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Assessing the Implications of the Russia-Ukraine Military Conflict on Romania's Grain Trade Dynamics

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Abstract: This study aims to examine the potential impact of the military conflict between Russia and Ukraine on Romania's grain trade dynamics. Following the onset of the conflict, Ukraine has increasingly exported grain through Romania, potentially leading to an oversupply in the market and subsequent depression of prices within Romania and at its borders. To investigate this phenomenon, the volume and value of grain imports from Ukraine were analyzed and compared to previous years, alongside the price trends of major cereals in the region. Data on the volume of cereal imports from Ukraine and Romanian exports, sourced from international databases, were utilized in a quantitative analysis to evaluate the dynamics of imports in conjunction with the evolution of export prices for Romania. This investigation offers insights into the potential consequences of the Russia-Ukraine military conflict on Romania's grain trade and the broader implications for regional agricultural markets.

Keywords: Military conflict; Grain price impact; Romania; Oversupply; Price decrease

1 Introduction

The military conflict between Ukraine and Russia has substantially influenced the global grain market. As the conflict intensified, large quantities of Ukrainian cereals entered the markets of European Union member states, including Romania, at reduced prices. This influx, however, has negatively affected the domestic prices of agricultural products within Romania, which is typically among the primary producers of cereals in the Black Sea region.

Existing literature highlights the Black Sea region's importance as a significant area for cereal production and export on a global scale. Previous studies have analyzed various factors influencing cereal production and export in this region, such as climate conditions, infrastructure, government policies, and developments in international markets. In addition to the impact of the war on the cereal market, the literature also discusses the challenges of food security in Europe in the context of the prolonged Russian-Ukrainian conflict, with Ukraine and Romania being identified as key countries in this regard [1, 2]. In response to this situation, European Union member states have collaborated to assist populations in coping with sudden increases in food prices and providing support to the most vulnerable individuals worldwide.

This study aims to conduct a quantitative analysis of data relating to the volume and value of cereal imports from Ukraine during the pre- and post-military conflict periods to identify potential influences on the market. The primary research objective is to inform policymakers, assist farmers, and contribute to academic scholarship by presenting the latest research in the field and identifying recommendations that may mitigate the unfavorable impact on markets. The central research hypothesis posits that an oversupply in the Romanian cereal market will lead to a decline in cereal prices, either domestically or for export.

The structure of the study is as follows: Section 2 provides a literature review, outlining recent and relevant research on the influence of military conflict, specifically on grain trade. Section 3 details the methodology, highlighting the primary materials utilized and the chosen research methods. Section 4 presents the results and discussion, while Section 5 concludes the study and offers a list of bibliographical references.

2 Literature Review

The global repercussions of Russia's unprovoked and unjustified invasion of Ukraine have been far-reaching, exacerbating the worldwide food crisis. To address the sudden increase in food prices and provide assistance to the most vulnerable individuals worldwide, European Union member states have collaborated in response to this crisis. In the context of this war, an influx of Ukrainian cereals has entered the markets of EU member states, as the bloc accepts these products to aid Ukraine. Moreover, a logistics blockade has led to Ukrainian grain shipments, originally intended for third-party countries, remaining in Central and Eastern European markets. Between June 2022 and July 2023, Ukraine reportedly exported 37.2 million tons of cereals, including 20.6 million tons through the Black Sea corridor. In the Romanian market, the introduction of large quantities of agricultural products from Ukraine at reduced prices has negatively affected the domestic prices of these products. Despite Romania's tradition of exporting rapeseed, wheat, sunflower, and corn, significant quantities of these agricultural products have been imported during this period.

To understand the impact of the war on cereal imports from Ukraine into Romania, a review of the relevant literature is provided. Voicilaș and Kalaman [3] analyzed the cereal market in the Black Sea region with a specific focus on Romania and Ukraine. A comparison of production, consumption, and exports of cereals in the two countries was conducted, and factors influencing their evolution were identified. The importance of the Black Sea region as a significant area for cereal production and export worldwide was emphasized, with Romania and Ukraine being major cereal producers in the region, playing a crucial role in the international grain market. Factors influencing cereal production and export in the two countries, including climate conditions, infrastructure, government policies, and developments in international markets, were analyzed. Additionally, the importance of cooperation between Romania and Ukraine in the agricultural and cereal trade sectors was highlighted [3]. This study provides a valuable overview of the situation prior to the war between Russia and Ukraine.

In a study by Rabbi et al. [4], food security challenges faced by Europe in the context of the protracted Russian-Ukrainian conflict were discussed, with Ukraine and Romania mentioned in the analysis. Issues related to agricultural production, transportation, trade, and policy were addressed, examining how they could affect food security in Europe. The importance of cooperation among European countries to tackle these challenges and ensure food security was emphasized. The study concluded that food security in Europe could be affected by regional conflicts, such as the one between Russia and Ukraine. In particular, the production, transportation, and trade of food products from Ukraine and neighboring countries could be heavily influenced by this situation, leading to supply issues and elevated prices. Greater cooperation among European countries and the implementation of a more robust agricultural policy were recommended to address these challenges and ensure food security in the region [4].

Stan et al. [5] analyzed global economic influences generated by the ongoing conflict between Ukraine and Russia, focusing on the consequences for Romania. The impact of this conflict on the global economy, particularly in terms of cereal and energy markets, was examined. The political and economic measures taken by Romania in the context of this conflict were explored, and a series of recommendations to protect its economic and political interests were proposed [5].

Mottaleb et al. [6] conducted a quantitative analysis on the potential impact of the armed conflict between Ukraine and Russia on global food security with a focus on wheat. Economic models and data on global wheat production and consumption were used to estimate the impact of the conflict on wheat production and prices, as well as on food security. The study suggested that a protracted conflict could lead to a significant decline in wheat production in Ukraine and, as a result, an increase in prices and a possible decrease in wheat consumption in other countries. The authors emphasized the importance of closely monitoring developments in Ukraine and other wheat-producing regions, as well as the need to develop appropriate risk and crisis management strategies to ensure global food security [6].

A parallel can be drawn with the effects on the cereal import market following the annexation of Crimea in 2014. The 2014 conflict between Russia and Ukraine significantly deteriorated trade relations between the two countries, including cereal exports. Russia, a major exporter of cereals to Romania and other European countries, experienced a significant impact on its cereal exports due to EU sanctions imposed following Crimea's annexation. In this context, Ukraine emerged as an alternative for cereal imports in Romania and other European countries. Ukraine's significant cereal production and lower production costs compared to most European countries resulted in lower prices for cereals produced in Ukraine. Cereal imports from Ukraine to Romania have increased significantly in recent years, with the majority of these imports consisting of wheat and corn [7, 8].

3 Methodology

In light of the significant changes observed in the cereal market following the onset of the military conflict, as documented in the existing literature, a comprehensive analysis of Romania's trade exchanges with its primary partners will be conducted. This analysis will consist of both a quantitative and qualitative assessment of export and import values and volumes, with particular attention paid to the quantities of cereals imported from Ukraine.

Additionally, an examination of the average import and export prices will be conducted to identify trends and potential correlations between volume and price.

Data for this analysis will be sourced from the International Trade Centre's international databases. The use of reliable and up-to-date data sources is crucial for ensuring accurate and relevant findings. By utilizing these databases, the analysis will be grounded in a strong empirical basis, contributing to the robustness of the results.

The methodology will be structured as follows:

(1) A comprehensive review of Romania's trade exchanges, focusing on both the value and volume of exports and imports, will be conducted. This review will provide an overview of the trade landscape and help identify key trends and fluctuations in the market.

(2) A detailed analysis of the quantities of cereals imported from Ukraine will be carried out, with a focus on the impact of the military conflict on these imports. This analysis will highlight the extent to which the conflict has influenced the cereal market and will serve as a basis for future research and policy recommendations.

(3) The average import and export prices of cereals will be calculated and analyzed to identify trends and potential correlations between volume and price. This analysis will offer insights into the price dynamics in the cereal market and help explain the observed fluctuations in cereal imports from Ukraine.

(4) The findings of the analysis will be discussed within the context of the existing literature, providing a comprehensive understanding of the implications of the military conflict on the cereal market. This discussion will contribute to the broader knowledge base on the subject and inform future research and policy initiatives.

4 Results and Discussions

As outlined in the Methodology Section, a comprehensive analysis was conducted on the volume and values of imports and exports for cereals and oilseeds over the past three years (2020-2022), on a quarterly basis, focusing on the main sources and destinations.

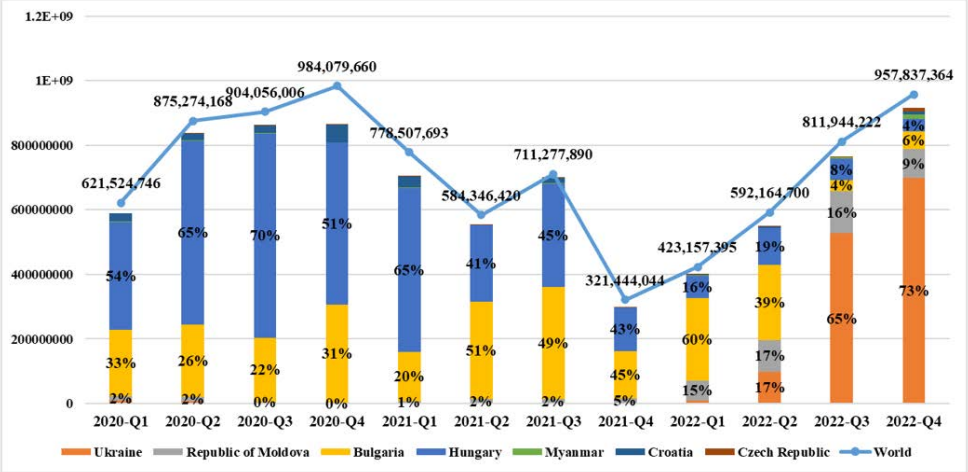

Figure 1. Dynamics of Romania's cereal import volumes by quarters, by main sources (kg)

Note: Data processed based on International Trade Centre data [9]

Figure 1 illustrates the fluctuation in Romania's cereal import volumes during the analyzed period, structured on a quarterly basis. It can be observed that the trade volume is much higher during quarters coinciding with the harvest period and immediately afterward, compared to the colder winter months. In the first quarter of 2020 (2020-Q1), Romania imported 621.5 million kilograms of cereals, with over half (54%) originating from Hungary, and 33% from Bulgaria. This trend persisted until the second quarter of 2022, which corresponds to the onset of the military conflict between Russia and Ukraine. Consequently, Ukraine began exporting cereals through Romania. In the second quarter of 2022, 17% of Romania's cereal imports, or 98 thousand tons, were sourced from Ukraine. This share continued to increase, and by the end of 2022, 73% of the approximately 1 million tons of cereals imported by Romania in the fourth quarter, or 698.3 thousand tons, came from Ukraine. This influx of cereals placed pressure on both producers and the market, which had to accommodate the additional quantity, especially considering that imports during the same period in the previous year (2021-Q4) were three times smaller.

As for cereal exports (Figure 2), they were significantly higher than imports, reflecting the characteristics of agriculture in Romania. Cereal exports also exhibited fluctuations, with a tendency to export during the harvest quarter or immediately afterward (quarters 3 and 4). The highest value was recorded in the third quarter of 2021, as pandemic restrictions eased, with an exported volume of 5.686 million tons. The volume then decreased substantially,

reaching the minimum of the analyzed period in the fourth quarter of 2020, at 2.2 million tons, due to the weak agricultural year of 2020, when a significant portion of wheat was kept for consumption and stocks. An analysis of export destinations revealed that 6% of cereals were exported to Jordan in the early part of the analyzed period, while in the fourth quarter of 2022, Italy and Spain each accounted for 16% of Romania's exports.

This raises questions about the true origin of these exports—whether they belong to Romania or include cereals transiting through Romania from Ukraine. Several countries were identified as significant recipients of Romania's cereal exports, both in terms of volume and proportion. The top seven countries in terms of volume in the last quarter of the previous year are depicted in the diagram. Notably, Egypt, historically Romania's stable partner with the highest export share, did not rank among the top seven countries in the past year. The recent substantial increases in these countries may indicate that they had been awaiting imports from Ukraine.

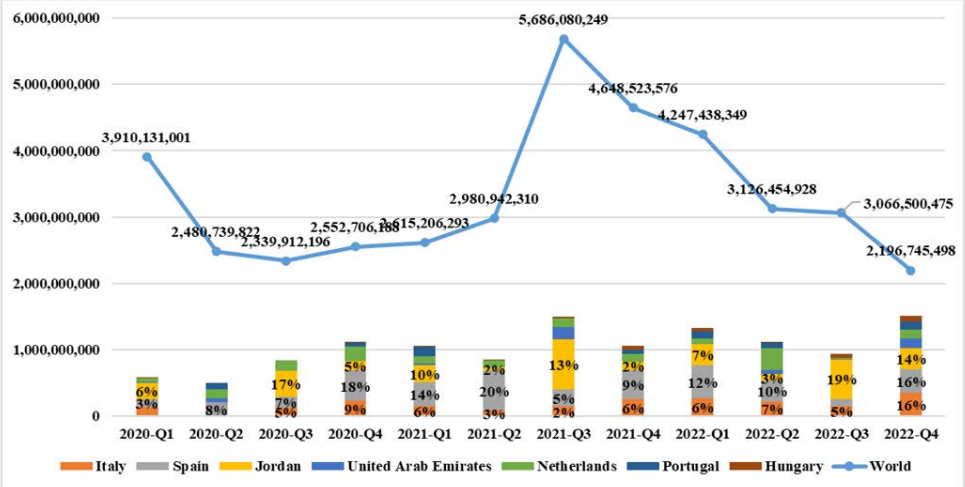

Figure 2. Dynamics of Romania's cereal export volume by quarter, by destination (kg)
Note:Data processed based on International Trade Centre data [9]

The values for imports and exports of cereal groups were also analyzed. By examining both the export and import values and their volumes, the ratio between their value and volume was calculated, ultimately determining the average import and export prices.

Table 1. Average import price of cereals by Romanian sources (dollars/kilogram)

Exporters	2020-Q1	2020-Q2	2020-Q3	2020-Q4	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4
World	0.301	0.204	0.201	0.261	0.359	0.286	0.251	0.424	0.545	0.370	0.299	0.337
Ukraine	0.413	0.252	0.245	2.322	1.036	0.899	0.523	2.493	0.637	0.286	0.272	0.272
Republic of Moldova	0.157	0.173	0.199	0.230	0.236	0.263	0.244	0.240	0.268	0.305	0.292	0.279
Bulgaria	0.200	0.226	0.208	0.234	0.273	0.287	0.243	0.345	0.341	0.395	0.392	0.575
Hungary	0.237	0.177	0.185	0.245	0.276	0.252	0.244	0.384	0.634	0.362	0.330	0.628
Myanmar	0.399	0.433	0.561	0.566	0.489	0.600	0.542		0.583	0.680	0.702	0.637
Croatia	0.162	0.161	0.181	0.192	0.243		0.256		0.343	0.379	0.327	0.387
Czech Republic		0.758	0.859	0.664	0.874	0.758	0.677	0.986	0.584	0.444	0.545	0.419
Spain	0.802	0.949	0.718		1.199		0.700		1.578	0.839	0.212	0.265

Note: Calculations based on International Trade Centre data [9]

The overall price of cereal imports (Table 1) fluctuated between $0.2 and $0.55 per kilogram, averaging $0.32 per kilogram for each quarter. Although the price increased compared to the initial period, a quarterly analysis in consideration of market supply revealed that the price in the fourth quarter of 2022 was lower than the same period in the previous year (2021-Q4) by 20.6%, or The price is $0.09/kg. This decrease can be attributed to the substantial increase in imports from Ukraine. Additionally, it was observed that the price of cereals from Ukraine in the last quarter was the second lowest, after those from Spain, contributing to the overall lower average import price.

For the average export price (Table 2), only the overall price was determined, revealing an increasing trend year by year. However, upon examining 2022 specifically, a noticeable decline in price from quarter to quarter can be

observed, taking into account the increased proportion of additional exports from Ukraine.

Table 2. Romania's average grain export price (dollars per kilogram)

Importers	2020-Q1	2020-Q2	2020-Q3	2020-Q4	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4
World	0.228	0.203	0.202	0.230	0.288	0.274	0.247	0.279	0.346	0.377	0.366	0.359

Note: Calculations based on International Trade Centre data [9]

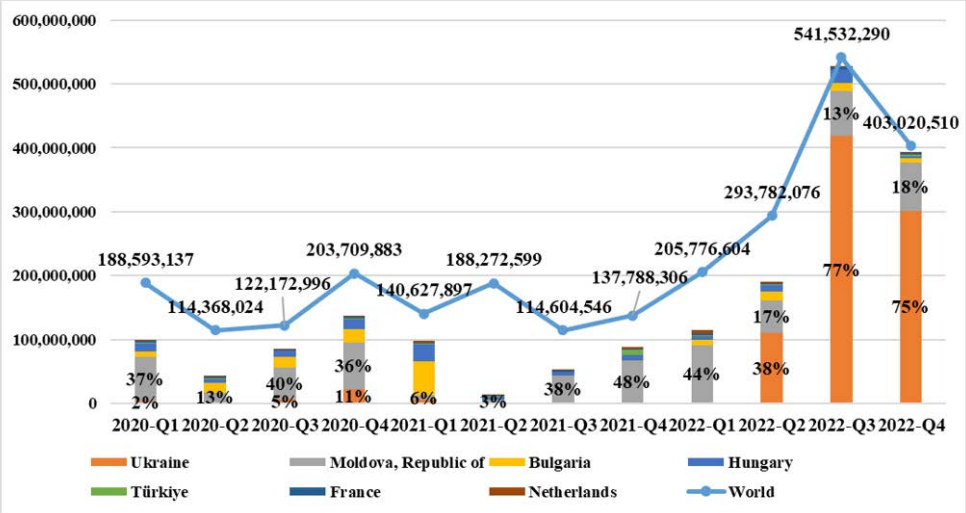

Figure 3. Dynamics of Romania's oilseed imports by quarter, by main sources (kg)

Note: Data processing based on International Trade Centre data [9]

When assessing the quarterly dynamics of oilseed imports (Figure 3), a more pronounced discrepancy can be discerned. Although import fluctuations occurred on a quarterly basis depending on the harvest period, with volumes ranging between 100,000 and 200,000 tons, the onset of the military conflict in 2022-Q2 and Ukraine's subsequent decision to export through Romania led to a substantial increase in imports, reaching a peak of 541,500 tons in 2022-Q3. Initially, the majority of Romania's oilseed imports originated from the Republic of Moldova; however, following the conflict period, imports from Ukraine accounted for $75 - 77\%$ of the total volume.

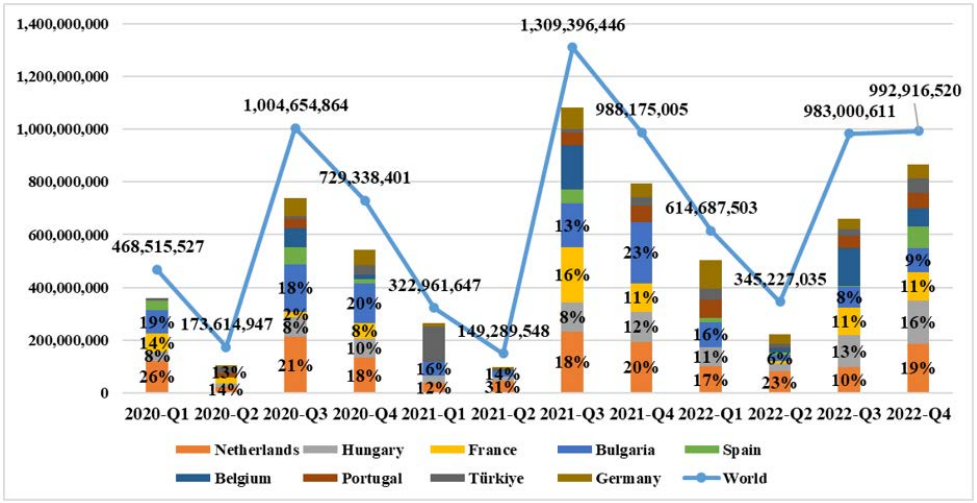

Figure 4. Dynamics of Romania's exports of oilseeds, by quarter, according to main destinations (kg)

Note: Data processing based on International Trade Centre data [9]

An analysis of Romania's oilseed exports (Figure 4) reveals a distinct pattern. Export volumes exhibit a significant increase during the harvest period (third quarter) from a previously low level, with this trend persisting. While no

major disruptions in exports are evident, the trend line indicates that the oscillating dynamics occur at a higher level, particularly in 2022-Q2, when a higher export volume is observed compared to the same period in previous years. Consequently, the significant increase in oilseed imports from Ukraine has been absorbed both through imports and the domestic market in Romania, given that the structure of export destinations has not undergone substantial changes.

By calculating the average import and export prices for oilseeds in a manner similar to cereals, relating the value of imports and exports to their volume, the situation can be summarized as follows:

Table 3. Average import price of oilseeds by Romanian sources (dollars per kilogram)

Exporters	2020-Q1	2020-Q2	2020-Q3	2020-Q4	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4
World	0.887	0.808	0.810	0.824	1.250	0.866	1.154	1.145	1.124	0.893	0.698	0.700
Ukraine	0.847	0.968	0.581	0.478	0.621	1.783	1.623	1.249	1.733	0.741	0.579	0.545
Republic of Moldova	0.398	0.450	0.448	0.515	0.663	0.788	0.591	0.626	0.831	0.808	0.625	0.581
Bulgaria	1.150	1.425	0.800	0.794	0.848				1.243	1.451	1.012	1.172
Hungary	1.264	1.062	0.844	0.973	0.988	1.979	1.902	1.632	2.583	1.455	0.803	2.100
Türkiye	2.779	2.799	3.054	3.119	3.417	3.221	2.799	3.002	3.031	1.805	2.315	4.125
France	7.102	4.642	8.780	8.985	8.547	8.079	12.080	7.545	7.172	8.981	7.077	6.445
Netherlands	6.312	3.726	3.414	6.948	4.273	3.850	4.371	4.789	2.614	1.913	4.099	4.65
Italy	5.001		2.969		4.471	5.239			3.187	2.056	2.281	2.856
Poland	2.380		2.856	2.577	1.995	5.735	3.102		2.140	0.899	1.033	2.222
Austria	2.221		2.686		3.592			1.481	1.907	1.331	1.342	2.457

Note: Calculations based on International Trade Centre data [9]

Table 3 shows that the overall average import price for oilseeds has decreased from $0.887 per kilogram to $0.7 per kilogram. However, when comparing the same quarters, significant decreases are observed in 2020-Q4 relative to the fourth quarter of previous years, with a reduction of up to 38.8% (compared to 2021-Q4). This situation is attributed to the notable quantitative imports from Ukraine, where the import price from this country is the lowest at $0.545 per kilogram, thus impacting the market.

Table 4. Romania's average oilseeds export price (dollars per kilogram)

Importers	2020-Q1	2020-Q2	2020-Q3	2020-Q4	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4
World	0.519	0.454	0.434	0.481	0.806	0.779	0.573	0.670	0.897	0.862	0.639	0.663

Note: Calculations based on International Trade Centre data [9]

In the case of the average export price (Table 4), only the overall average was determined, showing an increasing trend year by year. However, when focusing on 2022, it becomes apparent that the price has been decreasing from quarter to quarter, taking into consideration the increased proportion of additional exports from Ukraine. In 2022-Q1, Romania exported oilseeds at an average price of $0.897 per kilogram, while in 2022-Q4, the price dropped to $0.663 per kilogram.

5 Conclusions

An investigation into the impact of agricultural imports from Ukraine to Romania on prices yielded several noteworthy findings. The volume of cereal imports, when scrutinized across quarterly data for the past three years, has not exhibited a significant increase. High fluctuations were observed, with peak imports occurring during the harvest period. Notably, a shift in the structure of exporting countries to Romania has taken place. Previously, the majority of cereal imports originated from Hungary and Bulgaria; however, during the last three quarters examined (Q2, Q3 and Q4 of 2022), Ukraine accounted for the largest share of imports. In 2022-Q4, 73% of Romania's cereal imports were sourced from Ukraine.

Additionally, an analysis of export volumes by destination revealed that Egypt, once Romania's primary export partner, has experienced a significant decline in ranking. This finding implies that sizable exports have been directed to new destinations, suggesting that cereal imports from Ukraine have continued to flow to other countries with which partnerships exist. These factors have influenced cereal prices, with calculations of average import prices indicating that cereals from Ukraine are among the least expensive. Similarly, for exports, a decrease in prices has been observed in recent quarters, exerting considerable pressure on Romanian farmers due to increased marketing challenges and the necessity to sell for liquidity in establishing new crops for the following agricultural year.

With regard to oilseeds, the impact of imports from Ukraine mirrors that of cereal imports or can be considered even more substantial. An examination of import volumes disclosed that imports from Ukraine have not supplanted those from other countries, as was observed with cereals. These quantities of imports have been in addition to those from previous years, resulting in an increase of over 100%. Furthermore, an analysis of exports demonstrated that they have not risen to the same degree. Consequently, a significant portion of oilseeds imported from Ukraine has remained in Romania, further complicating the situation for farmers.

In light of these findings, several recommendations are proposed for market support and minimizing adverse market influences. It is suggested that cereal and oilseed imports from Ukraine should be regulated as much as possible by authorities in terms of both quantity and quality. Additionally, it is recommended that a quantitative limit be imposed on the harvesting period for cereals and oilseeds in Romania (during the agricultural campaign) to prevent an oversupply and consequent price decline. Concurrently, it is posited that the current practice of Romanian farmers storing and conditioning cereals for sale at higher commercial prices during the cold season may no longer be economically viable under these conditions. Therefore, it is recommended that Romanian farmers trade cereals as promptly as possible, potentially even earlier, to secure the first market price.

As for the limitations of the present study, the relatively short time frame considered, both pre- and post-military conflict, may be noted, given the limited availability of data. The exclusive reliance on quantitative analysis, without the inclusion of qualitative analysis, may also be mentioned.

Future research directions are suggested to encompass the impact of imports from Ukraine on a broader range of agri-food products, such as sunflower oil, a topic that has generated considerable market debate.

Author Contributions

Conceptualization, A.A. and I.L.P.; methodology, I.L.P.; software, I.L.P.; validation, A.A., A.S.I. and G.M.C.; formal analysis, A.S.I.; investigation, G.M.C.; resources, A.A.; data curation, I.L.P.; writing—original draft preparation, A.A.; writing—review and editing, I.L.P.; visualization, A.S.I.; supervision, I.L.P.; project administration, X.X.; funding acquisition, Y.Y. All authors have read and agreed to the published version of the manuscript.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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