraine. Generally speaking, more than 30 net importers of wheat rely on these two countries for obtaining more than 30% of their wheat imports.

11. In view of the above-mentioned circumstances, countries with high dependency on the Russian Federation and Ukraine for obtaining their needs of food products and fertilizers will have to set up emergency plans to confront the present crisis, including trying to obtain such needs from other countries, while hoping for a quick response from the new suppliers.

Egypt in focus

The main objective of the present study is to investigate the impact of the Russian Ukrainian crisis on food security in Egypt. Section 2 of this paper reviews previous studies concerned with the analysis of the impact of the Ukrainian crisis and other global and local changes on food security; Section 3 presents the study methodology in two parts. . Part 1 is a descriptive analysis of the impact of the Ukrainian crisis at the global level; and Part 2 includes a descriptive analysis of the impact of the Ukrainian crisis on food security in Egypt; using the partial equilibrium model for measuring the indexes of economic efficiency, community economic welfare, and the government proceeds realized at the national level. Section 4 summarizes the conclusion and the results obtained by the study.

2. Previous studies

The relationship between the Russian Ukrainian crisis and the economic situation in various countries has been tackled by only a few studies, given the recent occurrence of the crisis. The study of Breisinger, C. et al., 2022 aimed at analyzing the impact of the Ukrainian crisis on food security and poverty in Kenya, through applying the social accounting matrix (SAM) model. The study revealed that the crisis has had a negative effect on food security and the household consumption level in Kenya.

The study of the FAO Council, 170/6, 2022, investigated the effect of the struggle between the Russian federation and Ukraine on the World food situation, as well as other relevant issues, within the scope of the FAO activities. Using the descriptive analysis approach, the study concluded that the ongoing struggle will negatively affect global markets and food supplies, thus confronting food security in many countries with a real challenge, especially the low income countries that strongly depend on food imports, and the less privileged population categories.

The study of Diao, X., 2022, analyzed the impact of the Ukrainian crisis on food security and poverty in Rwanda, also using the social accounting matrix (SAM) model. The study results indicated that the global and the Ukrainian crises had led to the reduction of the gross domestic product and employment in Rwanda. Moreover, food security and the household consumption level in Rwanda had been negatively affected by those crises.

The importance of the present study is that it focuses on investigating the impact of the Russian Ukrainian crisis on food security in Egypt, in addition to using the partial equilibrium model, which is a dynamic model.

3. Methodology

In order to assess the effect of the Ukrainian crisis and global changes on food security in Egypt, the descriptive approach was used. The relevant data were analyzed in view of comparing the situation of strategic food commodities before and after the crisis. In addition, the partial equilibrium model was applied with the aim of comparing the indices of economic efficiency, social welfare, and realized proceeds at the national level regarding wheat as a main commodity, first as an average over the 2018 – 2020 period, then in 2021, and finally in 2022.

The following data were used: Quantities and values of wheat production, wheat consumption, wheat imports, wheat exports; local and World prices of wheat; and the exchange rate of the local currency against hard currencies. Data sources included the websites of FAO (www.Fao.org), the International Grain Council, the US Department of Agriculture (USDA), and the World Bank: The Pink Sheet at:

(www.worldbank.org/en/research/commodity-markets)

3.1. Main aspects of the Russian – Ukrainian crisis at the global level

Wheat has been the main strategic commodity greatly affected by the Russian – Ukrainian crisis, whether in terms of the quantity produced, the World price or the volume of international trade of wheat. These points are tackled in more details in the following.

3.1.1. Crisis impact on wheat production

Table 1 , Figures (1) and (2) indicate that according to FAO expectations, the World production of wheat in 2022 will amount to 770.9 million tons with a drop of 0.8% as compared to the previous year, after three years of continuous growth.

In Northern America, 70% of the area dedicated to the winter wheat crop had been struck by drought, thus affecting productivity and reducing winter production (the main production season) by about 8%. However, it is still expected that the total production, at the country level, will increase by 5% to reach 47.1 million tons in 2022 as compared to 44 million tons in 2021, due to an expected large spring wheat crop.

In Canada, spring is the main crop season. It is expected that the planted areas will be expanded to benefit from the rising wheat prices, after the drought experienced in 2021. The total wheat production has effectively jumped in 2022 to 31.2 million tons with a 44% increase over 2021.

In Europe, the Ukrainian war had a devastating effect on wheat production. Due to the war disturbances, the cropped areas were greatly reduced. Consequently, wheat production decreased by 38% in 2022.

In contrast, favorable weather conditions in the Russian Federation boosted grain production in general. Hence wheat production rose by about 10% in 2022 as compared to 2021 and amounted to 83 million tons in 2022.

In the European Union, wheat production slightly decreased in 2022 as compared to 2021 thus amounting to 138.7 million tons, due to the reduction of planted areas caused by the persistent drought in the southern regions.

Table 1: Wheat production of leading producing countries (2020 – 2022)

	2020	2021	2022 <i>f'cast</i>	Change: 2022 over 2021 %
		<i>million tonnes</i>		
European Union	126.7	138.9	138.7	-0.2
China (Mainland)	134.3	137.0	136.9	-0.1
India	107.9	109.6	105.5	-3.7
Russian Federation	85.9	76.1	83.5	9.8
United States of America	49.8	44.8	47.0	4.9
Canada	35.2	21.7	31.2	43.9
Australia	33.3	36.3	28.0	-23.0
Pakistan	25.2	27.3	26.5	-2.9
Argentina	17.6	22.1	21.0	-5.0
Ukraine	24.9	32.2	20.0	-37.8
Türkiye	20.5	17.7	19.0	7.3
United Kingdom	9.7	14.0	13.5	-3.3
Kazakhstan	14.3	11.8	13.5	14.3
Other countries	91.6	87.5	86.6	-1.0
World	776.7	776.8	770.8	-0.8

Source: FAO, 2022. *Food Outlook – Biannual Report on Global Food Markets*. Rome. <https://doi.org/10.4060/cb9427en>

After the great boom realized in 2021, wheat production in the United Kingdom (including Great Britain and North Ireland) is expected to remain unchanged at approximately 13.5 million tons.

Turning to Asia, India's wheat production in 2022 amounted to 105.5 million tons with a reduction of 4% in comparison to 2021, due to the unusually high temperature prevailing during the months of March and April leading to a reduced productivity and to local losses of wheat crops. While in Pakistan, wheat production in 2022 was close to that realized in 2021, amounting

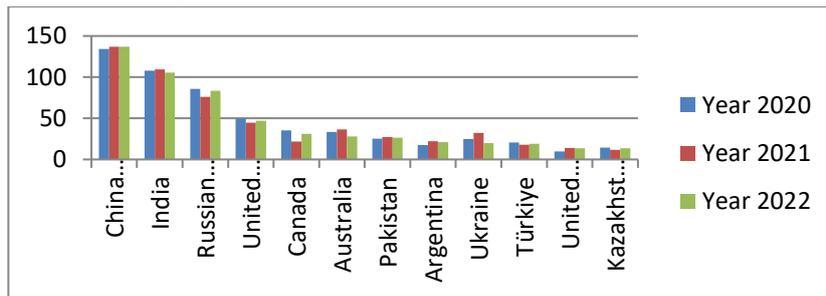
to 26.5 million tons. In China (Mainland), despite the bad weather conditions prevailing in some regions, wheat production in 2022 amounted to 137 million tons or almost the same level realized in 2021.

Very favorable weather conditions have prevailed in the western part of Asia, with the exception of a few inland regions that suffered from drought. Turkey as the leading producer was able to produce 19 million tons of wheat in 2022, thus realizing an increase in production of one million tons over the previous year; despite the rise in the prices of seeds and other agricultural inputs.

In North Africa, many countries suffered from low rainfall rates that remained below average. That situation was more apparent in Morocco where wheat production in 2021 dropped by 67% as compared to the previous year. The situation in Algeria was less severe but it also led to the decrease of wheat production.

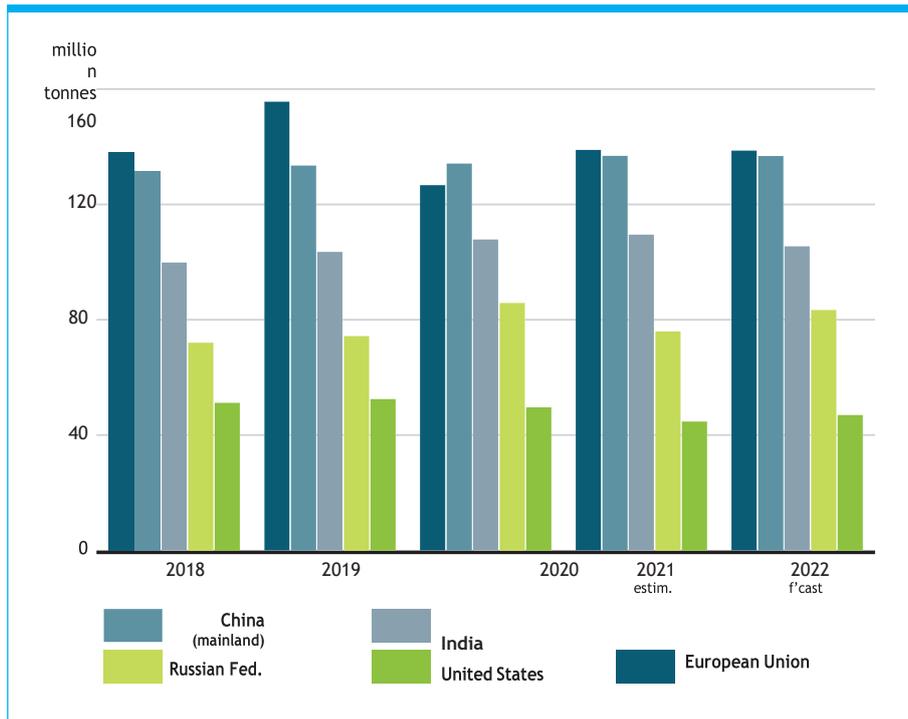
From the above-mentioned analysis, it appears that the World production of wheat slightly decreased in 2022, for the first time in four years.

Figure (3): Wheat production of leading producing countries (2020 – 2022)



Source: The Author’s calculations, using the FAO data displayed in Table 1.

Figure (4): Wheat production of the main producing countries (2018 – 2022)



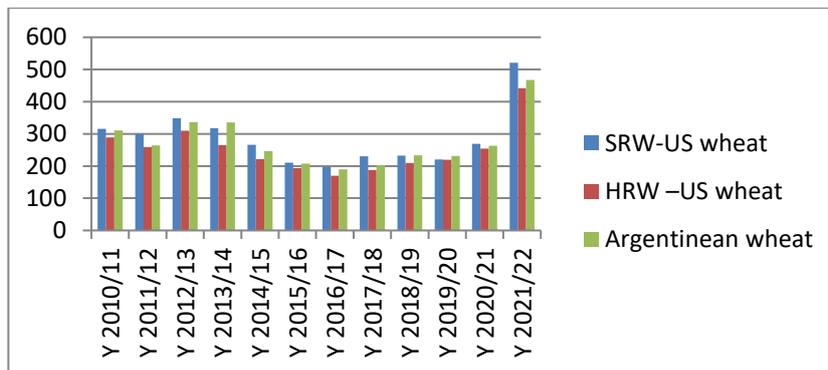
Source: Table 1, based on the FAO data.

3.1.2. Impact of the Ukrainian crisis on the World wheat prices

The prices of forward contracts of wheat, maize and soya beans rose to unprecedented levels during the last six months. The Ukrainian war, export restrictions and other protective measures, in addition to the worsening weather conditions in the United States and the European Union decreased the probability of available global grain supplies. The forward contract prices of wheat rose to a peak of 495 US dollars per ton on March 7th,

2022, thus reaching a higher level than the previous price record registered in 2008. Since then, those prices kept fluctuating around a high price of 400 US dollars per ton. However, there was a drop in prices by the end of May, in view of the reports referring to the establishment of a temporary maritime passage allowing the safe shipment of Ukrainian grains across the Black Sea (Food and Agriculture Organization of the United Nations, Rome 2022).

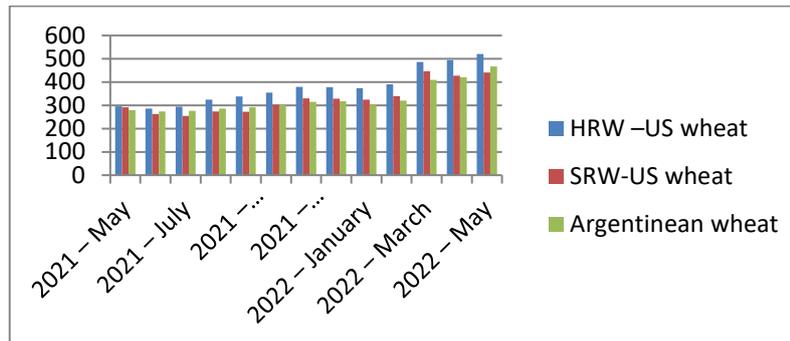
Figure (5): Fluctuations of the World prices of wheat (US \$/ton) during the time period 2010/11 – 2021/22



Source: The Author’s calculations, based on data from the International grain Council and USDA

Figure (5) underscores the rise in the World prices of wheat especially between 2020/21 and 2021/22, with an increasing ratio of 93.68% for the Hard Red Winter (HRW) - US wheat, 73.62% for the Soft Red Winter (SRW)- US wheat, and 77.56% for the Argentinean wheat.

Figure (6): Fluctuations of the World prices of wheat (US \$/ton) during the time period May 2011 – May 2022



Source: The Author's calculations, based on data from the International grain Council and USDA

Figure (6) shows the surge in the World prices of wheat over the time period May 2021 – May 2022, and especially during the month of March 2022, with an increasing ratio of 475.38% for the HRW – US wheat, 588.14% for the SRW – US wheat, and 434.75% for the Argentinean wheat.

From the above-mentioned, we deduce that the World prices of wheat hit a new record in year 2021/2022 and soared to unseen heights since 2008.

3.1.3. Impact of the Russian-Ukrainian war on the international trade of wheat

Figures (7), (8) and (9) reflect the decline in the volume of international trade of wheat in 2022/2023 as compared to the previous year 2021/2022.

According to FAO estimates, the volume of international trade of wheat (including wheat equivalent in the form of wheat flour) is expected to amount to 188.9 million tons in 2022/23, thus recording a decline of approximately 3.2 million tons (1.7%) in comparison to the estimated level of 2021/22.

Assuming that the Ukrainian war will persist, the Ukrainian exports of wheat are expected to drop by 50% (9 million tons) as compared to the previous season thus heavily reducing wheat exports at the global level in 2022/2023 due to the prevailing export impediments. The main seaports in Ukraine have been closed by the Russian forces since the end of February 2022; and the inland infrastructure has been damaged. It is probable that Ukraine will continue to export small quantities of wheat through the railroad and across its European borders. It is unknown when Ukraine – which used to be one of the leading wheat producers and exporters – will be able to resume exporting its wheat through its main seaports.

Turning to the other major exporting countries, their reduced production led to a decrease in wheat exports from Australia and India, and to some extent, from Argentina.

In India, a ban limiting wheat exports was issued in May 2022. Therefore, wheat shipments from India are expected to decline in 2022/2023. This decline is occurring after the big increase achieved in the Indian market quota in 2021/2022, supported by the decrease of the Ukrainian wheat exports, the high record of wheat production realized by India in 2021, and the competitive prices of Indian wheat exports that led to the opening of new markets including Egypt and Vietnam. However, it is expected that previous contractual obligations, inter-governmental sales and sales for food security purposes will be exempted from the ban on wheat exports. India is expected to export 7 million tons of wheat in 2022/2023, still looming much higher than the average quantity of Indian wheat exports over the last five years. Exports from the United States of America are expected to decline below the low level achieved in the previous year due to the reduced local supplies. On the other hand, wheat exports

from Canada and the Russian Federation are expected to rise in 2022/2023 given the expected increase in production.

Due to its abundant wheat supplies and its geographical proximity from numerous Ukrainian markets, the European Union is expected to increase its wheat exports to 38 million tons in 2022/2023. If this target is reached, the European Union will become the greatest wheat exporter in the World.

On the import side, the reduced imports of the Asian countries are probably behind the expected decline in the world demand.

At the regional level, the total wheat imports of Asia are estimated at 99.3 million tons or approximately 6% less than the 2021/2022 figure. This decline is mostly due to the expected drop of 57% (4.5 million tons) in the imports of the Islamic Republic of Iran in 2022/2023 as compared to 2021/2022, due to an increase in production over the low production level of the previous season. However, Iran's imports are still expected to exceed the average quantity of Iranian wheat imports over the last five years, given the importance of this commodity.

In China (Mainland), the uncompetitive prices of wheat in comparison to other grains are expected to reduce wheat imports by 15% (1.7 million tons) in 2022/2023 as compared to 2021/2022; although wheat imports will remain higher than the average import quantity due to the big demand for fodders.

To partially compensate such expected import reductions, the imports of Iraq are expected to increase in 2022/2023 due to the reduced local production for two consecutive years and the need to replenish the low stock of the previous year. On the other hand, the imports of Indonesia and Turkey – the biggest and the third biggest importers of wheat in Asia – are expected to remain fixed at 10.8 million tons and 9 million tons respectively.

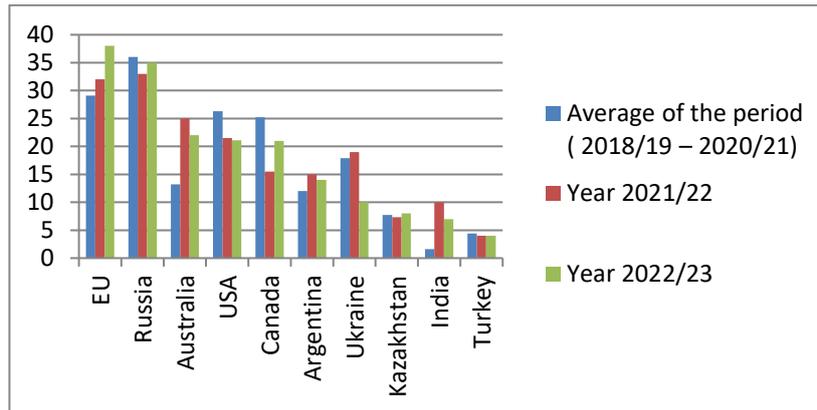
In contrast, the demand for wheat imports of numerous countries in Africa is expected to increase in 2022/2023 at the ratio of 5% (2.6 million tons) over the estimated import figure of 2021/2022, to reach a total of 54 million tons in 2022/2023. This increase is largely due to the rise of 32% (1.5 million tons) in the imports of Morocco, to reach a total of 6.2 million tons in 2022/2023 in order to compensate the great drop in local production [See: Figures (7),(8) and (9)].

In Egypt, the biggest importer of wheat in the World, wheat imports are expected to amount to 13 million tons in 2022/2023, with a slight increase over the 2021/2022 level, in view of replenishing Egypt's wheat stock. During the last months, the Egyptian government has adopted measures for importing wheat from new markets, including Argentina and India. Algeria is the second biggest wheat importer in Africa and the fifth biggest importer at the World level. It is expected that Algerian wheat imports will slightly rise in 2022/2023.

Ethiopia, Mauritania, Sudan and Tunisia similarly rely on wheat imports to cater to their local consumption needs. Nigeria, the most populated country and the third biggest importer of wheat in Africa, is expected to import 6.2 million tons in 2022/2023, with a small reduction in comparison to the previous year.

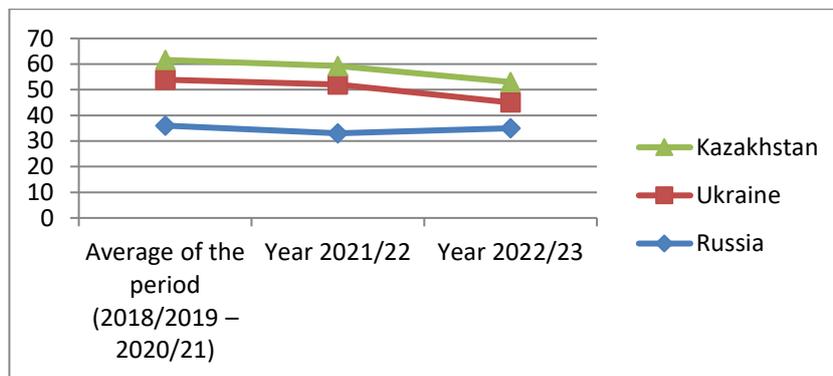
In Latin America and the Caribbean Sea region, total wheat imports in 2022/2023 are expected to remain close to their 2021/2022 level at 23.8 million tons. In Brazil, the biggest wheat importer in that region, imports are expected to decline in 2022/2023 by 3.1% in comparison to the previous year, to 6.3 million tons, due to the expected increase in the country production. In Mexico – the second biggest wheat importer in that region – imports are expected to remain close to their 2021/2022 level at 3.3 million tons.

Figure (7): Wheat exports of the ten biggest exporting countries [average of the period 2018/19 – 2020/21; 2021/22; 2022/23] (Quantity in million tons)



Source: The Author’s calculations, based on data from the International Grain Council and USDA

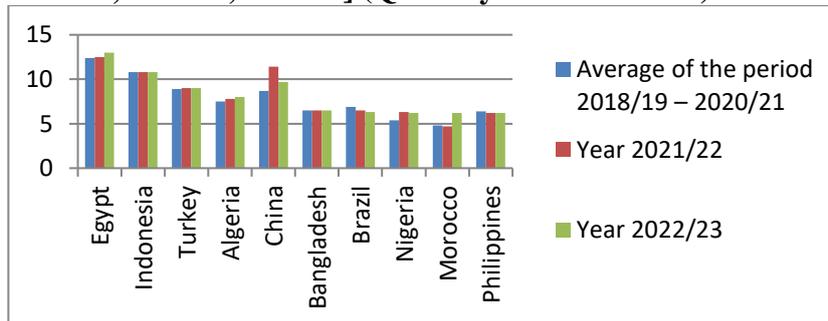
Figure (8): Wheat exports of the Black Sea countries during the last five years (Quantity in million tons)



Source: The Author’s calculations, based on data from the International Grain Council and USDA

From Figures (7) and (8), we note a slight decline in the Russian exports from an average of 36 million tons during the period (2018/19 – 2020/21) to 35 million tons in 2022/23; whereas the Ukrainian exports sharply dropped from an average quantity of 17.9 million tons during the first period to 10 million tons in 2022/23 due to the Russian-Ukrainian war and its disastrous impact. Exports from the European Union rose from an average of 29.1 million tons during the period (2018/19 – 2020/21) to 38 million tons in 2023 thus becoming the biggest wheat exporter worldwide. In Kazakhstan wheat exports fluctuated from 7.7 million tons on average during the period (2018/19 – 2020/21) to a low of 7.3 million tons in 2021/22, to rise again to 8 million tons in 2022/23.

Figure (9): Wheat imports of the ten biggest importing countries [Average of the period 2018/19 – 2020/21; 2021/22; 2022/23] (Quantity in million tons)



Source: The Author’s calculations, based on data from the International Grain Council and USDA

From the above-mentioned analysis, the decline in the volume of international trade of wheat between 2021/22 and 2022/23 becomes apparent.

3.1.4. The impact of the Russian-Ukrainian war on wheat uses

The early expectations concerning wheat uses at the global level in 2022/2023 point out to a slight decrease of 0.4% in wheat uses to record 769 million tons, in comparison to the estimated peak of 2021/22. The increase in the demand for wheat for human consumption is expected to be more than offset by the decrease in the demand for wheat for agricultural purposes such as animal fodders, and to lesser extent, in the demand for industrial purposes. The total uses of wheat in 2022/23 will decrease by 1.1% from the trend of the ten previous years, for the first time in three years. Moreover, the largest part in the decrease in the total wheat uses at the global level consists of a decrease of 4.1% in the quantity of wheat to be used for animal fodders amounting to 144 million tons, as compared to the corresponding quantity in 2021/22. The rise in prices led to the contraction of wheat demand for animal fodders in the European Union and China, the biggest market and the second biggest market of wheat for this purpose, respectively.

In China, an important price subsidy for wheat will be offered, to support using wheat instead of maize for animal fodders. In the European Union, the decrease in the demand for wheat for animal fodders is due to the rise in grain prices, the decrease in the demand for meat, and the impact of the bird flu.

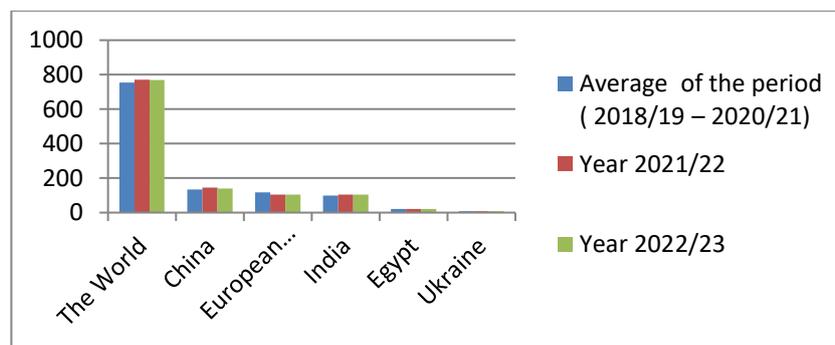
The other uses of wheat are also expected to decline by approximately 1.8% as compared to their level in 2021/22, to amount to 89 million tons in 2022/23. These uses include the requirements of the industrial sector, seeds, and the wastes remaining after harvesting. This decline probably reflects the expected drop in the industrial use of wheat in India, given that stricter restrictions were imposed on local supplies after the high record wheat exports realized in 2021/22 and the expected decrease in production in 2022/23.

In contrast to animal foddors and industrial uses, the World use of wheat for direct human consumption which represents 70% of total uses, is expected to rise by 0.9% in 2022/23, or at a lower rate than the average rate, to reach 536 million tons. The per capita annual consumption of wheat at the global level is therefore expected to remain almost fixed at 67.4 kilograms in 2022/23 as compared to 67.5 kg in the previous year.

The biggest increase in the human consumption of wheat is expected to occur in Asia, as this region absorbs about 60% of the World human consumption of wheat. Due to the slight and persistent increase in per capita wheat consumption in this region, this item is expected to reach 66.9 kg in 2022/23.

In the European region, the consumption of food in Ukraine is expected to drop sharply due to the ongoing war and the escape of thousands of Ukrainians to the EU countries [See Figure (10)].

Figure (10): Recent changes in wheat uses by the main user countries [Average quantity of the period 2018/19 – 2020/21; 2021/22; 2022/23](Quantity in million tons)



Source: The Author's calculations, based on data from the International Grain Council and USDA

From the above-mentioned analysis, we note that wheat uses have sharply declined in 2022/23.

3.1.5. Impact of the Russian – Ukrainian war on wheat stocks

Based on preliminary expectations concerning production in 2022 and wheat uses in 2022/23, the World stock of wheat is expected to amount to 298 million tons by the end of the season in 2022, with an increase of 1.2 million tons (0.4%) over the starting levels, thus reaching a new record. Most of the expected increase in wheat stocks will be concentrated in China (with an increase of 6.8 million tons due to the drop in wheat uses and the increasing production); in the Russian Federation (with an increase of 5.1 million tons due to the expected increase in production); and in Ukraine (with an increase of 2 million tons as a result of exports being impeded by the war). Wheat stock increases in these three countries exceed the expected reduction in the wheat stocks of many countries, including India and Morocco due to their decreasing production.

According to the current expectations, the ratio of wheat stock to wheat uses at the global level will amount to 37.9% in 2022/23 or slightly lower than the ratio registered in 2021/22 amounting to 38.6%. However, the estimated 2022/23 figure still stands much higher than the historically low ratio of 23.3% registered in 2007/2008. If China is excluded, this ratio falls to 24.4%, which is still much higher than the corresponding ratio of 19.2% registered in 2007/2008.

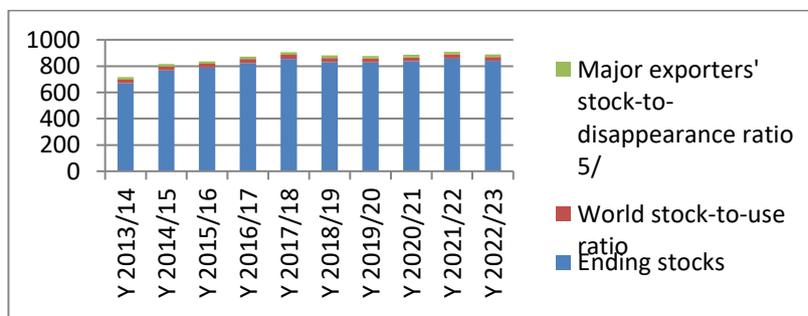
The ratio of wheat stock - at the end of the period - of the main exporters to their total stock-to-disappearance (calculated by adding total domestic uses to exports), as a measure reflecting wheat availability in global markets, is expected to rise from 17.6% in 2021/2022 to 19% in 2022/23. It is noteworthy that these figures include the accumulated stock in Ukraine, which is expected to almost triple in 2022/23 in comparison to the average stock quantity registered over the last five years. Due to the siege imposed by the Russian Federation on Ukraine's

seaports, it is hard to tell when Ukraine will be able to resume exporting its wheat in a normal way so that such stock can be available in global markets.

In the other main exporting countries, stocks are expected to decline in Australia and the USA to their lowest level in nine years, due to the drop in production for six consecutive years below the average of the previous five years. In Canada, the wheat stock is expected to slightly rise above its lowest level of the previous year, while remaining at its second lowest level ever recorded since 2007/2008.[See: Figures (11),(12) and (13)]. [Food and Agriculture Organization of the United Nations, Rome, 2022]

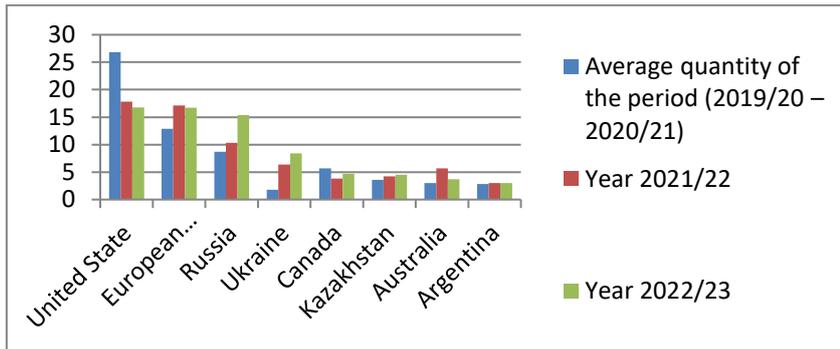
We conclude that the World wheat stock quantities have slightly increased in 2022/23.

Figure (11): Major exporters’ stock-to-disappearance ratio (%), World stock-to-use ratio, and ending stocks over ten years (2013/14 – 2022/23)



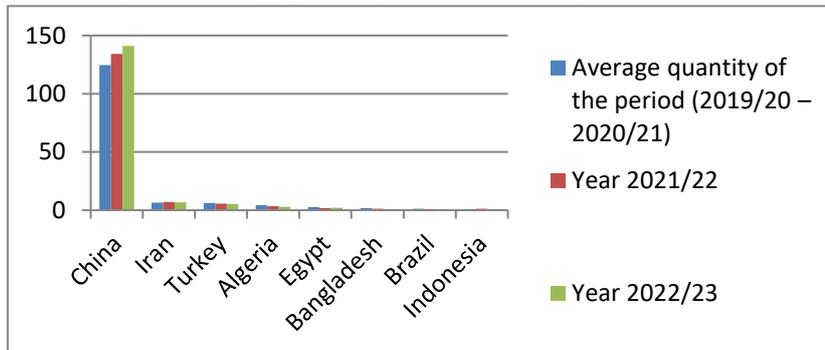
Source: The Author’s calculations, using data from : www.fao.org/markets-and-trade/commodity-policy/archive/en/groupANDCommodity=Wheat

Figure (12): Main exporters' wheat stocks in recent years [Average quantity of the period 2019/20 – 2020/21; 2021/22; 2022/23](Quantity in million tons)



Source: The Author's calculations, using data from : www.fao.org/markets-and-trade/commodity-policy/archive/en/groupANDCommodity=Wheat

Figure (13): Main importers' wheat stocks in recent years [Average quantity of the period 2019/20 – 2020/21; 2021/22; 2022/23](Quantity in million tons)



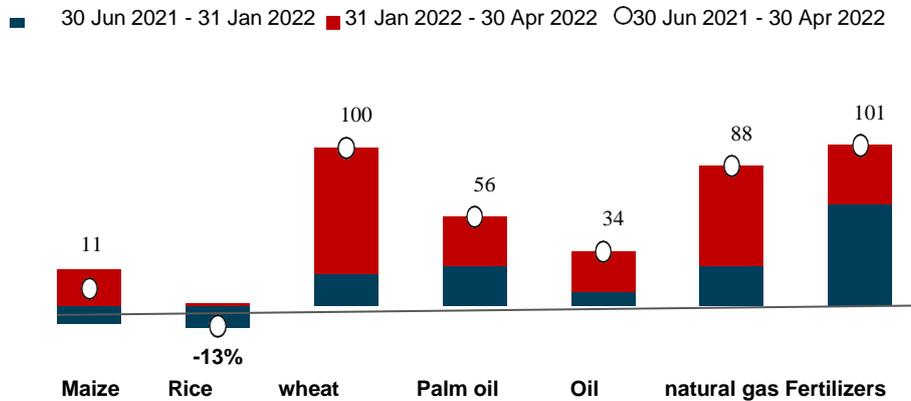
Source: The Author's calculations, using data from : www.fao.org/markets-and-trade/commodity-policy/archive/en/groupANDCommodity=Wheat

3.2. Impact of the Russian-Ukrainian war on Egypt

3.2.1. Impulses of World prices and their effect on local prices

During the last months, the world prices of food products, fuel and fertilizers have soared driven to a great extent by the ongoing war in Ukraine and the related penalties imposed on the Russian Federation. Other factors such as the reaction of various governments and the ban imposed on certain exports, contributed to that rise in World prices (Laborde and Mamun, 2022). For instance, the prices of palm oil and wheat, taken at their real value, increased by 56% and 100% respectively, between June 2021 and April 2022, with most of the increase occurring since February 2022, as can be seen from Figure (14).

Figure (14): Fluctuations of the World real prices of selected commodities during the period June 2021 – April 2022 (in US dollars)



Source: The Author’s calculations using the World Bank data concerning the World prices of the main commodities.[The Pink Sheet at: www.worldbank.org/en/research/commodity-markets]

N.B.: The nominal prices in US dollars obtained from the Pink Sheet were transferred to real prices that reflect the total increase in World prices during the said period, using as a discount rate the US consumer price index that rose by 7.2% from June 2021 to April 2022. It is noteworthy that price fluctuations greatly differed from one commodity to the other. The real prices of maize increased by 11% while the prices of rice fell by 13%. The prices of raw naphtha and natural gas rose considerably, and the weighted average price of fertilizers simply doubled.

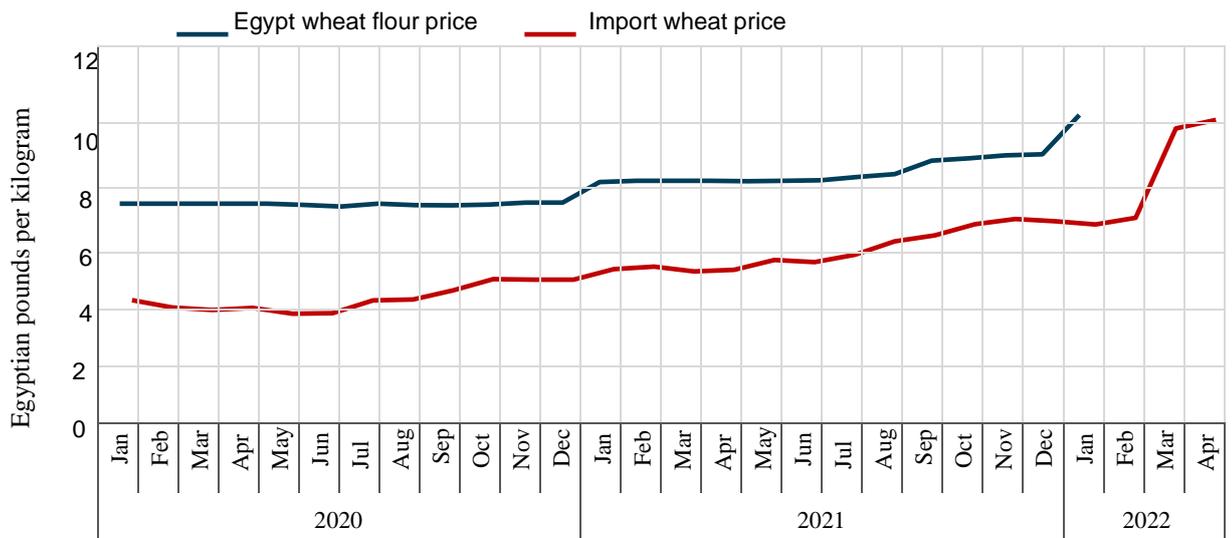
These wide fluctuations and their impact on economic stability, poverty and food security are raising serious concerns for low and medium income countries and their development partners. The Middle East and North Africa (MENA) Region in general, and Egypt, in particular, have been strongly affected by the Russian- Ukrainian war due to their high dependency on food imports.

The regional weakness analysis carried out by the International Food Policy Research Institute underscores that the MENA countries, such as Egypt, Sudan, and Yemen, are particularly vulnerable to the trade shocks resulting from the Russian- Ukrainian war [Abay et al., 2022a]. Egypt, as the greatest importer of wheat in the World, used to obtain about 85% of its wheat imports from Russia and Ukraine; in addition to substantial supplies of the other main agricultural commodities. According to the UN comtrade data, Ukraine had been supplying Egypt with 30% of its maize imports; while Russia and Ukraine together provided Egypt with 85% of its imports of sunflower oil. Due to this high dependency on imports, Egypt experienced tremendous increases in food product prices. The Central Agency for Public Mobilization and Statistics (CAPMAS) in Egypt reported that immediately after the beginning of the Russian-Ukrainian war, the food price index

recorded its highest inflation rate in five years, as it rose to 20% in March 2022. Such inflation clearly reflects the trade restrictions imposed by many of the exporting countries on food exports.

A comparison between wheat import prices at the Egyptian borders with wheat local prices in Egypt reveals that World price fluctuations had a direct and a huge influence on local prices. This can be explained by the fact that wheat is the main agricultural commodity in Egypt and that 60% of the demand for wheat is met through imports. [See: Figure (15)]

Figure (15): Nominal prices of wheat in Egypt during the period January 2020 – April 2022



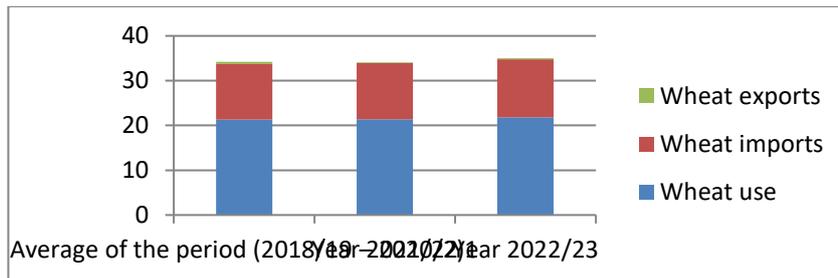
Source: The Author’s calculations using the World Bank data concerning the World prices of the main commodities. [The Pink Sheet at: www.worldbank.org/en/research/commodity-markets]

One of the most important measures devised by the Egyptian government in that respect was raising the government’s

purchasing price of local wheat at the ratio of 25%- from 800 Egyptian Pounds (EGP) to 1000 EGP per ardab; or from the equivalent of 300 US dollars to 340 US dollars per ton (at an increasing ratio of 13.6%) for the 2023 season. Moreover, this purchasing price is deemed a guiding price and is liable to increase in case of a rise in the World prices of wheat. The new purchasing price will encourage farmers to supply greater quantities to the government (FAO).¹

3.2.2. Impact of the Russian-Ukrainian war on wheat production, trade, stock and uses in Egypt :

Figure (16): Wheat exports, imports and uses in Egypt in recent years[Average of the period 2018/19 – 2020/21; 2021/22; 2022/23]



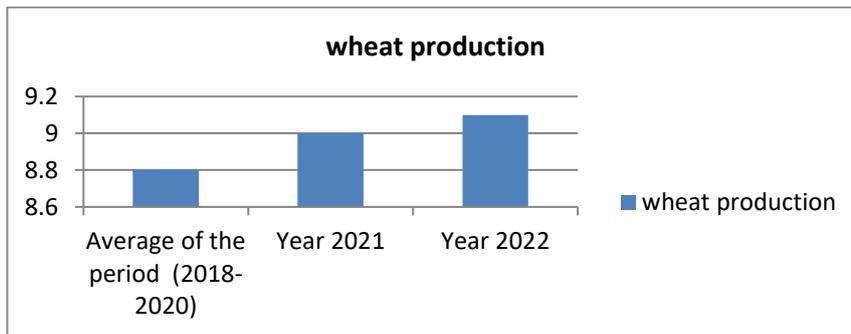
Source: The Author’s calculations using the World Bank data concerning the World prices of the main commodities.[The Pink Sheet at: www.worldbank.org/en/research/commodity-markets]

Figures (16), (17), and (18) show that Egypt’s wheat imports and uses did not experience great changes. Hence, Egypt’s wheat imports rose from an average of 12.4 million tons during the period 2018/19 – 2020/21 to 13 million tons in 2022/23;

Source: www.fao.org/markets-and-trade/commodity-policy archive/en/group and ¹ commodity=Wheat

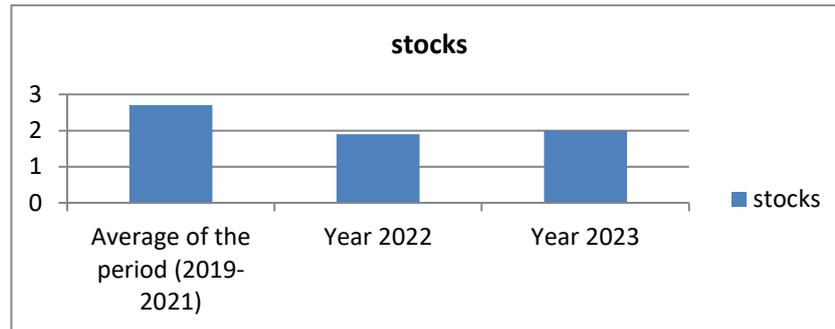
while wheat uses rose from 21.3 million tons to 21.8 million tons during the same period. Wheat actual production (as the wheat crop has been already harvested) increased from 8.8 million tons as the average of the period 2018 – 2020) to 9.1 million tons in 2021/2022. However, wheat stocks were deeply affected as they dropped from 2.7 million tons as an average over the period 2019 – 2021 to 1.9 million tons in 2022. They are expected to rise by 5.3% approximately in 2023.

Figure (17): Wheat production in Egypt [as an average of the period 2018-2020; and in years 2021 and 2022] (Quantity in million tons)



Source: The Author’s calculations using the World Bank data concerning the World prices of the main commodities.[The Pink Sheet at: www.worldbank.org/en/research/commodity-markets]

Figure (18): Wheat stocks in Egypt (in million tons) [as an average of the period 2019-2020; and in years 2021 and 2022]



Source: The Author's calculations using the World Bank data concerning the World prices of the main commodities.[The Pink Sheet at: www.worldbank.org/en/research/commodity-markets]

3.2.3. Impact of the Russian-Ukrainian crisis and global changes on food security in Egypt

The Russian-Ukrainian crisis was not the only disturbing factor on the global scene in general and in Egypt in particular. The Covid-19 pandemic and the floating of the Egyptian Pound have had wide reaching effects. In order to investigate this point, the partial equilibrium model was empirically applied, with the aim of measuring the indices of economic resource exploitation efficiency, per capita economic welfare, and government proceeds (from customs duties on wheat imports), and through comparing the average values of these indices over the period 2018-2020; with the realized values in 2021, and in 2022. The focus of this study on wheat can be easily explained since wheat is considered the most strategic commodity in Egypt, and since Egypt is the biggest importer of wheat in the World, among other reasons.

Results of the partial equilibrium model application [See: Table 2]

a) Indices of economic resource exploitation efficiency
These indices measure the net economic loss in wheat production, the net economic loss in wheat consumption and the net social loss².

According to the results of the partial equilibrium model application, there was a net economic loss in production due to wheat imports, in the three periods under consideration. During the first period (2018 -2020), the net economic loss in wheat production was estimated at 3155.87 million EGP approximately; then it dropped by 87.34% to 399.55 million EGP in **2021**; then it sharply rose by 2313.6% between 2021 and 2022, to reach 9643.837 million EGP in 2022. The large gap in the net economic loss in wheat production between **2021** and 2022 `is due to the Russian – Ukrainian crisis and its reflection on the World prices of wheat and to the changes in the exchange rate of the Egyptian Pound against hard currencies.

The net loss in wheat consumption followed a similar course. Starting from 4541.89 million EGP in the first period (2018 - 2020), it decreased by 87.34% in **2021** amounting to 574.38 million EGP; then it soared to 13736.8 million EGP in 2022, thus recording an increasing rate of 2291.55% between **2021** and 2022. This huge rise in the net economic loss in wheat consumption underscores the challenges confronting the Egyptian economy as a result of the above-mentioned factors. A net social loss resulting from both the net economic loss in production and the net economic loss in consumption was also revealed in the three periods under consideration. The net social

² Net social loss = Net economic loss In Production+ Net economic loss In consumption, using the partial equilibrium model application.

loss amounted to **7697.76** million EGP during the first period (2018 – 2020); then it sharply decreased to **973.95** million EGP in **2021 at the rate of 87.34%** in comparison to the first period, only to reach a high of **23380.6** million EGP thus recording an increasing rate of about **2300%** between **2020** and 2022. This tremendous increase in the net social loss index reflects the huge impact of the global crisis on Egypt.

b) Indices of social economic welfare

The economic welfare of producers and the economic welfare of consumers are measured by two indices: The change in the producer surplus and the change in the consumer surplus, respectively.

The results of the partial equilibrium model application – as shown in Table 2 – indicate that the producer surplus increased during the first two periods because the local prices of wheat were higher than the World prices. Hence in the first period (2018 – 2020), the positive change in the producer surplus amounted to 24240.94 million EGP; then it decreased by 60% in 2021 to 9893 million EGP approximately. Conversely, in 2022, the producer surplus registered a loss estimated at approximately 64887 million EGP, realizing a rate of change of 760% in 2022 in comparison to the producer surplus in 2021. The loss (760%) incurred between 2021 and 2022 resulted from a bundle of interrelated factors; most importantly due to the big rise in World prices over and above local prices, the devaluation of the Egyptian Pound, and the increasing cost of wheat production due to the rising prices of agricultural fertilizers.

The results displayed in Table 2 reveal that the consumer surplus has also been negatively affected by the rising prices of wheat imports, throughout the three periods under consideration. During the first period (2018 – 2020), the change in the

consumer surplus was estimated at - 70854.6 million EGP. That loss declined to 25330.2 million EGP in 2021, recording a decreasing rate of 64% approximately. However, the loss in the consumer surplus sharply rose to 118603 million EGP in 2022, recording a change rate of 368% between 2021 and 2022. This of course means that the poverty ratio increased and that household consumption in Egypt has been negatively affected during the three periods under study and particularly in 2022.

C) Indices of the realized proceeds at the national level

They include two indices: The change in the government's proceeds; and the change in foreign currency proceeds, expressed in local and foreign currencies.

According to the results of the partial equilibrium model application, the realized proceeds of the government – as shown in Table 2 – increased during the first and the second study periods, as a result of wheat importation. Hence, the gain in the government's proceeds was estimated at 38916 million EGP in the first period (2018-2020), and at about 14516 million EGP in 2021, with a decrease of 63%. Conversely, the government's proceeds recorded a big loss of 77098 million EGP in 2022, with a declining rate of 631% between 2021 and 2022 in the government's revenues from the customs duties imposed on wheat imports.

On the other hand, foreign currency payments for wheat imports registered a drop – foreign currency saving – during the first two study periods. In 2018-2020, the foreign currency saving amount stood at 9330 million EGP, then it declined to 7287 million EGP in 2021, with a decreasing rate of 22%. However in 2022, foreign currency payments for wheat imports sharply rose to the equivalent of 96316 million EGP, at an increasing rate of 1422% between 2021 and 2022, thus recording a great loss in

foreign currency funds. Again that loss can be explained by several factors; mainly the rising World prices of wheat, and the devaluation of the Egyptian Pound against the US dollar. Expressed in US dollars, the wheat import bill soared at the ratio of 996% between 2021 and 2022.

Table 2: Indices of the Efficiency of economic resource exploitation, Social economic welfare, and Government's proceeds at the national level concerning wheat during the period (2018-2020), and in the years 2021 and 2022 (Values in million EGP)

Indices	2018-2020	2021	2022	Rate of Change 2018-20/2021	Rate of Change 2021/2022
Efficiency indices					
Net economic loss In production	3156	399.56	9643.8	87%	2314%
Net economic loss In consumption	4542	574.39	13736.8	87%	2292%
Net social loss	-7698	-973.95	-23380.6	87%	2300%
Welfare indices					
Change in Producer surplus	24241	9839.79	-64886.9	60%	759%
Change in Consumer surplus	-70855	-25330.16	-11803.7	64%	568%
Government's Proceeds indices					
Change in Government proceeds	38916	14516.43	-77097.5	63%	631%
Change in foreign Currency funds (EGP)	-933	-7286.93	96316.1	22%	1422%
Change in foreign Currency funds (\$)	-574	-465.78	4013.2	19%	962%

Source: The Author's calculations, using the partial equilibrium model application and data from: www.fao.org/markets-and-trade/commodity-policy archive/en/group and commodity=Wheat

4. Conclusion

The World prices of food products, fuel and fertilizers have lately soared to new heights, thus raising concerns about their possible impact on economic stability, food security and poverty in the developing countries. The present study used the descriptive approach in addition to the partial equilibrium model regarding strategic commodities such as wheat to investigate that impact. The partial equilibrium model allows us to follow up the direct and indirect effects of the rise in World prices, while due consideration is given to the other main factors that contribute to the determination of the total effect.

The results of the study analysis show that in Egypt, the global crisis led to an increase in the net economic loss of production and the net economic loss of consumption. The welfare of producers and consumers receded; while the foreign currency proceeds declined and the foreign currency payments increased, leading to a rising deficit in the State budget in Egypt..

However, the above-mentioned economic losses are not substantial when compared to the overall size of the economy. Moreover, the sharp rise in the import prices of wheat and edible oils may have some beneficial effect for the local producers of these commodities; although the net effect on their welfare is still negative, in view of the increase in the price of fertilizers, the decrease in the use of fertilizers, and the resulting decrease in agricultural productivity. The negative impact of the Russian-Ukrainian war has gained intensity due the simultaneous and drastic devaluation of the Egyptian Pounds versus the US dollar. Generally speaking, household consumption deteriorated at the national level, but more importantly in rural areas, thus increasing the gap between urban and rural areas in Egypt. In other words, poverty in Egypt increased due to the impact of the

global crisis, over the whole country and in the rural areas in particular.

It is noteworthy that the adoption of a healthy nutritional regime for the Egyptian family has become more costly. Therefore, there is a constantly widening gap between the current level of household food consumption and the requirements of a healthy nutritional regime. It is clear that the continuing global crisis is expected to cause greater negative effects to the Egyptian economy, through increasing poverty and affecting food security, and particularly in rural areas.

5. Recommendations

The results of this paper underscore the need for the government to adopt certain packages and programs that are liable to protect Egyptian citizens against the increasingly rising prices and deteriorating food security situation. The following guidelines are suggested:

1. Within the framework of financial policies, the role of public expenditure for overcoming the crisis should be given due consideration. For instance, removing the subsidization of combustibles should be, at least temporarily, suspended. Such a measure will tend to reduce the net economic loss in consumption and allow the realization of a positive consumer surplus.
2. Adequate measures should be carried out to alleviate producers' burden, through granting subsidies to producers and providing them with the necessary raw materials.
3. In addition, producers should be granted greater tax exemptions. Items 2 and 3 above will tend to reduce the net economic loss in production and allow the realization of a positive producer surplus.

Hence, the above-mentioned measures will tend to reduce the net social loss.

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