

# **THE IMPACT OF THE WAR IN UKRAINE ON THE ENERGY AND FOOD MARKETS**

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## **ABSTRACT**

The study explores how the war has drastically altered global market dynamics within a year, emphasizing the significant rise in energy commodity prices across Europe. This increase has placed substantial financial strain on households and businesses, exacerbating the economic challenges posed by the post-pandemic recovery period. In Poland, the reliance on coal for energy has made the surge in coal prices especially burdensome, while elevated gas prices have complicated household heating and higher oil prices have impacted transportation costs. The paper highlights how European Union countries, in response to sanctions against Russia, have sought alternative energy sources, leading to increased imports from Norway, Belgium, and the Netherlands. This shift has illustrated the fragility and interdependence of global energy supplies and underscored the urgency for EU countries to accelerate the development of renewable and nuclear energy sources. Moreover, the study discusses the broader geopolitical repercussions of the conflict, noting how it has forced nations to realign their political stances and alliances. The paper concludes that while the conflict has had some positive effects, such as spurring renewable energy initiatives, the overall impact on global markets has been predominantly negative, with significant disruptions in food and energy supplies and profound geopolitical shifts..

**Key words:** Ukraine War, Energy prices, Food prices, Food security, European Union.

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## **1. International food and energy market**

### **1.1. Food market based on FAO Food Price Index**

The market for food products is very large and complex. It involves many actors, producers and buyers, who differ not only in their specifics, but also

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in size. We have both small family farms, which make up the vast majority of farms, and large commercial farms, which are few in number, but which account for the vast majority of farm acreage around the world (Lowder, Skowet and Raney, 2016). As a result, it is very difficult to describe the food market without leaving out details that may be very important to some, because the subject is too vast for any one work to describe everything. Therefore, this work uses an index that is used by international organizations, which reflects the prices of the most basic agricultural products.

The FAO Food Price Index (later also described as FPI) as explained on its website by the Food and Agriculture Organization of the United Nations (FAO, no date): "is a measure of the monthly change in international prices of a basket of food commodities. It consists of the average of five commodity group price indices weighted by the average export shares of each group from 2014 to 2016." As written above, it is an index that is updated monthly, and therefore allows you to observe and analyze changes in the food commodity market in real time, which allows you to observe changes with a high degree of accuracy, which for such a broad issue can be called "live" changes. The index takes into account the price of meat, grains, vegetable oils and dairy products and sugar. Both Ukraine and Russia are among the world's largest producers of cereals (Nasir, Nugroho and Lakner, 2022) and vegetable oils (Rabbi *et al.*, 2023) as well as other food goods, which means that the ongoing conflict between these countries has a significant impact on the price of these products.

In order to fully show the changes that the war in Ukraine has caused in the food goods market, it is necessary to start with an analysis of the years preceding the war. In 2016–2020, the FPI was below 100, i.e. the average value of food goods included in the index basket was lower than the base value. This means that the price of these goods was lower than before, which should be understood as a good thing, as it shows that access to food, and therefore the fight against hunger, was easier and cheaper. However, the situation changed in 2021, which of course has to do with the COVID-19 pandemic and the lockdown it caused. The value of the index was 125.7 in that year, a very big jump from previous years, which had shown stability at around 92–98. This was a change that was felt by almost everyone, whether inflation was high in a country as in Argentina or low as in Norway (OECD, no date), every country felt the rise in food prices. However, the 2022 lockdown was just a memory, and despite this, the index value rose again, reaching 143.7. Under normal circumstances, the index value should have been falling, as the economy began to operate again without pandemic tightness, and inflation, while still high, began to fall noticeably in many countries. The only reasonable explanation for the renewed rise in value was the outbreak of war in Ukraine.

A closer analysis of FPI also confirms this. Products that Ukraine and Russia are largely responsible for producing have become much more expensive than those produced by other countries. The price of sugar has risen by only 5 points, which is understandable since Ukraine does not produce large quantities of sugar. The situation is different for Russia, which is one of the largest producers in the world, but here we are dealing with a country that produces it mainly for its own use and Russia's share of global sugar exports is low, which means that the war has little impact on a market dominated by countries such as Brazil and Thailand (US DoA, 2022). The situation is very similar for meat. The value of the FPI index for meat increased by almost 11 points in 2022 compared to the previous year. Ukraine is not a significant meat producer, while Russia, despite its high production, is only marginal in terms of exports compared to countries such as Brazil or the US (US DoA, 2023). It is these two elements of the FPI basket that changed the least in 2022. However, the same cannot be said of the other three components of the index.

Russia is one of the world's largest grain producers, as is Ukraine, which despite its small size produces more grain than, for example, Australia or Argentina (FAO, no date). As a result of the war between two of the world's largest grain producers, prices have changed dramatically. The value of the index increased by 23.5 points in 2022. The production of dairy products is also interesting, as despite high production, Russia is ultimately forced to import these products from abroad anyway. However, Ukraine exports milk abroad in large quantities, which is hampered by the war. But perhaps most interestingly, a large amount of milk is exported by Belarus, which has been cut off from much of the global market due to its close relationship with Russia (Kite Consulting, 2022). It is the export problems from Ukraine and Belarus that are driving up the price of dairy products globally, as shown by the index, which in 2022 rose more than 23 points from the previous year. The last element in the FPI basket is vegetable oils. In this case, many non-war factors, such as droughts or export restrictions, are influencing their price increase. However, the war has had a major impact on sunflower oil prices. Ukraine is the world's largest producer of sunflower oil (FAO, no date), and the war prevented its normal export. Therefore, the almost 23-point year-on-year increase in the value of the vegetable oil index in 2022 is only partly due to the war in Ukraine.

## **1.2. Energy market based on oil, gas and coal prices**

The energy market is one of the most geopolitically sensitive markets for European countries. As indicated in the report "European Electricity Review 2023" (Jones *et al.*, 2023), 1104 TWh of the 2795 TWh of electricity generated in 2022 in the European Union came from fossil fuels. As much as 20% of the total energy came from gas and 16% from coal. Both of these resources are

largely imported from Russia. The value of gas imports to the European Union amounted to 374,662.404 million cubic meters in 2021. Almost half (154,028.142 million cubic meters) came from Russia (Eurostat, no date). This shows how dependent the EU is on Russia for gas imports. The situation is very similar for fossil fuels. Total imports in the EU amounted to 115,644,666 thousand tons in 2021, and again almost half came from Russia (51,144,244 thousand tons) (Eurostat, no date). In the same year, total oil imports into the European Union amounted to 446,454.309 thousand tons, where Russia accounts for about 25% of this value (112,343.391 thousand tons) (Eurostat, no date). Such high values are, of course, due to Russia's geographical proximity to the European Union, which in turn leads to low import prices. In the case of gas, a significant part of its cost is precisely transport costs. Up to half of the cost of gas can come from the cost of transporting it (Hafner and Luziani, 2022, p. 54), and this means that shortening the distance between the source of gas and its destination can significantly reduce the cost of the good. With high demand for gas, this could mean savings in the billions of euros.

The main source of gas to the European Union is pipelines, which feature a fixed route and flow that can be easily controlled. They are also characterized by low operating costs, especially over distances of less than about 5,000 kilometers (depending on the transportation fee) (Ibid, p. 55). This makes them a great solution for European countries that are quite close to Russia, which provides cheap gas with a low-cost transportation option. What is more, in the case of a gas pipeline, a large part of the investment is the construction itself (about 90%), with operating costs making up the rest. This means that after spending a lot of money on the construction of such a pipeline, importing it from abroad is very cheap. In the case of oil, the situation is somewhat different. Although it can also be transported by pipeline (Hart, 2014, pp. 328–329), which, like the gas pipeline, allows cheap long-distance transportation, more than 90% of Russian oil reaches Europe by ship (Earl, 2022, p. 9). However, unlike gas, which serves as a source of electricity and heating, oil is used primarily for transportation. 65% of oil in the European Union is used as fuel, and road transport alone accounts for 50% of consumption (Ibid, p. 2). Only 21.5% of oil is used in industry. Interestingly, in 2020, only three European Union countries accounted for more than half of Russian oil imports, and they were Germany (28.13 Mt), Poland (17.94 Mt) and the Netherlands (13.08 Mt) (Ibid, p. 6).

Ultimately, geographic factors make it very economically viable to import energy resources from Russia, and for this reason, since the collapse of the USSR and the opening of the Russian economy to the Western world, trade between Russia and Europe has flourished. This has allowed (primarily Western European countries) to effectively develop their economies and energy sectors

without undertaking the large expenditures that come with building modern energy sources. What is more, trade in energy raw materials, among other things, has made it possible to establish positive relations between countries that were fierce enemies even before the fall of the Iron Curtain. However, good relations and positive economic exchanges for Europe were also associated with the possibility of trouble.

Such was the trouble that appeared after the outbreak of war between Russia and Ukraine. The democratic countries of the West were set on helping Ukraine, but due to economic ties with Russia it was impossible to fully support the country. A sudden cutoff from Russian raw materials would have spelled disaster for the energy sector of many Western countries, led by Germany, which generates half of its energy with coal and gas (Jones *et al.*, 2023), which largely comes precisely from Russia. The economic ties that European Union countries had with Russia led to paralysis of their ability to support a country that was in desperate need of military equipment, which, for the rest, was exactly what Russia was hoping for.

However, several months after the invasion began, the situation changed. European Union countries decided to introduce sanctions aimed, among other things, at restricting trade with Russia in order to become independent and open a path for themselves to help Ukraine, without fear of threatening Russia with possible supply cuts. This is well illustrated by the example of Germany, where 4 countries account for the majority of imported gas: Belgium, the Netherlands, Norway and Russia, which together account for more than 80% of imported gas. As recently as early 2022, about 35% of imported gas came from Russia, which accounted for the largest share of gas imports. This situation lasted until May, as already in June Norway had the largest share of gas imports, while Russia was in second place. However, since September 2022, the share of Russian gas has been completely eliminated (Eurostat, no date). The gap left by Russia was mostly filled by Norway, although a significant increase in share can also be seen from Belgium and the Netherlands.

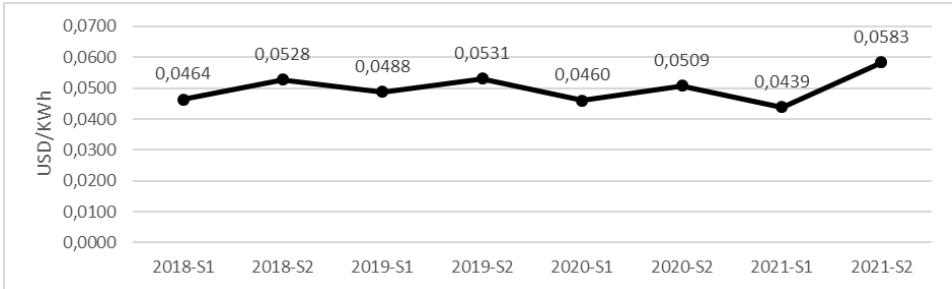
## **2. Empirical analysis of selected markets**

### **2.1. Food and energy market analysis**

The analysis first includes energy prices. Figure 1 shows the cost of gas for households in the European Union, one can see the stability of prices. Even as a result of the pandemic, prices have not undergone any significant changes. Seasonal fluctuations can be noted, of course, but they are natural for an energy source used for home heating. This price stability is also an important factor why gas is so widely used for heating in Europe. The predictability of its price makes it easy to plan budgets for both households and businesses, or even entire

countries. This price stability is, of course, due to the fact that much of the gas used in the EU comes from Russia (as described in more detail earlier).

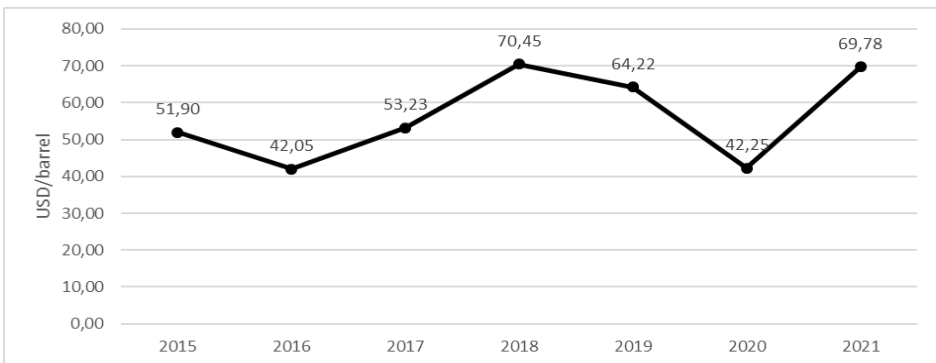
In the case of oil, the situation is very similar.



**Figure 1.** Cost of gas in the European Union for households in 2018–2021 (semi-annual data)

*Source: own compilation based on Eurostat data. Prices converted at an exchange rate of 1.0683 EUR/USD*

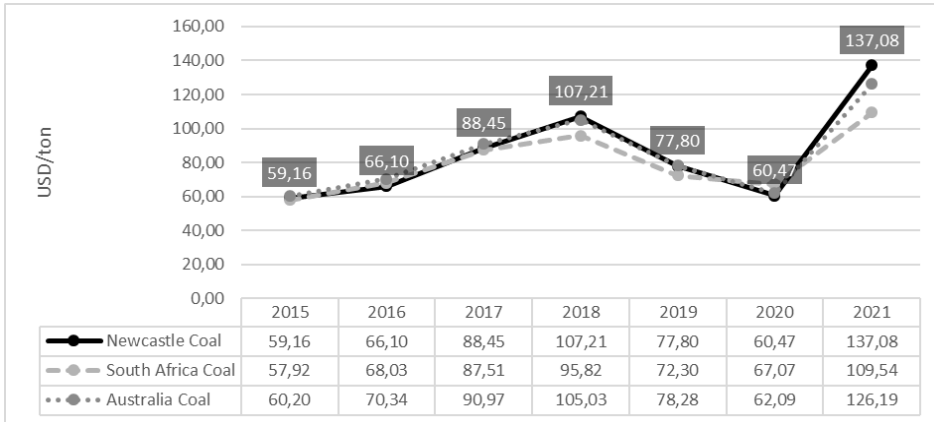
As can be seen, the price of oil fluctuates between \$40–70 per barrel on an annual basis. Larger fluctuations in the price are due to the fact that oil is a commodity used much more in industry, which means greater differences in demand than in the case of gas, which is used mainly for power generation and heating. As a large part of the oil used in the European Union comes from Russia, there is relative price stability here as well, but also energy dependence on the part of Russia. It is also worth noting that there was a drop in the price of oil in 2020. The pandemic took a heavy toll on oil prices for a period, and there were situations where the price of a barrel was negative (WEF, 2020). Although prices recovered very quickly, the overall price trend caused by OPEC's overproduction of oil allowed prices to remain low.



**Figure 2.** Average price per barrel of oil in the European Union from 2015 to 2021

*Source: own compilation based on Eurostat data.*

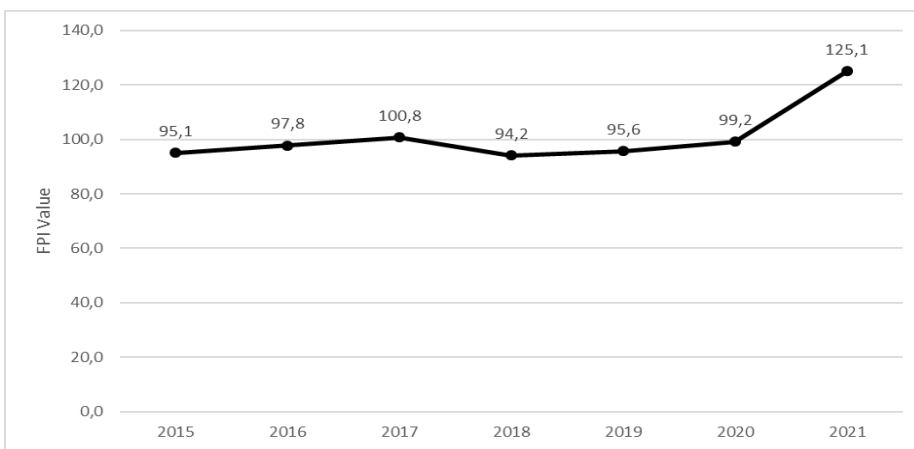
The last major energy source is coal. Here, as in the previous examples, the price is quite stable, and any fluctuations follow the same trend as oil.



**Figure 3.** Price per ton of coal in selected markets from 2015 to 2021

Source: own compilation based on World Bank and Barchart data.

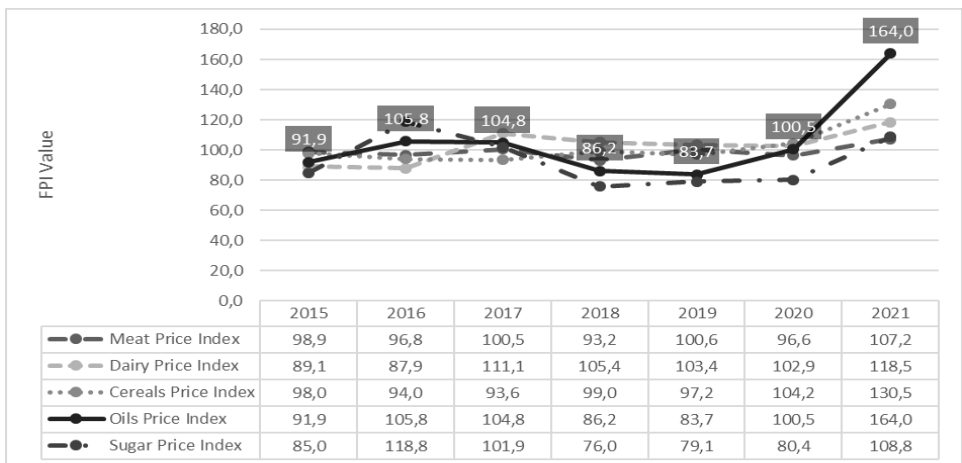
Australian coal prices, South African coal prices, and Newcastle coal futures prices were used for comparison. It is the latter that most closely reflects European coal prices, and is therefore highlighted in the figure. One can immediately notice a decline in 2019–2020 and a big rebound in 2021, which doubled coal prices from the previous year. Again, the end of the lockdown period and the opening up of economies that rely on coal not only for energy, but also for the production of goods such as steel, are responsible for this.



**Figure 4.** Food Price Index from 2015 to 2021 (2014–2016=100)

Source: own compilation based on data from the Food and Agriculture Organization of the United Nations.

At the end of the subsection, the FAO Food Price Index will be discussed in more detail. Since this index consists of several components, it will be presented in both forms. As can be seen in Figure 4, the value of the index is constant and no significant fluctuations are seen in it until 2021, with the earlier years showing relative stability and small declines. Interestingly, the lack of a decline in 2020 here (noticeable in other figures) is due to the fact that, despite the pandemic, many farmers were still able to work their fields without problems. The jump in 2021 is largely due to consumers' willingness to spend extra money, which allowed producers to raise prices. It is also an early sign of the inflationary increase coming a year later.



**Figure 5.** Food Price Index product groups from 2015 to 2021 (2014–2016=100)

*Source: own compilation based on data from the Food and Agriculture Organization of the United Nations.*

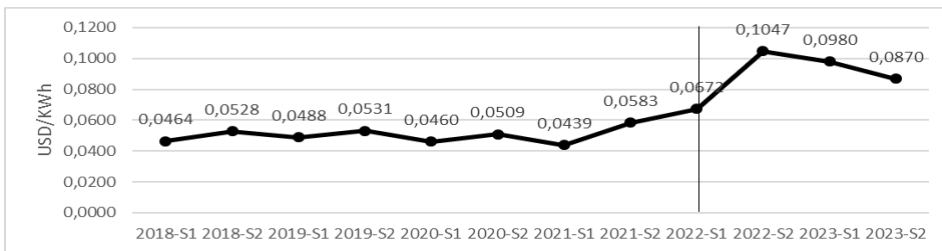
The same conclusions can be drawn by analyzing the graph of the FAO FPI components presented in Figure 5. Here, too, one can see stability from 2015 to 2020 and an increase in 2021. However, it is noticeable that the main factor responsible for such a large increase in 2021 was the price of oils. While the price of most goods increased very slightly, the price of oils increased by more than 60% year-on-year. Such a high jump may be due to the fact that, unlike other goods considered in the index, oils are used not only in the food industry, but also in the production of cosmetics, for example.

## 2.2. Food and energy market analysis in war period

Following the designated order, the analysis of the markets will begin with the energy market, starting with gas prices. The trend of rising prices, which



began in 2021, continued and even accelerated in 2022. As can be seen in Figure 6, gas prices have doubled since the beginning of 2021, which is a big problem in countries such as Poland and Germany, where many households use gas for home heating during the winter. The situation was saved by a fairly warm winter, which significantly reduced the demand for gas, but many households still felt the cost increase. In addition, the figure includes prices for households, but the situation for businesses was no better, which hurt businesses in an already tough macroeconomic situation.

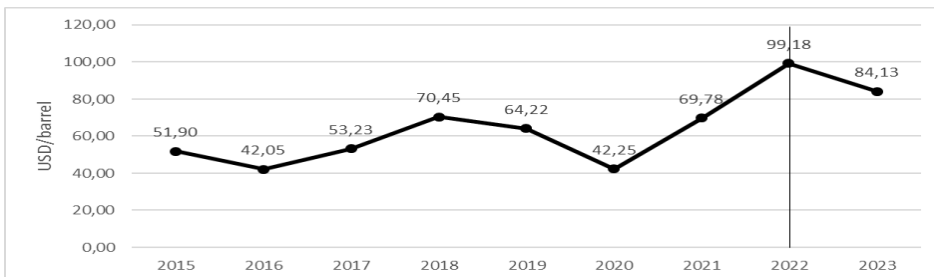


**Figure 6.** Cost of gas in the European Union for households in 2018–2023 (semi-annual data)

Source: own compilation based on Eurostat data. Prices converted at an exchange rate of 1.0683 EUR/USD.

Such a large increase in prices is due to the sanctions imposed on Russia by the European Union, which forced EU countries to buy gas from alternative sources, which entailed an increase in prices. Gas from Norway is much more expensive than from Russia, while transportation by tankers means higher transportation costs than by pipeline. One can also see a downward trend since the 2022 summit, but prices are still much higher than before the war began. This situation was predicted to happen right after the conflict started, due to European dependence in Russian raw resources.

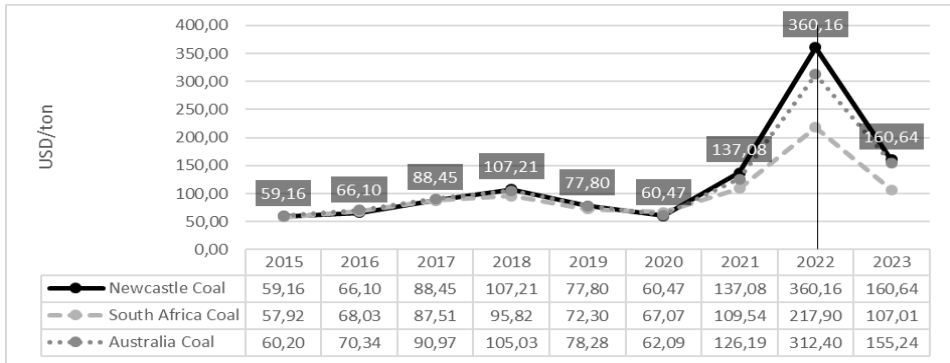
The situation is analogous for oil.



**Figure 7.** Average price per barrel of oil in the European Union from 2015 to 2023

Source: own compilation based on Eurostat data.

The ban on the purchase of crude from Russia led to an increase in prices, as oil purchased from other countries carried higher transportation costs, and due to its different source of origin, its unit price could also be higher. Moreover, the previously described practice of countries such as India reselling Russian oil at an inflated price led to an increase in the cost of purchasing in the European Union. There was a slight decline in the price of a barrel of oil in 2023, but despite this, the price still remains significantly higher than in the years before the war.



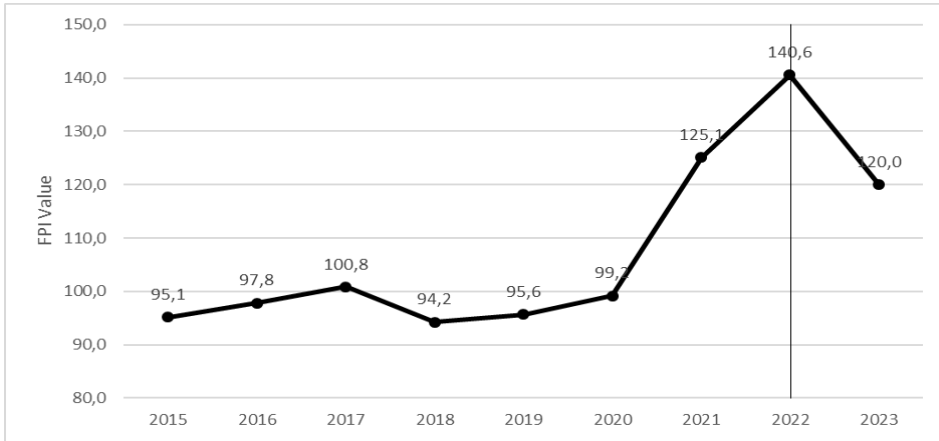
**Figure 8.** Price per ton of coal in selected markets from 2015 to 2023

Source: own compilation based on World Bank and Barchart data.

The last energy resource discussed is coal. Its price also rose in 2022, as with the other energy resources described. However, here the increase is much more noticeable than before.

This is due to the fact that coal is much more costly to transport than gas or oil, and this means that any increase in transport distance is reflected in the price. Due to the energy transition in the European Union, coal mines are slowly being closed, so it is impossible to increase production within the community, forcing EU countries to import coal from further afield. The resulting price increase is shown in Figure 8. We can see a price increase of about 160% per year. Such a huge increase in costs is a problem for the power sector, especially in Poland, Germany, the Czech Republic and Bulgaria, where a very large part of electricity comes from coal (Jones *et al.*, 2023). Speculation in the markets has also played a large part in the price increase, leading to a price bubble based on speculation. As you can see, the price in 2023 decreased significantly, but still remains above pre-war prices.

For food prices, the Food Price Index continued its upward trend in 2022, with a decline in 2023.

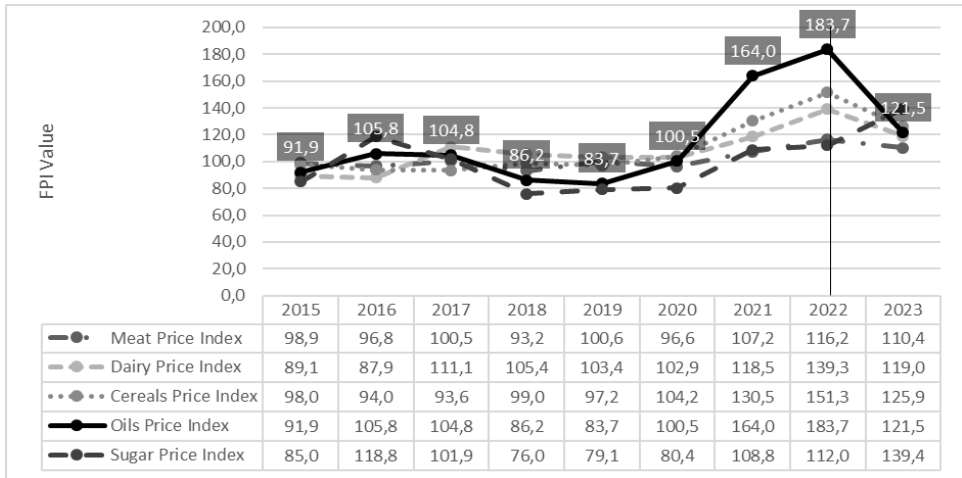


**Figure 9.** Food Price Index from 2015 to 2023 (2014–2016=100)

*Source: own compilation based on data from the Food and Agriculture Organization of the United Nations.*

While prices rose less in 2022 than in 2021, the continuation of the trend itself is worrisome, as it means further increases in food prices for people around the world. The situation is being exacerbated by the war, which is having a major impact on food exports from Russia and Ukraine, which means primarily grains and oils. However, the continued rise in prices can also be partly blamed on the poor global economic situation, such as the persistently high inflation rate, which means, among other things, that food prices have just risen. What is more, the components of the FPI did not rise equally. Some of them have grown at a higher rate than the average, while others have almost stopped their upward trend, as shown in more detail in Figure 10. It shows that the largest price increases were recorded precisely by products from Ukraine and Russia: oils, cereals and dairy products. Meat and sugar, on the other hand, recorded very low growth, not exceeding the standard fluctuations of the pre-pandemic period.

This shows that prices for products from outside the war region have recovered. Fortunately, despite the continuation of the conflict, oil prices have fallen significantly, reaching their lowest level since 2020 and reversing the downward trend. This may be related to the relative calm in Western markets, where they have become accustomed to the war situation. This is definitely good news for consumers, as it means prices of necessities are falling.



**Figure 10.** Food Price Index product groups from 2015 to 2023 (2014–2016=100)

Source: own compilation based on data from the Food and Agriculture Organization of the United Nations.

### 2.3. Summary of results

As the data presented shows, the global situation in the markets has changed a great deal in just one year since the war began.

The situation on energy markets in Europe is not enthralling. Prices of all major energy commodities have gone up significantly, and the European Union is not ready to cut off completely. After the sanctions, European countries were forced to import them from other sources, which noticeably affected the bills for households and businesses, which is a big problem considering that the war started almost immediately after the world was recovering from the pandemic. In Poland, the increase in the price of coal has been felt the most, since the energy sector relies on it the most. But higher gas prices are also a problem, as many households use it for heating during the winter. Higher oil prices, in turn, are a big problem for companies that need to transport the goods they produce, and every mode of transportation uses oil to a greater or lesser extent. All of this comes after a period of very high prices instability caused by the pandemic. If there are any positives to be found in this energy crisis, it is that such big problems will definitely encourage European Union countries to build renewable energy sources faster and also nuclear energy, which is not only low-carbon, but also cheap to produce.

Overall, the situation can be called tragic for almost every country in Europe, but also for many countries around the world that relied on Ukrainian grain or Russian energy, and as a result of the war were forced to take a position and stand with, or against, the West in the ongoing conflict.

### 3. Conclusions

Analyzing all the information presented, several conclusions can be reached.

The persistence of this conflict is a major problem in many markets. The markets presented in this paper, food and energy, serve to illustrate the situation in a way that everyone can feel and understand. However, there are many other markets, more or less globalized, that have also suffered from the ongoing conflict. Russian banks have completely lost their opportunities to participate in foreign markets, mainly through their cutoff from the SWIFT system. Changes in oil prices are imprinting themselves all over the world, both for consumers of these products, such as the United States, but also for producers, such as Saudi Arabia. Both sides have to deal with changes in the price, but also in oil consumption. The situation is very similar for numerous other commodities. There are markets that have gained from the war, as this paper also shows, but there are far fewer of them, and their gains do not compensate for losses on the rest of the world economy.

The geopolitical changes resulting from the war are significant. Already one can see very large changes in world politics, mainly in Europe. Previously neutral countries have been forced to choose which side they want to stand on. Finland and Sweden, after decades of neutrality, have decided to abandon it in favor of the security that NATO can provide (Reuters, 2023). In the global arena, on the other hand, the U.S. was able to demonstrate its strength once again through military support for Ukraine. Russia, on the other hand, has shown itself to the world in a way it very much wanted to avoid, as a militarily incompetent power that is incapable of conducting effective military operations outside its territory. China, in turn, is taking advantage of the situation to further its global strategy with less interference from the United States, which is largely focused on supporting Ukraine.

Even despite Ukraine's tremendous success in defending its territory, the country has suffered disproportionately more damage and losses than Russia. Ukraine must reckon with the fact that even victory on the frontline does not mean peace and prosperity, since the destroyed country will have to be rebuilt, and the cost of such an undertaking will be enormous. On the other hand, the damage and losses on the Russian side are negligible. Apart from armaments, there is no question of major losses, no cities razed to the ground and buildings that may take years to rebuild. Once the war is over, Russia will not have to rebuild, as it will in the case of Ukraine. However, for many years, Russia will be seen by the world as an aggressor and a country that cannot be trusted. This will take its toll on the country's economy, but despite this, Russia will find countries that are ready to help it further develop its economy.

Ultimately, everyone must reckon with the fact that after the war ends, the world will enter a new era with new alliances, new global relationships and new enemies. However, it is impossible to be sure how all this will form, as many of the issues that will affect it are simply too complex and variable to make any predictions.

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