

The impact of agro-food imports from Ukraine on the Romanian market: a post-conflict economic analysis

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Abstract. *The conflict between Russia and Ukraine has had a significant impact on agri-food markets in Eastern Europe, leading to a reconfiguration of trade routes and increased imports from Ukraine. This study analyzes the effects of these changes on the Romanian agri-food market, with a particular focus on price developments. Using a quantitative methodology based on the analysis of data on imports and price fluctuations between the periods 2020-2021 and 2022-2023, the research highlights both the benefits and the challenges generated by these massive imports. The results show that while imports from Ukraine reached a record high in 2022, the impact on prices has been uneven, with prices remaining high despite increased supply. The study emphasizes the importance of support measures for local producers and the need for a balanced strategy to ensure the stability of the Romanian agri-food market.*

Keywords: agro-food imports, Ukraine, Romania, Russia-Ukraine conflict, prices, international trade, agriculture, supply chains, agricultural economy.

JEL Classification: M40, M41.

1. Introduction and context of the study

The armed conflict between Russia and Ukraine, which began in 2022, has had major consequences for regional trade, directly affecting agri-food markets in Eastern Europe. Restrictions on maritime transport in the Black Sea, imposed by the Russian blockade of Ukrainian ports, have forced Ukraine to reconfigure its trade routes for the export of cereals, oilseeds and other essential agri-food products. In this context, Romania has become a strategic point for both the transit of Ukrainian goods and their integration into European supply chains. The Port of Constanta has played a key role in absorbing a significant part of Ukrainian exports, becoming a crucial alternative to maritime transport. Its capacity has been rapidly expanded to handle higher volumes of goods, and Romania's rail and road infrastructure has been adapted to facilitate trade flows. The Danube has also become an important transport artery, allowing the transfer of grain from Ukrainian ports on the river to logistics hubs in the European Union (Voicilas, 2020).

This redirection of trade flows has generated both opportunities and challenges for Romania and other countries in the region. On the one hand, Romanian infrastructure has benefited from investments and modernizations aimed at improving transport logistics. On the other hand, the large influx of Ukrainian products has created tensions among Romanian farmers, who have faced increased competition and a decrease in prices for local products (Olei, 2019).

At the European level, the European Union has intervened by adopting support measures for the states affected by the increase in trade flows, including by financing infrastructure projects and providing compensation for affected farmers. At the same time, solidarity corridors created to facilitate Ukrainian exports have become an essential component of European trade policy in the context of the conflict (Jagtap et al., 2022).

Thus, the impact of the war on the agri-food markets in Eastern Europe was not limited to the reconfiguration of trade routes, but also influenced the economic and political balance in the region. Romania, through its strategic position, became a key actor in managing the global food crisis and in maintaining the stability of agricultural markets in the EU (Veghes and Dima, 2022).

This paper aims to analyze the impact of these massive imports on the agri-food market in Romania, with a particular focus on price developments. The study compares two distinct periods, 2020-2021 and 2022-2023, to highlight the changes caused by the conflict and to provide a clear picture of the economic implications of the new trade routes.

2. Literature review

Existing studies on international agri-food trade highlight the importance of supply chains and their stability in maintaining predictable prices (Morales, 2017). The literature indicates that external shocks, such as armed conflicts or trade restrictions, can generate

volatility in agri-food markets, affecting both producers and consumers (Bellemare, 2015; Headey and Fan, 2010).

Research on the impact of the war in Ukraine on European agri-food markets is still developing, but initial analyses suggest that the redirection of Ukrainian exports through neighboring countries has had consequences on prices and the competitiveness of local producers (OECD, 2023). In the case of Romania, the increase in agri-food imports from Ukraine has been accompanied by concerns about the effects on local farmers and possible market distortions (MADR, 2023).

Economic analyses of agri-food markets in crisis contexts highlight that agri-food prices can be influenced by both internal and external factors, such as variations in global supply and demand, trade policies and tariff barriers (Gouel & Jean, 2015). Studies on trade shocks indicate that massive imports can lead to lower prices on the domestic market by increasing supply, but can also generate negative effects on local producers by reducing their competitiveness (Anderson and Nelgen, 2012).

Several studies conducted by FAO (2022) and the World Bank (2022) highlight that the unrestricted access of Ukrainian agri-food products to the markets of neighboring countries has generated economic pressures on local farmers. In particular, Romania, Poland and Hungary have reported difficulties in maintaining the competitiveness of their own agricultural production due to lower prices for Ukrainian products. Reports also show that these rapid changes can have long-lasting effects on the structure of agricultural markets and may require compensatory measures from the state (European Commission, 2024). In conclusion, the specialized literature highlights a series of determining factors for the evolution of agri-food markets in contexts of geopolitical crisis. The present study aims to contribute to this literature through a detailed analysis of how massive imports from Ukraine influenced the prices of agri-food products in Romania, considering the market dynamics and the economic implications of this phenomenon.

3. Methodology

To assess the impact of agri-food imports from Ukraine on the Romanian market, this paper uses a quantitative methodology based on the analysis of import data and price developments. The study is carried out in several stages, each of which plays an essential role in identifying and interpreting the effects of these imports on the Romanian agricultural economy.

Data collection: Data on agri-food imports are taken from official sources, such as the National Institute of Statistics (INS), Eurostat and the Ministry of Agriculture. In parallel, data on the average prices of the main agri-food products in Romania are used to analyze the correlations between imported volumes and price fluctuations.

Analysis period: The study compares two distinct time intervals – the pre-conflict period (2020-2021) and the post-conflict period (2022-2023). This comparison allows for the

observation of the changes generated by the increase in imports from Ukraine and their impact on the domestic market.

Analysis methods

Descriptive analysis of the evolution of imports and prices for the main agri-food products.

Statistical analysis using correlation coefficients and econometric regressions to identify the relationships between import volume and price dynamics.

Comparison of trends through diagrams and graphs, highlighting significant changes in the market.

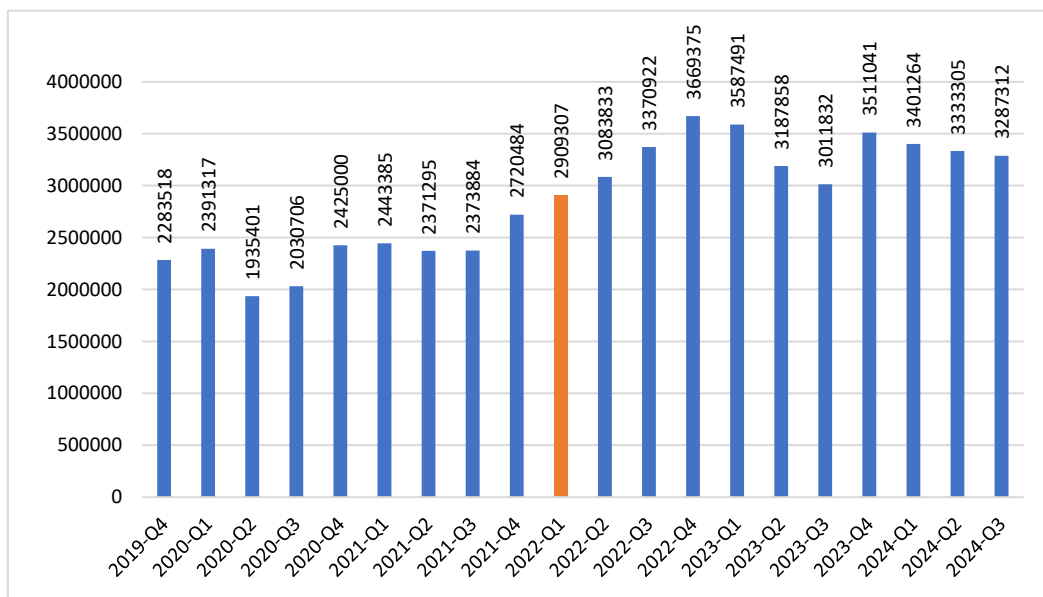
Interpretation of results: Based on the results obtained, conclusions will be drawn regarding the impact of imports from Ukraine on the agri-food market in Romania. The implications for local producers, consumers and policymakers will be highlighted, providing a detailed perspective on the economic and trade changes determined by these changes.

Through this approach, the study will contribute to understanding how geopolitical and trade changes influence Romania's agricultural economy. It will also provide a basis for formulating public policies adapted to the new market realities, thus supporting informed decision-making in the agri-food sector.

4. Results and discussion

In the research, we started by studying the dynamics of the value of imports of agri-food products at the level of Romania, in order to determine the first variable analyzed (Figure 1).

Figure 1. Value of Romanian food imports, in the period 2020-2023, quarterly



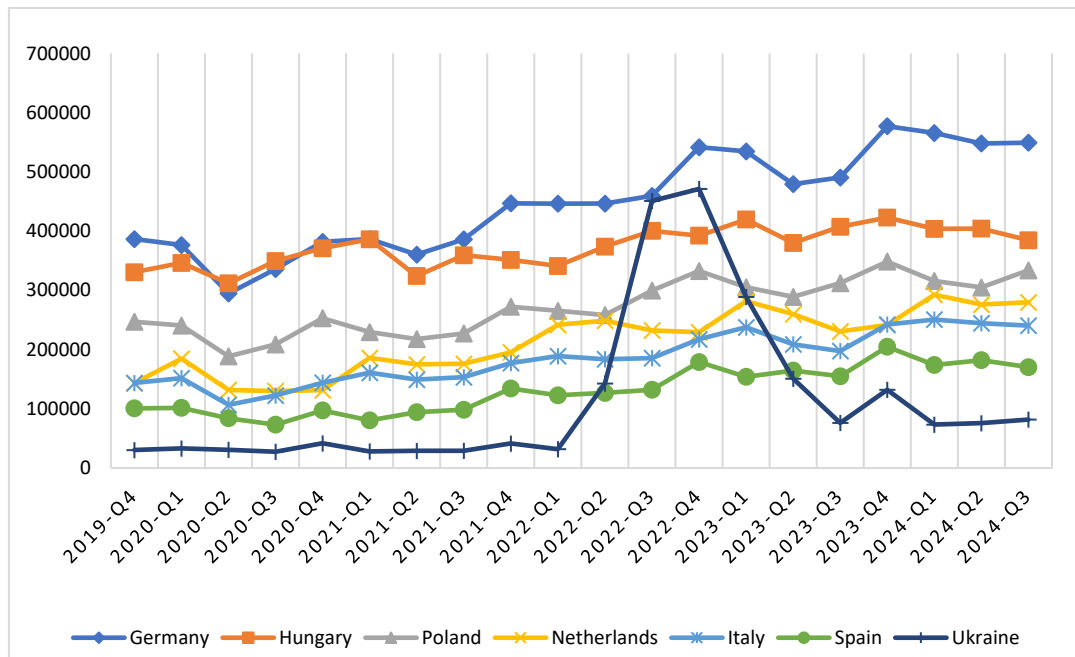
The graph shows the evolution of Romania's total imports of agri-food products from the 4th quarter of 2019 to the 3rd quarter of 2024.

In 2020-Q2, there was a significant decrease, probably as a result of the COVID-19 pandemic. After 2020-Q3, imports began a gradual recovery, maintaining a constant increase throughout 2021.

Starting with 2022-Q1, there was a strong increase, culminating in a peak in 2022-Q4. The year 2023 was characterized by oscillations, with a slight decrease after the first quarter, followed by a strong recovery in 2023-Q4.

For 2024, a slight decrease is observed, but imports remain at a high level compared to previous years.

Figure 2. *Dinamics of Romanian food imports value, in the period 2020-2023, quarterly*



The graph shows the evolution of Romania's imports from the top 5 agri-food exporting countries between Q4 2019 and Q3 2024.

Germany is Romania's main supplier, with significant increases after 2022-Q1, reaching a peak in 2023-Q4. However, in 2024, imports from this country register a slight decrease, but remain at a high level.

Hungary shows a stable trend, with moderate variations, but maintaining its importance as a trading partner of Romania. In 2023 and 2024, a moderate increase is noted, indicating a consolidation of trade relations between the two countries.

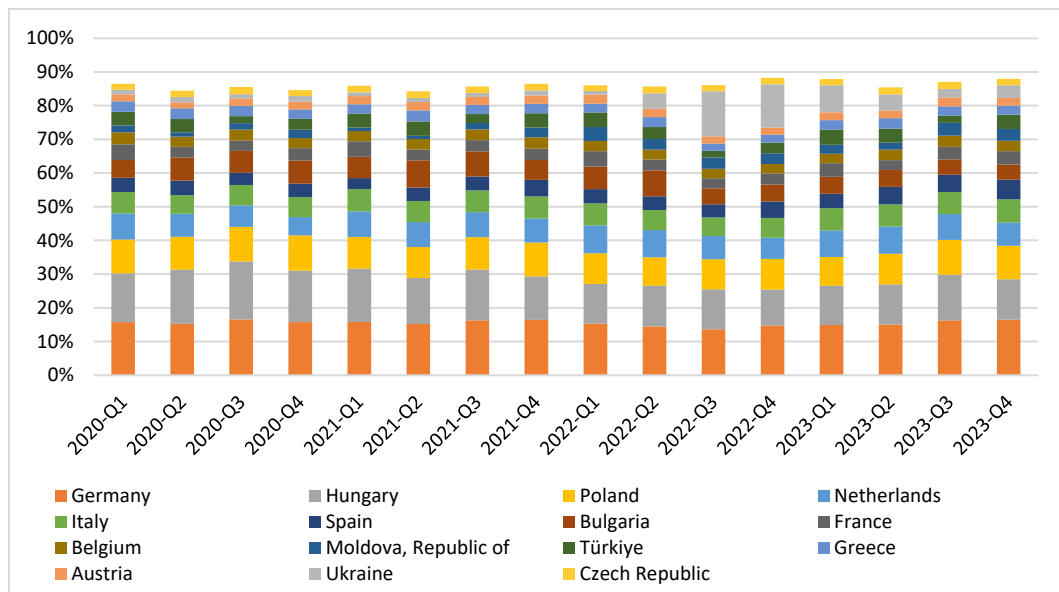
Poland follows an upward trend, although with greater fluctuations compared to other trading partners. Imports from this country have continued to increase in recent years, which shows Romania's increasing dependence on Polish agri-food products.

The Netherlands (Holland) recorded a significant increase in 2022, followed by successive declines and recoveries. These oscillations may be influenced by international economic and logistical conditions, which affect Dutch exports.

Italy maintains a stable level of imports, with small oscillations from year to year. This suggests a consolidated and constant trade relationship, without major changes in the period analyzed.

An important aspect to mention is the situation of Ukraine, which, starting with 2022, has become an increasingly important supplier, despite the effects of the war with Russia. After the outbreak of the conflict, imports from Ukraine recorded spectacular increases, especially in 2022 and 2023, due to changes in supply chains and trade facilities granted by the EU. In 2024, although imports seem to stabilize, Ukraine remains an essential player in the Romanian agri-food market.

Figure 3. Share of Romanian food imports value, in the period 2020-2023, quarterly



During the period 2020-2023, the shares of Romania's imports from the main exporting countries underwent significant changes, especially as a result of the conflict between Russia and Ukraine. This evolution can be analyzed in two distinct stages: the pre-conflict period (2020-Q1 – 2021-Q4) and the post-conflict period (2022-Q1 – 2023-Q4).

During the pre-conflict Russia-Ukraine period (2020-Q1 – 2021-Q4), the structure of Romania's imports was relatively stable, without major fluctuations in the shares of each

exporting country. Germany and Hungary dominated imports, with shares of 14%-17%, reflecting a high dependence on these two states. Poland and the Netherlands also played an important role, with shares between 8% and 10%, maintaining a constant contribution to Romania's trade flows.

In the case of other countries such as Italy, Spain, Bulgaria, France, Belgium and Greece, imports ranged between 3% and 6%, without significant changes during the period analyzed. A notable aspect is the presence of Ukraine, which before the conflict had a low influence on Romania's imports, with a share of only 1%-2%. This indicates that Ukraine was not an essential supplier of agri-food products for Romania before 2022.

After the Russian invasion of Ukraine, which began in February 2022, the structure of Romania's imports changed significantly. The most notable change was the exponential increase in imports from Ukraine, which went from 1%-2% before the conflict, to a peak of 13% in 2022-Q3 and Q4. This sudden increase was due to logistical changes and the facilities granted by the European Union to Ukrainian agri-food products.

In 2023-Q1, imports from Ukraine remained high (8%), but later started to decline, reaching 5%-4% in the following quarters. This trend suggests a possible stabilization of the market and an adaptation of Romania to the new trade conditions in the region. At the same time, Germany, Hungary and Poland maintained their influence on imports, with relatively stable shares, with 14%-16% for Germany, 11%-16% for Hungary and 9%-10% for Poland.

Although imports from the Netherlands, Italy, France and Belgium did not undergo significant changes, Austria and other Western European states maintained a low influence, with shares ranging between 2%-3%. This indicates that the changes in Romania's agri-food trade did not significantly affect imports from these countries.

In order to significantly determine the differences in the value of imports in the mentioned periods, respectively before the conflict and the period after, the t-test was used to determine the differences between the means (table 1).

Table 1. *t-Test: Value of food import in Romania pre și post conflict*

	GERMANY		HUNGARY		POLAND		NETHERLANDS		ITALY		UKRAINE	
	Variable 1	Variable 2	Variable 1	Variable 2	Variable 1	Variable 2	Variable 1	Variable 2	Variable 1	Variable 2	Variable 1	Variable 2
Mean	371105	496959	349937	392145	229647	301344	163659	245638	145595	207676	32479	217966
Variance	1931232883	2390150929	569730463	724867365	678012807	952214541	772893132	316416947	485627899	529570531	33801829	27981227987
Observations	8	8	8	8	8	8	8	8	8	8	8	8
Hypothesized Mean Difference	0		0		0		0		0		0	
df	14		14		14		12		14		7	
t Stat	-5.4150		-3.3180		-5.0225		-7.0254		-5.5110		-3.1345	
P(T<=t) one-tail	0.0000		0.0025		0.0001		0.0000		0.0000		0.0083	
t Critical one-tail	1.7613		1.7613		1.7613		1.7823		1.7613		1.8946	
P(T<=t) two-tail	0.0001		0.0051		0.0002		0.0000		0.0001		0.0165	
t Critical two-tail	2.1448		2.1448		2.1448		2.1788		2.1448		2.3646	

Source: contribution of authors.

Following the t-Test: Two-Sample Assuming Unequal Variances analysis, significant increases in Romania's imports from Germany, Hungary, Poland, the Netherlands, Italy and Ukraine are observed between the pre-conflict period (2020-Q1 – 2021-Q4) and the post-conflict period (2022-Q1 – 2023-Q4). For each country, we also calculated the percentage share of increase in imports between the two periods.

Imports from Germany increased from an average of 371,105 thousand euros in the pre-conflict period to 496,958.5 thousand euros in the post-conflict period. This represents an increase of approximately 33.9%.

The results of the statistical test indicate a significant difference between the means (t Stat = -5.4150, P-value two-tailed = 9.11E-05), which confirms that this increase is not random. This suggests a greater dependence of Romania on German imports in the post-conflict period, probably due to the need for stability in supply chains.

In the case of Hungary, the average imports increased from 349,936.8 thousand euros to 392,144.6 thousand euros, which represents an increase of approximately 12.1%.

The statistical test indicates a significant difference between the two periods (t Stat = -3.3176, P-value two-tailed = 0.005078). This more moderate increase, compared to Germany, suggests that Romania continued to import steadily from Hungary, but without dramatic changes in dependence on this trading partner.

Imports from Poland increased from an average of 229,647.4 thousand euros to 301,344 thousand euros, marking an increase of approximately 31.2%.

The test results (t Stat = -5.0225, P-value two-tailed = 0.000187) show a significant difference between the two periods. This suggests that Poland has consolidated its position as a key supplier for Romania, with a significant increase in trade volumes.

The average imports from the Netherlands increased from 163,658.8 thousand euros to 245,637.9 thousand euros, which means an increase of approximately 50.1%, the highest percentage increase among the European countries analyzed.

The statistical test indicates a very significant difference (t Stat = -7.0254, P-value two-tailed = 1.38E-05), confirming that this increase is not accidental. The Netherlands has become an increasingly important supplier, which suggests an intensification of trade relations between the two countries, possibly due to the reorientation of logistics chains.

Imports from Italy increased from 145,594.5 thousand euros to 207,675.5 thousand euros, registering an increase of approximately 42.6%.

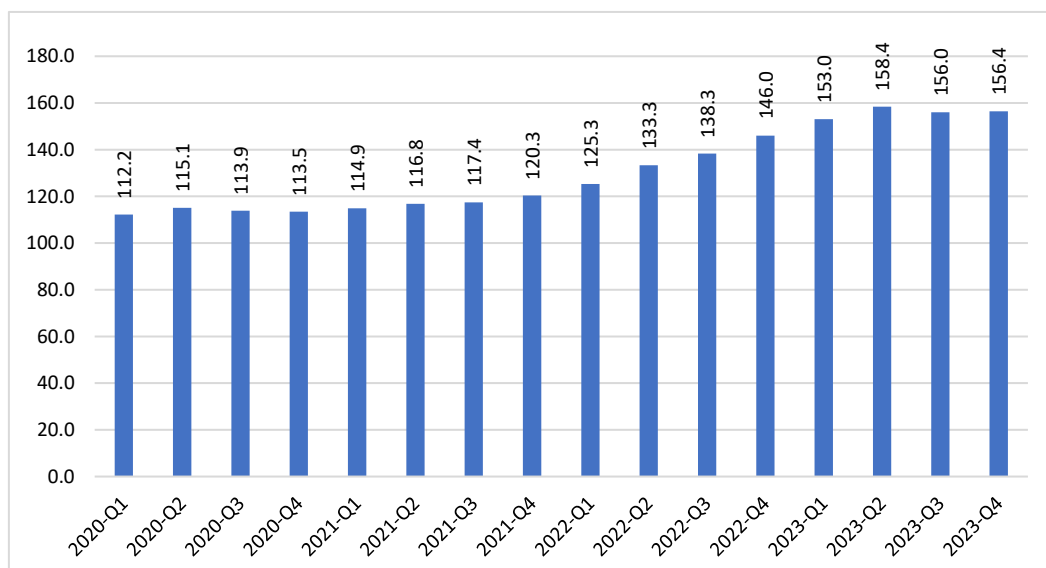
The test results (t Stat = -5.51097, P-value two-tailed = 7.67E-05) show that this increase is significant. Italy has become a more important partner for Romania in the post-conflict period, probably due to changes in supply networks and increased demand for certain agri-food products.

Imports from Ukraine recorded the most spectacular increase, from an average of 32,478.88 thousand euros in the pre-conflict period to 217,965.9 thousand euros in the post-conflict period. This represents an increase of approximately 571.3%, the largest of all the countries analyzed.

The test results (t Stat = -3.13446, P-value two-tailed = 0.016506) confirm that this increase is statistically significant. This massive jump is explained by the support provided by the European Union to Ukraine for agri-food exports, but also by the reorientation of trade flows in the region after the start of the conflict.

Next, a second variable in our analysis was the one related to the dynamics of agri-food product prices (figure 4).

Figure 4. Consumer Prices Food Indices (2015 = 100)



The food price index chart shows a significant increase in food prices between 2020-Q1 and 2023-Q4, with a peak in 2023-Q2 and a slight stabilization in 2023-Q4. This index reflects changes in food costs for consumers and is influenced by factors such as imports, domestic supply, inflation and geopolitical events.

In 2020, the food price index was relatively stable, ranging between 112.2 and 115.1, indicating moderate price increases. In 2021, the index continued to increase gradually, reaching 120.3 in Q4, suggesting moderate inflation, driven by the post-pandemic economic recovery.

In 2022, prices rose sharply, with the index rising from 125.3 in Q1 to 146.0 in Q4, an increase of 16.5% over the year. This price explosion coincided with the onset of the Russia-Ukraine conflict, which disrupted supply chains and led to increases in the costs of energy and agricultural raw materials.

In 2023, the index reached record values, fluctuating between 153.0 and 158.4 in the first three quarters, but stabilized slightly at 156.4 in Q4. This indicates a slowdown in price growth, a sign that the market is starting to stabilize, but food prices remain significantly higher compared to previous years.

After the increase in agri-food imports from Ukraine starting in 2022-Q1, we would expect a deflationary effect (i.e. a decrease in prices). However, analysis of the price index shows that although imports increased, prices continued to rise in 2022, suggesting that the price-reducing effect of imports was not sufficient to counteract global inflationary pressures.

In 2023, prices stabilized at a high level, suggesting that the increased availability of Ukrainian agri-food products helped to moderate price increases. The slight decrease in the index in Q4 2023 (from 158.4 to 156.4) could indicate that large imports of cheaper products from Ukraine and the reduction in global inflation have started to have an effect on the market.

In table 2 we identify the Pearson correlation coefficients between the two variables.

Table 2. Correlation between variables

		Correlations		
		CPFI	WD_FI	UKR_FI
CPFI	Pearson Correlation	1	,861**	,573*
	Sig. (2-tailed)		,000	,020
	N	16	16	16
WD_FI	Pearson Correlation	,861**	1	,775**
	Sig. (2-tailed)	,000		,000
	N	16	16	16
UKR_FI	Pearson Correlation	,573*	,775**	1
	Sig. (2-tailed)	,020	,000	
	N	16	16	16

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The Pearson correlation analysis between the food price index (CPFI), Romania's total agri-food imports (WD_FI) and Ukraine's agri-food imports (UKR_FI) reveals significant relationships between these variables. The purpose of this analysis is to identify the impact of imports on food prices and to understand to what extent imports from Ukraine have influenced the Romanian market.

The results show a strong positive correlation ($r = 0.861$) between total imports and food prices. This indicates that as imports increase, food prices also increase.

This relationship is statistically significant ($p\text{-value} = 0.000$), suggesting that Romania is dependent on imports for its agri-food supply, and the increase in imports has not led to a decrease in prices, but to their maintenance at a high level. This phenomenon can be explained by high transportation costs, global inflation and the increase in food demand in the current geopolitical context.

The correlation between imports from Ukraine and food prices is moderate ($r = 0.573$), meaning that although there is a relationship, it is not as strong as in the case of total imports.

The statistical significance of this correlation ($p\text{-value} = 0.020$) confirms that imports from Ukraine had an impact on prices, but not enough to cause a significant reduction in them. This may be due to logistics costs, currency fluctuations or infrastructure limitations that prevented a faster decrease in prices.

We observe a strong correlation ($r = 0.775$) between total imports and imports from Ukraine, indicating that Ukraine has become a crucial supplier for Romania.

This result is statistically significant ($p\text{-value} = 0.000$) and suggests that, in recent years, imports from Ukraine have represented an important part of Romania's total imports. This trend can be explained by the removal of customs duties on Ukrainian agri-food products and the increase in trade flows due to the Russia-Ukraine conflict.

The results show that total imports had a stronger effect on prices than imports from Ukraine, suggesting that Romania relied on more external sources for supplies, not just Ukraine.

For consumers, this phenomenon means that food prices have remained high, even though imports have increased. This is contrary to expectations, as, in theory, an increase in imports should lead to a reduction in prices through competition.

For Romanian farmers, the increasing dependence on imports, especially from Ukraine, may put pressure on domestic production, causing lower purchase prices for producers. This could lead, in the long run, to reduced domestic production and increased dependence on agri-food imports.

If imports from Ukraine continue to increase, food prices are likely to stabilize or even fall slightly. However, if Romanian farmers reduce their production due to competition, domestic supply could decrease, which could lead to price increases in the long term.

Another important factor is the evolution of energy costs and global inflation, which will influence both production costs and final prices of agri-food products.

The massive increase in agri-food imports from Ukraine to Romania, following the conflict with Russia, may have multiple economic and social implications on the Romanian market, especially on local production, the competitiveness of Romanian farmers and the evolution of food prices.

5. Conclusions

The war in Ukraine has led to an accelerated increase in imports from this country, amid logistical changes and facilities granted by the EU. Imports from Ukraine reached a historic high in 2022 (13%), but in 2023 a decrease and stabilization at lower values (5%-4%) was observed.

At the same time, traditional exporting countries, such as Germany, Hungary and Poland, were not significantly affected, maintaining their constant shares in the structure of Romania's imports. This dynamic suggests that Romania and the European Union have managed to integrate Ukrainian agri-food products into a sustainable supply system, but with a slight return to the traditional structure of imports in 2023.

If current trends continue, it is possible that Ukraine will maintain an important presence in Romania's agri-food trade, but without surpassing the influence of traditional partners in the European Union.

All six countries analyzed have recorded significant increases in imports in the post-conflict period. The largest percentage increases were observed for the Netherlands (+50.1%) and Italy (+42.6%), while Poland and Germany had solid increases of over 30%. Imports from Ukraine increased by more than 6 times (+571.3%), indicating a major reorientation of supply chains. Very low p-values (< 0.05) for all countries confirm that these increases are statistically significant, meaning that they are not random fluctuations, but reflect a real change in trade flows.

In conclusion, Romania adapted its import strategy following the conflict, significantly increasing its dependence on Ukraine, but also strengthening trade relations with traditional partners in the European Union.

Large imports from Ukraine did not lead to an immediate drop in prices, but helped stabilize them in 2023. In 2024, we may see a slight decrease in prices, but this evolution will depend on the dynamics of the domestic market, imports and macroeconomic factors.

The Pearson correlation analysis shows that total agri-food imports are strongly correlated with the increase in food prices, and imports from Ukraine had a moderate effect on this phenomenon.

These data suggest that although imports increased, they did not lead to a significant decrease in prices, but contributed to stabilizing them at a high level.

The explosion of agri-food imports from Ukraine has caused a significant change in the Romanian market. In the short term, this phenomenon may lead to a decrease in food prices, benefiting processors and consumers. However, in the long term, the negative impact on Romanian farmers may become a major problem, reducing competitiveness and domestic production, which could generate price fluctuations and increased dependence on foreign imports.

To avoid negative effects in the long term, protective measures for local producers are needed, such as higher subsidies, import regulations and stimulating the consumption of domestic products. This situation represents a major challenge for Romanian agriculture and requires a balanced strategy to maintain the stability of the agri-food market.

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