

The Price of Energy Paid by EU Consumers in the Context of the War in Ukraine - Empirical Research

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Abstract

Today, energy is essential for human activities, and any disruption in this field directly or indirectly affects people's lives. A significant example of this is the war in Ukraine, launched by Russia in February 2022, which had important consequences on the energy market. The events between February 2022 and December 2023 have considerably influenced the global energy market, with impacts particularly felt by consumers.

While the energy market is a global entity, the impacts of disruptions are not uniformly distributed. The European Union, a longstanding major energy consumer of Russia, was thrust into the eye of the storm. When Russia breached diplomatic treaties and launched an attack on a neighboring country of the EU, the energy situation in the region underwent a seismic shift.

This geopolitical upheaval also reverberated across the United States of America (USA). Despite not being a direct participant in the Ukrainian conflict, the US was not immune to its ripple effects. As energy prices in international markets fluctuated, the US demonstrated its resilience by swiftly adapting to these changes.

Now, the question arises: How were energy consumers in the EU versus those in the USA affected?

Through its structure (introduction, section 2 - literature review, section 3 - methodology and conclusions) through the analysis we carried out, this office research aims to observe the differences between the way this crisis was felt at the level of the EU compared to those in the US. Thus, we used Difference in Difference econometric analysis in this desk research to see if and how there were changes.

Keywords

Energy, European Union, United States of America, consumer, price, war.

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Introduction

Energy has made possible the development, progress, and advancement of technology, economic growth, and human well-being.

Energy has always been an essential element for the functioning of many processes and activities, and today, it is a complex tool, a vital tool for evolution (Casier, 2016).

Therefore, energy is the resource and tool that ensures and generates prosperity and economic power and influences political decisions (Schmidt-Felzmann, 2019; Flouros, Pistikou and Plakandaras, 2022). Due to these characteristics, its material value is incomprehensible and far exceeds the values of other assets (Sweidan, 2021).

Geopolitics is a concept that links a state's geographical positioning to its international relations (political, economic, and social) with other states (Overland, 2019).

Supporters of this concept believe that geopolitics offers different analyses through which it is possible to observe and study the effect of the manifestation of risks or threats in a state or in a region on consumer

behavior or on economic markets (Khurshid et al., 2024). In this sense, according to what those people support and propagate the instability and unpredictability of the political class; the occurrence and development of military crises (wars, terrorist attacks, etc.); the occurrence of commercial misunderstandings; the application of sanctions, regulations or reforms (Gong and Xu, 2022) or interruptions in supply processes (Antonakakis et al., 2017; Cunado et al., 2020), are only part of the events and topics that geopolitics has in sight.

At the macro level, there is a powerful link between energy and geopolitics, which came along with the process of globalization and the development of society (Liu et al., 2019). It has been proven that countries or regions with energy resources are or have a high potential to be economically prosperous areas (Tichý and Dubský, 2024). But, sometimes, this abundance of energy resources does not always ensure economic prosperity and a better standard of living for citizens, but most of the time, those areas or states are insecure and face many crises (military crises in particular) (Duan et al., 2022; Khurshid et al., 2023).

The war started by Russia at the end of February 2022 when it attacked Ukraine is a military crisis that, as Antony Blinken, the Secretary of State of the United States of America (USA), declared, "represents much more than we can imagine" (U.S. Department State, 2022).

This war, due to the geopolitical context and Russia's role as a major energy producer and exporter, impacts military, energy, and food security worldwide (Tichý and Dubský, 2024).

Also, the Russian-Ukrainian conflict has changed the way of development and the dynamics of economic, commercial, and diplomatic relations on the axes European Union-Russia, European Union-United States of America, and United States of America-Russia and the repercussions of these changes were felt most by people in their capacity as citizens and consumers (Khurshid et al., 2024).

Therefore, an increase in insecurity and the emergence of the risk of a new world war could be observed, a significant increase in food or energy prices, several production processes were affected, disruptions occurred in the supply chain of many products or many people lost their jobs (Jagtap et al., 2022; Ahmed, Hasan and Kamal, 2023).

The present study is trying to analyze the impact of the war in Ukraine in the period April 2022-December 2023 on the evolution of the values of the consumer price index of energy in the European Union compared to the evolution of the consumer price index of energy in United States of America.

The reasons of this comparison are that Russia, the most important energy supplier to the European Union (Eurostat, 2022), is embroiled in this conflict, and the war is unfolding on the EU's borders, affecting states that are European Union members (Romania, Poland, Latvia, Lithuania, Estonia, Finland) or members of the North Atlantic Alliance (NATO).

This paper is a desk research study which used quantitative data and the difference-in-difference (DID) econometric statistical technique to make the comparison. The study is structured in several sections, as follows: section 1 represents the literature review part; section 2 is the methodology; section 3 contains the results and discussion. The conclusions of the research, its limits, and future research that can be carried out on this subject can be found in the paper's final part.

1. Literature review

It was already known that any critical military event affects the world economy and can be directly or indirectly related to large energy-producing and exporting countries (Burger, Graeber and Schindlmayr, 2014).

At the same time, it was also known that those who settle the impact of this type of critical event are ordinary consumers who feel and bear these effects because they are thought in the price they pay for energy (Mbah and Wasum, 2022; Hossain, Masum and Saadi, 2024; Khurshid et al., 2024).

Russia and Ukraine, due to their geographical positioning, are large producers and exporters of energy (oil, natural gas, coal, etc.), and one of their main customers is European Union (Eurostat, 2022; Mbah and Wasum, 2022).

In 2022, the global economy, incomes, and lives of all consumers were severely affected by the COVID-19 pandemic (Ibn-Mohammed et al., 2021). However, this aspect was not very important to the Kremlin regime when decided to begin the war against Ukraine, and its repercussions worsened the already existing precarious situation and further affected world security in many ways (Osiichuk and Shepotylo, 2020).

The European Union has historically had very good trade relations with Russia in terms of energy trade (Eurostat, 2022; European Commission, 2023a). Thanks to them, for many years, the European Union secured the necessary amount of energy at an advantageous price, which ensured the European Union's support for high energy consumption, consumption that raised the standard of living of citizens, respectively contributed to the development of the alliance European from an economic and social point of view (Dannreuther, 2016; Siddi, 2018).

These close and advantageous trade ties have made Russia the leading energy supplier for the European Union by 2022 (Eurostat, 2022; European Commission, 2023a). Also, the European Union, due to the seriousness it has shown and due to the continuous increase in the amount of energy purchased and the constant improvement of economic-commercial relations with Russia, has become and represented the most prominent business partner of Russia and a significant pillar of the Russian economy (Tichý and Dubský, 2024).

But with the start of the war in Ukraine, the European Union-Russia relations deteriorated because the European Union condemned Russia's behavior, called for an immediate end to the war, and supported Ukraine with economic and material resources or supported its own member that helped manage the crisis Ukrainian migrants (Trebesch, Kharitonov and Bomprezzi, 2023; European Commission, 2023, European Commission, 2024; IfW Kiel Institute For The World Economy, 2024). Thus, the diplomatic relations that the European Union had with Russia reached a shallow level, and the economic-commercial partnership in terms of energy trade between Brussels and Moscow was significantly reduced or completely interrupted (Table no.1) (Umar et al., 2022).

Table no. 1. Volumes of trade energy European Union – Russia

Product	Unit	Volumes by year		Percentage change
		2021	2023	
Crude Oil	mb/d	2.26	0.22	-90%
Oil products	mb/d	1.05	0.09	-91%
Natural gas	bcm	155	27	-83%
LNG	bcm	13	18	38%
Uranium products	€ millions	572	1064	86%
Coal	Mt	52	0	-100%
Electricity	TwH	13	0	-100%
Sum (excl. Uranium products)	TJ	14,251,000	2,221,000	-84%

Source: McWilliams et al., 2024.

The radical transformation of this partnership and the economic-commercial relations between the two generated a series of consequences because the energy security of the European Union depended to a large extent on Russia (Liadze et al., 2023) due to the fact that approximately 25% of the oil bought and used by the European Union and 40% of natural gas came from Russia (Wiseman and Mchugh, 2022).

Being in this situation of trade and diplomatic crisis plus an ongoing military crisis on the eastern borders of many member countries and preceded by a GDP decline of over 1% in the year (Liadze et al., 2023), the European Union had to find new energy suppliers to overcome these difficult times and not to face a shortage of energy or not to endanger the security and integrity of consumers (Hossain, Ferdous and Ferdous, 2024; Hossain, Masum and Saadi, 2024).

Consequently, the European Union strategically diversified its energy suppliers, intensifying its commercial relations with Norway, the United States of America, and Kazakhstan. These countries, which took the place of Russia in terms of the import and supply of oil and natural gas from 2023, became some of the most important suppliers of these products for the European Union (Table no. 1 and Figure no. 1) (Eurostat, 2023; McWilliams et al., 2024).

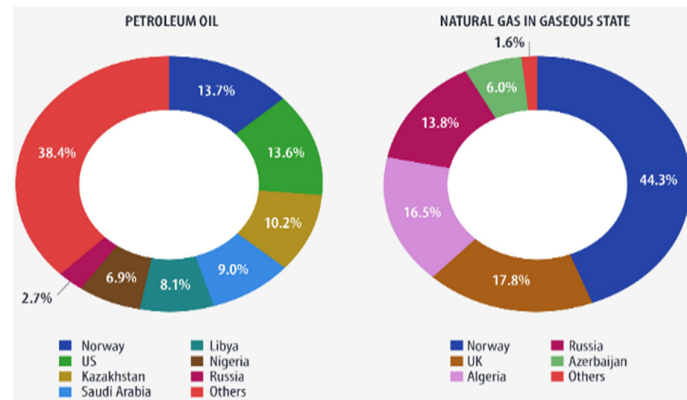


Figure no. 1. The diversifying of EU's oil and natural gas suppliers
Source: Eurostat, 2023.

The United States of America, like the European Union, condemned Russia's behavior, called for a cease-fire, and supported Ukraine with a lot of economic and military resources right from the beginning of the war (IfW Kiel Institute For The World Economy, 2024).

But compared to the European alliance, the United States of America has learned from past mistakes regarding energy availability and supply (the crisis caused by the embargo on oil from Arab countries due to the 1973 Arab crisis) (Zulkifli and Haqem, 2022). In this way, the United States of America was not as affected by the Ukraine war regarding energy availability (Guenette et al., 2022).

At the same time, the United States of America, due to its geographical positioning and the large reserves of energy resources on its territory, plus due to the policies it has had over time, has managed to become the largest oil producer in the world and the second largest energy producer in the world worldwide in 2022 (Sweidan, 2021; U.S. Energy Information Administration (EIA), 2022).

In addition, compared to the relations that the European Union had with Russia, the United States of America and Russia trade relations have always been at low rates (The Office of the United States Trade Representative (USTR), 2023), their value being significantly lower than that between the EU and Russia (Liadze et al., 2023).

But even if there were these different perspectives between the European Union and the United States of America, surprisingly, the war in Ukraine, even though it is located on another continent, thousands of kilometers away from the nearest city situated on the American continent, has impacted and affected the sector United States of America energy most likely because of the interconnection of goods markets with financial markets and because of the complexities this military crisis has (Egan, 2022; The White House, 2022).

For example, the introduction of sanctions against Russia for starting this war and the refusal of Arab countries to increase their oil or other energy products led to the highest peak in oil prices in recent years, surpassing the one recorded in 2014 (Ivanova, 2022).

However, with these significant differences between the European Union and the United States of America, what is the difference between the two in terms of the evolution of the value of the consumer price index of energy?

2. Methodology

This study is a desk research that used quantitative data and used the Difference-in-Difference (DID) econometric statistical technique to be able to observe the evolution and the difference (if any) recorded between the values of the consumer price index of energy from the level of the European Union compared to the values of the consumer price index of energy of the United States of America from the period April 2022-December 2023 following the outbreak and development of the war in Ukraine.

DiD is a technique used in performing specific analyses to measure and evaluate the consequences caused by an intervention on a specific group (treatment group) within an observational or quasi-experimental study (Huntington-Klein, 2021). It measures the effect of an intervention on a threatened group (treatment) and compares the result obtained with values from a control group. DiD uses longitudinal data, data available both before (pre) and after (post) the intervention (treatment), and the confirmation or the refutation

of the obtained results is done by using the parallel trends test (Columbia University Mailman School of Public Health, 2016; Huntington-Klein, 2021).

DiD is based on regression: $\delta DD = (\bar{Y}B2 - \bar{Y}B1) - (\bar{Y}A2 - \bar{Y}A1)$, where: δDD = Difference in difference; $\bar{Y}A1$ = Control group pre-intervention; $\bar{Y}A2$ = Control group post-intervention; $\bar{Y}B1$ = Treatment group pre-intervention; $\bar{Y}B2$ = Treatment group post-intervention

In this analysis, the treatment group is made up of the values of the consumer price index of energy from the European Union, and the control group is made up of the values of the consumer price index of energy, but from the United States of America.

The United States of America is the control group because it is geographically positioned at a great distance from the battlefield; it does not have significant economic relations with Russia or Ukraine; it is not energy dependent because it is one of the largest energy producers and the largest oil producer in the world (U.S. Energy Information Administration (EIA), 2022; World Integrated Trade Solution (WITS), 2024a).

The European Union is the treatment group because it has a common border with Russia and Ukraine (the battlefield); European Union countries have developed economic and commercial relations with Russia and Ukraine, it depends on the energy produced and exported from Russia and Ukraine (World Integrated Trade Solution (WITS), 2024b).

The values of the consumer price index of energy were recorded between January 2019 and December 2023. They were provided by the OECD Statistics (Organisation for Economic Co-operation and Development (OECD), 2024), and the analysis was carried out using the STATA program.

The intervention in the analysis is the beginning of the war in Ukraine (February 2022), and the period preceding the manifestation of the intervention (pre) is January 2019-January 2022. The period April 2022-December 2023 is the period following the manifestation of the intervention (post).

To realise this analysis, two hypotheses were issued:

Hypothesis 0 or null hypothesis – the intervention, the outbreak of the war in Ukraine, did not cause a change in the values of Consumer price index of energy in the European Union, the treatment group.

Hypothesis 1, or the alternative hypothesis, states that the intervention, the outbreak of the war in Ukraine, caused a change in the values of Consumer price index of energy in the European Union treatment group.

3. Results and discussions

After performing the DiD analysis, it is observed that the impact of the intervention, the outbreak of the war in Ukraine, on the value of the energy price in the European Union obtained a coefficient of 10.00114 and a value of $P > |t|$ of 0.000 at a confidence level of 95, which proves that the result is significant (Table no. 2).

Table no. 2. The results of DiD analysis

Average treatment effect on the treated (ATET)	Coefficient	$P > t $
The impact of the war Ukraine on the the value of consumer price index of energy	10.00114	0.000

Source: author's own research.

The results of the parallel trend test (Chart no. 1) show that the trends were relatively similar in the pre-intervention period. After the intervention, the trends changed, the values recorded in the treatment group being much higher than those in the control group.

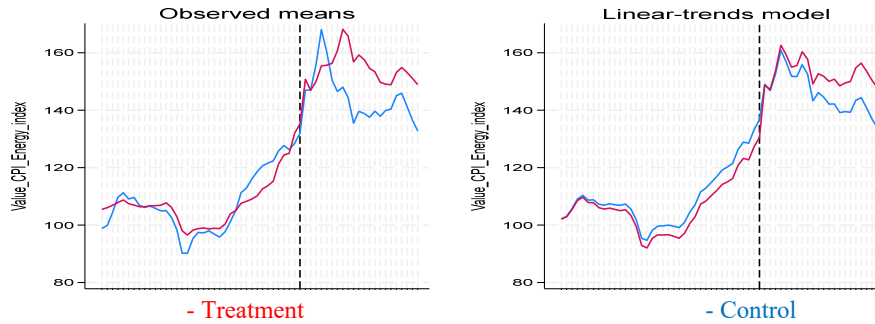


Chart no. 1. Graphical representation of trends

Source: author's own research.

Conclusions, future research and research limitations

In conclusion, the DiD analysis (Table no. 2 & Chart no. 1) demonstrates that the outbreak of the war in Ukraine (the intervention) caused a change in the value of the consumer price index of energy (in the treatment group (European Union) compared to the control group (United States of America) which confirms Hypothesis 1 or the alternative hypothesis.

This change was relatively predictable as the European Union and the United States of America responded similarly to Russia's behavior and actions. Thus, even if they are not directly involved through the presence of military troops in the conflict zone, both have supported and offered military, economic, and social support to Ukraine and have diminished diplomatic and commercial relations with Russia since the beginning of the crisis (European Commission, 2024; IfW Kiel Institute For The World Economy, 2024). However, the discrepancy in the 10-fold increase in Consumer price index of energy in the treatment group can be attributed to the fact that the European Union is not a large energy producer and is dependent on Russian energy. The shock of the energy market also caused this increase in the value of consumer price index of energy. Suddenly, the demand exceeded the available supply and the international agreements between the world states and the other major energy suppliers (Qatar, Saudi Arabia, United Arab Emirates, etc.).

At the same time, the war in Ukraine and the disruption of trade relations or their reduction to minimal levels also have positive sides because they can transform the energy sector in the European Union and accelerate that much-desired transition to green energy from sustainable sources (air, water, sun, wind) that the European Union aims to adopt and use to its full potential.

United States of America consumers now pay a lower price for energy than European Union consumers, but haven't United States of America consumers already paid that price in advance through all the military actions it has taken over time on countries rich in energy resources to become the main oil producer worldwide today (Tichý, Tichý and Glaeser, 2019; Sweidan, 2021; Tichý and Dubský, 2024)?

We need a clear and correct answer to this question. Still, even if European consumers have it more complicated now in terms of the price they pay for energy and bear a 10-fold price increase, the fact that the European Union has kept the peace - over time and that it did not ensure its energy independence through unconventional and unfair means, we consider that it weighs more for the appearance of the values and principles on which the European Union is built.

As for the limitations of the analysis, it is essential to consider that no analysis can be 100% perfect.

The actual limitations existing within this analysis may be related to the availability, aggregation mode, and variables omitted from the data used for the values investigated through the DiD technique, the study design (choice of the control group and the threatened group/treated group; the choice the period for which the analysis is performed or the robustness of the study).

However, contrary to these limitations, the DiD analysis provides essential insight into the impact of the war in Ukraine on the value of consumer price index of energy in the European Union (treated group) and the United States of America (control group).

Future research on the impact of the war in Ukraine can be done by expanding the DiD analysis to include more countries, using micro-level data, or including more variables to reduce confusion and obtain more accurate estimates.

Also, the use of alternative methods, such as the analysis of differences in synthetic differences (SIDD) or the attempt to use other matching techniques to identify a new control group that is much more comparable to the treated group) is taken into account.

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