OIL DEMAND AND WORLD OIL PRICE DEVELOPMENTS DURING ECONOMIC CRISIS, MACRO-ECONOMETRIC ANALYSIS

Anamaria-Geanina MACOVEI
Stefan cel Mare University of Suceava, 720229, Romania
anamaria.macovei@usm.ro

Abstract
The economic crises have had a significant impact on oil demand and oil prices per barrel worldwide, with significant economic consequences and requiring appropriate adaptation strategies. Oil is one of the most important energy sources used in industry, transport, and production. Fluctuations in oil demand and oil prices have a significant impact on national and global economies. The aim of this study is to provide a time series analysis of the evolution of oil demand and the price of a barrel of oil as an important source of energy in the world that plays a role in the global industry. The proposed objectives to achieve this aim are O1: analysis of the influence of crises on global oil demand, O2: analysis of the influence of crises on global oil barrel prices, O3: time evolution of global oil demand, and O4: time evolution of global oil barrel prices. Analytical and forecasting methods will be used to achieve the proposed aim, using statistical data on oil demand over the period 2005-2022 and the average oil price per barrel over the period 1976-2022. The results of the study consist of macro-econometric models for the analysis of the evolution over time of the level of oil demand and the average price of a barrel of oil, focusing on the economic crises that occurred during the period analyzed.

Keywords: *macro-econometric model; oil demand; oil price per barrel; economic crisis.*

JEL Classification: C22, H21, O23

I. INTRODUCTION

The economic crisis has had a strong effect on economies around the world, and the oil industry has been no exception. The demand for oil and the price of a barrel of oil fluctuated significantly during this period, with major consequences for countries globally whose economies are heavily influenced by the oil industry.

The oil industry has a major impact on the economy, both globally and nationally. Oil is one of the world's most important energy resources and plays a key role in the global economy. It is used as a major source of fuel in industry, as a raw material in industrial processes, and in the transport sector, forming the basis for the production of petrol, diesel, and aviation fuel. Oil is also an essential raw material for the petrochemical industry, which produces various types of chemicals such as plastics, fertilizers, medicines, detergents, and more. Petrochemicals are widely used in various areas of life and the economy. Oil reserves are discovered in the early 20th century in the Middle East, after which they are located in other regions around the world (Kamal, 2005). Oil is the most important product in the world trade of raw materials. It often becomes a point of political and strategic interest. Countries dependent on oil imports can be vulnerable to changes in world market oil prices and fluctuations in supply, which can affect their economic and political stability. In addition, control over oil resources can be important for geopolitical influence and dominance.

The oil industry is one of the most important industries worldwide, significantly influencing gross domestic product (Norouzi & Fani, 2020; Hamilton, 2009). It provides jobs both directly in oil extraction, refining, and transportation, and indirectly in related areas such as technological development, engineering, logistics, etc. The health of the industry is directly dependent on the oil sector, and its growth or decline has been influenced by global economic crises. Throughout history, the world has faced several major economic crises that have had a significant impact on the oil industry due to their influence on global economic conditions, investor sentiment, and market dynamics. Financial crises can affect the oil sector in the following ways: decreased oil demand, price volatility, reduced investment, credit constraints, and geopolitical and governmental implications.

Throughout history, the oil industry has been in a continuous state of research and innovation, leading to the development and diversification of production. The industry is constantly investing in extraction technologies and new, greener products that help the environment. Innovative technologies and sustainable materials, such as hydraulic fracturing, are absolutely necessary for this (Boudet et al., 2014). However, it should be noted that the oil industry also has some negative consequences, including environmental pollution. Despite its major importance, the development of alternative energy sources and efforts to reduce greenhouse gas emissions are

contributing to the search for and promotion of other more sustainable forms of energy (Grosu et al., 2022), which may affect the future of oil.

The aim of this paper is to analyze the evolution of global oil demand and average oil price per barrel during economic crises, examining the consequences of these fluctuations and exploring strategies to cope with these challenges. The proposed objectives to achieve this aim are:

O1: Analysis of the impact of crises on global oil demand,
O2: Analysis of the impact of the crises on global oil barrel prices,
O3: Evolution of global oil demand over time,
O4: Evolution over time of global oil barrel prices.

To achieve the proposed goal, analytical and forecasting methods are applied, using statistical data on oil demand for the period 2005-2022 and the average price per barrel of oil for the period 1976-2022. The results of the study consist of macro-econometric models for the analysis of the evolution over time of the level of oil demand and the average price per barrel of oil, with a focus on the economic crises that occurred during the period under analysis.

II. LITERATURE REVIEW

Oil is one of the world's main sources of energy. Oil reserves consist of oil resources located underground and are discovered using new prediction methods using satellite databases (Newaz et al., 2023). Countries with significant oil reserves are Saudi Arabia, Venezuela, Canada, Iran, Iraq, Russia, the USA, etc. Countries with oil reserves are often rich and have a significant influence on the world economy. Saudi Arabia is the country with the largest oil reserves in the world and plays an important role in oil production as a member of OPEC. Venezuela has the second largest oil reserves in the world, followed by Canada. The reserves of heavy crude oil in the Orinoco Belt have great potential (De Mirabal et al., 1996). Canada is particularly known for its Athabasca (Cretaceous) oil sand reserves in Alberta (Fustic et al., 2012). These reserves contain a type of heavy oil that requires more complex processes to extract the oil. Iraq is another Middle Eastern country with rich oil reserves. Its deposits in the Persian Gulf allow for high oil production (Chapman & Khanna, 2006). Russia is one of the largest oil producers in the world and has rich oil reserves (Rutland, 2008). Oil is extracted in many fields, including the Ural Mountains and Siberian regions. The US has large oil reserves to meet consumption. The Permian Basin in Texas, Prudhoe Bay in Alaska, and Gulf Coast fields have significant reserves. The top 5 oil-producing countries in the world are shown in the figure:
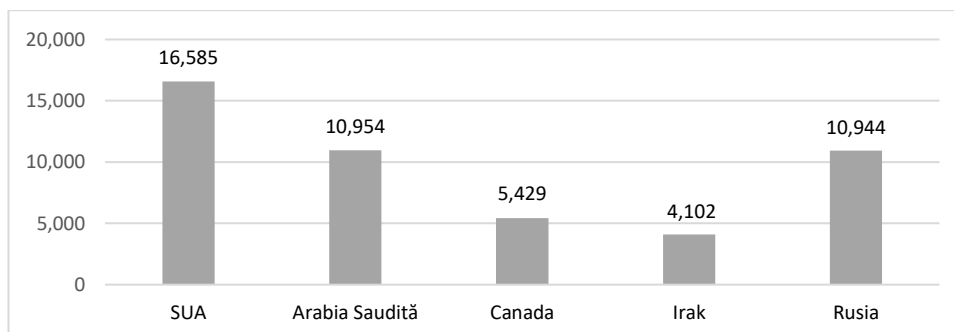

Figure 1. Major oil-producing countries worldwide in 2021 (in 1,000 barrels per day),
Sursa: https://www.statista.com/markets/410/topic/444/fossil-fuels/#statistic1

Figure 1 shows that the largest oil-producing country is the USA, followed by Saudi Arabia, Russia, Canada, and Iraq. Countries with oil reserves can have a significant trade advantage, as their strength can be decisively influenced by the stability of oil supply and prices. Oil is used in transport, industry, heating, and power generation. The price and supply of oil affect the performance of the energy sector and international trade (Ftiti et al., 2016). In (Chapman & Khanna, 2006) the authors outline the historical evolution of the price structure that has maintained a stable world oil market, based on a Security framework for major oil-producing countries.

Financial crises have a specific impact on the oil industry and can vary depending on the nature and severity of the crisis, as well as other factors such as the dynamics of global oil demand and supply, geopolitical events, and technological advances. Between 1970 and 2023, the world faced several major economic crises (Figure 2). The 1973 oil crisis (Campbell & Laherrere, 1998), triggered by the OPEC (Organisation of Petroleum Exporting Countries) embargo, led to a sharp increase in oil prices and a major economic recession in many countries. This crisis is heightening geopolitical tensions, with direct implications for oil markets. Economic difficulties increase political instability, leading to conflicts and trade disputes between major nations, impacting oil production, transport routes, and supply chains. Numerous studies (Rasche & Tatom, 1981; Burbidge &

Harrison, 1984; Gisser & Goodwin, 1986) have investigated the impact of economic crises on the price of a barrel of oil and on the economy. The global recession of 1980-1982 (Huntington, 1984; Apergis & Payne, 2010) was a period of significant recession, characterised by rising unemployment and declining economic performance in many countries, with a significant impact on the oil industry. The Asian financial crisis of 1997 (Iswahyudi, 2016), affected countries such as Indonesia, Thailand, South Korea, and Malaysia, the crisis was triggered by problems in the financial sector and had a major effect on Asian economies. The global financial crisis of 2008-2009 was a major economic crisis, also known as the subprime mortgage crisis, which began in the United States and spread around the world. It caused bank failures, rising unemployment (Aubuchon & Wheelock, 2010), and a wide-scale recession in many countries. The sovereign debt crisis in the Eurozone (since 2010) has created severe tensions within the European Union (Greece, Spain, Italy, Ireland, and Portugal) (Trabelsi, 2012) and required interventions and financial support programs to prevent economic collapse.
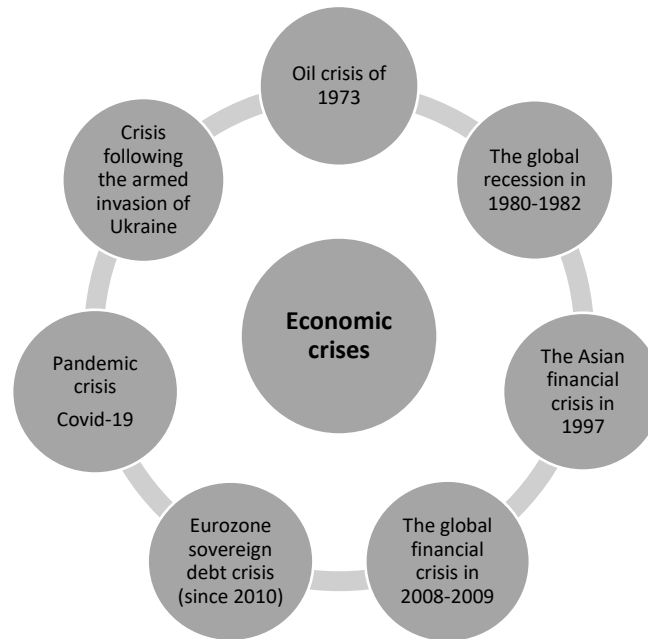

Figure 2. Economic crises 1970-2023

The economic crises of 1970-2023 discourage investment in oil exploration, production, and infrastructure. During periods of economic uncertainty, companies reduce or postpone capital spending, which limits the development of new oil projects and leads to a decrease in oil supply over time. During financial crises, governments intervene with monetary policies, bailouts, or stimulus packages to balance the economy. Such interventions have specific implications for the oil industry, such as regulatory changes, subsidies, or fiscal incentives (Tulvinschi, 2021) aimed at supporting oil-related activities or promoting energy diversification.

The analysis in this study is based on historical data on oil demand and the average price per barrel of oil, as well as information on economic crises and oil markets from official sources such as energy reports, oil industry databases, and scientific publications.

III. MODELING METHODOLOGY

Empirical and analytical research methods are used in this study. The present research aims to analyse the development over time of oil demand between 2005 and 2022 and the average price of a barrel of oil between 1976 and 2022. The estimated equation of the cubic regression model (Macovei, 2020), adapted for the variables under analysis, has the form:

$$Y_t = \alpha + \beta \cdot t + \gamma \cdot t^2 + \mu \cdot t^3 + \varepsilon,$$

where Y_t is the global oil demand or average price per barrel of oil and t is the time variable, i.e. period rank. The variables of the model analyzed are shown in Table 1:

Table 1. Model Description

Model Name	MOD_1, 2

Dependent Variable	1	Oil demand
	2	Oil barrel price
Equation	1	Cubic
Independent Variable		Case sequence
Constant		Included
Variable Whose Values Label Observations in Plots		Unspecified
Tolerance for Entering Terms in Equations		.0001

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

Based on the model proposed for analysis, a comparative analysis will be carried out to estimate the evolution of oil demand and the average price per barrel of oil during different economic crises and to identify the factors influencing this evolution. Case studies and previous research investigating the economic consequences of demand volatility and average oil price per barrel and the strategies to be adopted during these periods will be analyzed.

IV. THE EVOLUTION OF GLOBAL OIL DEMAND OVER TIME

Economic growth at home and abroad is leading to increased industrial production and activity in the transport sector, which is driving up demand for oil. Oil demand is linked to the need for oil as an energy source and as an industrial feedstock (Ilaș et al., 2022). This can vary depending on a number of factors, including the world economy, the needs of the transport sector, industrial production, and household energy consumption. The demand for cars, ships, planes, and other transport equipment directly influences the demand for oil, as most of them use petroleum products such as diesel or gasoline.

Conflict or instability in oil-producing countries has influenced global oil supply and demand and caused prices to rise or fall. Analyzing global oil demand over the period 2005 to 2022 gives Table 2:

Table 2. Model Descriptive statistic for global oil demand

	N	Minimum	Maximum	Mean	Std. Deviation
Oil demand	18	83.65	100.27	91.3433	5.82167
Valid N (listwise)	18				

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

The lowest oil demand in the period under review is in 2005 and the highest oil demand is in 2019. Thus, oil demand has evolved significantly over the period under review due to changes in global economic growth, technological advances, environmental concerns, and government policies.
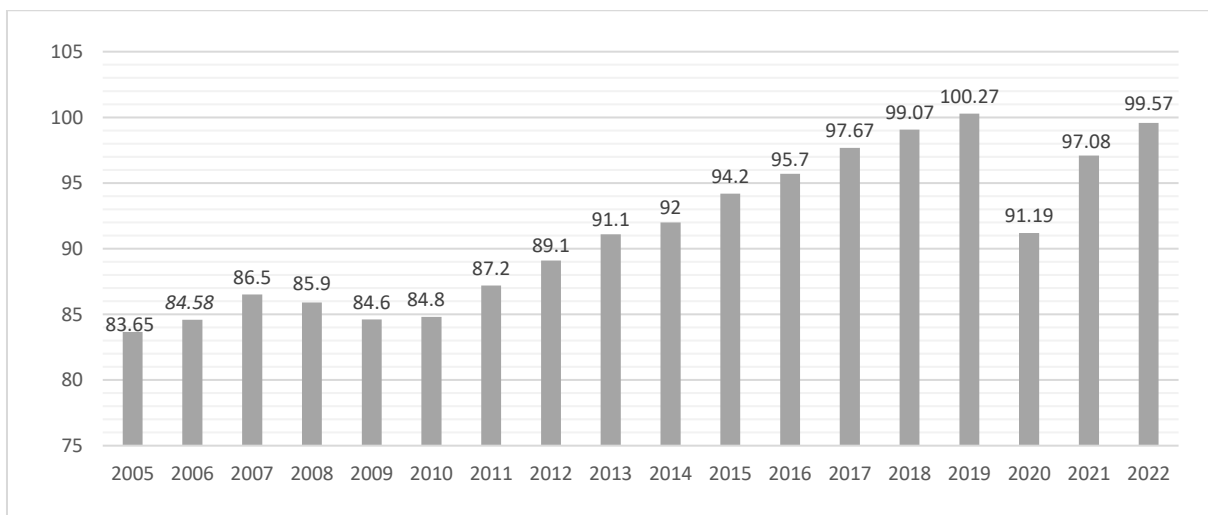

Figure 3. World oil demand from 2005 to 2022 (in million barrels per day),
Source: https://www.statista.com/statistics/271823/global-crude-oil-demand/

Figure 3 shows fluctuations in oil demand over the period 2005-2022 due to economic cycles, so oil demand is closely linked to economic developments. In the period 2005-2007, oil demand is increasing, with a growth rate of 3.41%, due to emerging economies such as China and India. The financial crisis in the US in 2008, caused by the fall in mortgage lending, led to the collapse of the mortgage market and the crisis in financial

institutions. This has led to a financial recession through a sharp drop in social and economic activity, industry is using less energy and reducing investment, thus oil demand is down 2.20%. After the financial recession, the demand for oil is still increasing (Hamilton, 2009). The percentage increase for the period 2009-2019 is 18.52%, due to emerging economies, trade policy options and their growing energy needs. This increase in demand for oil also has an effect on the price of a barrel of oil and on the gross domestic product. However, the COVID-19 outbreak severely disrupted global oil demand, with a sharp drop of 9.06%. The shutdown or curtailment of economic activities, travel restrictions, and the isolation of the population at home led to a sharp drop in oil consumption. Many countries have taken measures to limit the spread of the virus, leading to reduced transport, production, and global energy demand. Following the pandemic, demand for oil recovered, with a 9.19% percentage increase, as restrictions were gradually lifted and economic activity resumed. However, the pace of recovery has varied from country to country and region to region, depending on their ability to control the virus and stimulate economic growth. During the 2008-2009 and 2020-2021 crises, economic activity slowed, leading to reduced industrial production, lower consumer spending, and lower energy consumption. This decline in overall economic activity leads to a decrease in demand for oil (Figure 3) as businesses and consumers reduce their energy consumption.

Global oil demand is complex and dynamic, depending on many factors. It can vary over time and space. Figure 3 shows that the evolution of global oil demand over time can be estimated using a cubic model.

Table 3. Model Summary pentru cererea globală de petrol

R	R Square	Adjusted R Square	Std. Error of the Estimate
.930	.865	.836	2.355

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

According to Table 3, the correlation ratio is 0.930, so there is a strong correlation of global oil demand values. This is time-varying as it has fluctuating values over the period analyzed. The determination ratio is 0.865, so 86.5% of the variation in oil demand is explained over time due to financial recession, declining consumption, emerging economies, and energy needs.

Table 4. ANOVA for global oil demand

	Sum of Squares	df	Mean Square	F	Sig.
Regression	498.536	3	166.179	29.971	.000
Residual	77.626	14	5.545		
Total	576.161	17			

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

From Table 4 the value of the F-test is 29.971 and the model determined is validated, so based on the data from the period analyzed it is possible to estimate oil demand in the next period with a probability of 95%.

Table 5. Table Coefficients for global oil demand

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Case Sequence	-1.285	1.231	-1.179	-1.044	.314
Case Sequence ** 2	.306	.149	5.479	2.058	.059
Case Sequence ** 3	-.011	.005	-3.512	-2.152	.049
(Constant)	85.746	2.777		30.881	.000

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

According to Table 5 the macro-econometric model equation of the evolution of global oil demand is:

$$Oil\ demand = 85.746 - 1.285 \cdot t + 0.306 \cdot t^2 - 0.011 \cdot t^3$$

Oil demand is largely due to production demand. If global demand for oil increases, producers are under pressure to increase production to meet market needs, otherwise producers have to minimise or stop production. Oil demand is influenced by economic growth, industrialisation, transport, and other sectors that use oil as their main source of energy, which has led to a sharp increase over the period 2009-2019. Due to the restrictions imposed by the COVID-19 outbreak, global oil demand has been reduced and refineries have faced oversupply and limited storage capacity. According to the model equation obtained, the evolution of oil demand has two inflection points, a trough in 2006-2007 and a peak in 2020. Analyzing the data and the equation of the model obtained, it can be

seen that the evolution of oil demand has a decreasing trend for the periods 2005-2007, which predicted the financial crisis of 2008 and 2020-2022 which was due to the period of health crisis and pandemic restrictions, but also to the large quantities of oil extracted in that period and an increasing trend 2008-2019. Therefore, a decrease in oil demand is expected in 2023 due to environmental policies. The measures taken by governments guarantee the safety of oil production, refining, and transport as well as environmental risks (Chichilnisky & Heal, 1993).
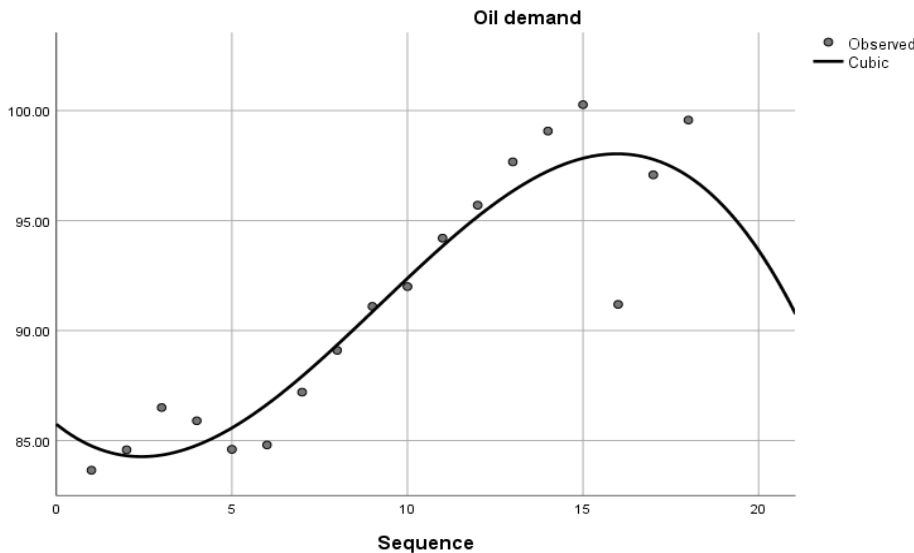

Figure 4. Estimation of the cubic regression model for global oil demand
Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

Figure 4 shows a downward trend in oil demand and an average oil demand of 95.65 million barrels per day is forecast for 2023. The trend in the model determined is also confirmed by other assumptions such as: the increased attention to climate change and efforts to reduce emissions could have an impact on oil demand and the increased interest in renewable energy sources such as solar or wind power could lead to a transformation of the energy mix and reduce oil demand. Another factor driving down oil demand is the increasing use of fuel-efficient cars and the growth of electric cars. Electric vehicles are expected to have a more significant impact on oil demand in the coming years as their market share increases. Note that this study does not take into account the Russian invasion of Ukraine which is having an effect on the global economy and the increased demand for oil.

V. THE EVOLUTION OVER TIME OF THE AVERAGE ANNUAL GLOBAL PRICE PER BARREL OF OIL

Like oil demand, the evolution of the average price per barrel depends on a number of factors, including geopolitical events, oil crises (Hamilton, 1983), the supply-demand balance, and the oil market environment. Oil is widely exported and imported, and the price of a barrel of oil is closely linked to the demand for oil. It is very important for the trade balance of many countries. Analyzing the evolution of the average price of a barrel of oil between 1976 and 2022, we obtain Table 6:

Table 6. Model Descriptive statistics for the average annual price of a barrel of oil

	N	Minimum	Maximum	Mean	Std. Deviation
Oil barrel price	47	12.80	111.63	42.9543	30.24362
Valid N (listwise)	18				

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

The lowest value of the price of a barrel of oil for the period analyzed is reached in 1976 and 1998, and the highest value in 2012. Figure 5 shows a sharp fluctuation in the average annual price of a barrel of oil due to technological progress, government policies, financial crises, and social changes toward cleaner and more sustainable energy sources. Between 1976 and 1980, due to the development of the automotive industry, the price of oil increased 2,875 times, followed by a period of decline. Due to the global recession of 1980-1982, economic growth stagnates (Huntington, 1984) and the average price of a barrel of oil is in continuous decline until 1986. The fluctuations from 1987-2000 are due to the Asian financial crisis and are insignificant, which is also noted in the paper (Iswahyudi, 2016) where Indonesia's economic growth in the years before and after the Asian financial crisis is presented. A large increase in the price of oil barrel is in the period 2001-2008 when there was a percentage increase of 296.69% and the largest increase is in 2007-2008 (Hamilton, 2009). The financial crisis in the US in

2008 also affects the price of oil barrels by decreasing it by 36.58%. After this global financial crisis, the price of a barrel of oil recovers in 2012, by 81.48%. Between 2012 and 2016, there is a decrease of 155.62%, followed by a 63.36% increase in price until 2018. From 2018, the price of a barrel of oil falls by 41.18% until 2020. In early 2020, the COVID-19 epidemic and the associated economic slowdown had a significant impact on the oil market. Oil prices fell significantly, even recorded negative values due to the sudden drop in oil consumption and lack of storage space. After the COVID-19 outbreak, the price of a barrel of oil recovered continuously as the world reopened and demand for oil began to increase, so the price also rose by 140.54%.
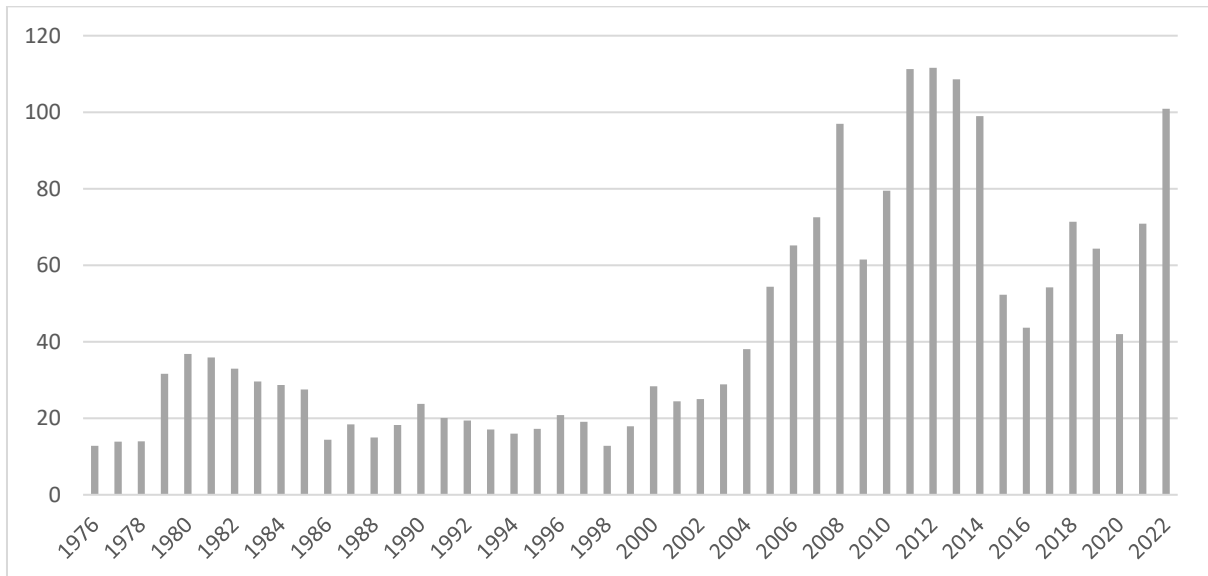

Figure 5. Average annual oil price per barrel 1976-2022 (in US$ per barrel),
Source: https://www.statista.com/statistics/262860/uk-brent-crude-oil-price-changes-since-1976/

Changes in the average oil price have a significant impact on the emerging economy, on fuel prices and on the exchange rate. Depending on oil imports and exports, countries' exchange rates can fluctuate. In addition, some countries with high oil production may have a stronger currency due to oil export revenues. The oil industry is a huge business, with large international oil companies and local players. Fluctuations in the price of oil, as well as its derivatives, petrol, diesel, et., can affect the profits and investments of these companies, as well as the gross domestic product, through excise duties on oil products (Macovei, 2021).

Table 7. Model Summary for the average annual price of a barrel of oil

R	R Square	Adjusted R Square	Std. Error of the Estimate
.784	.615	.588	19.417

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

Table 7 shows that the correlation ratio is 0.784, which indicates that the values of the average annual price of a barrel of oil over the period analyzed are correlated on the model proposed for analysis, but with a lower correlation than in the case of oil demand. This changes over time as the values fluctuate over the period analyzed. The coefficient of determination is 0.615. This means that 61.5% of the variation in the average annual price of a barrel of oil over time is explained by price volatility. Financial crises lead to increased volatility and uncertainty in the global market. Price volatility also extends to the oil market, causing significant fluctuations in the average price per barrel of oil (Figure 5). Investor panic, speculative trading, and changes in market sentiment can contribute to sudden price declines or increases, impacting oil producers, consumers, and investors (Kalkuhl et al., 2016).

Table 8. ANOVA for the average annual price of a barrel of oil

	Sum of Squares	df	Mean Square	F	Sig.
Regression	25862.771	3	8620.924	22.865	.000
Residual	16212.352	43	377.031		
Total	42075.123	46			

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

From Table 8 the value of the F-test is 22.8965 and the second model determined is validated, so on the basis of data from 1976-2022, it is possible to estimate the average annual price of a barrel of oil in the following period with a probability of 95%.

Table 9. Table Coefficients for the average annual price of a barrel of oil

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Case Sequence	-5.810	2.195	-2.634	-2.647	.011
Case Sequence ** 2	.329	.106	7.392	3.116	.003
Case Sequence ** 3	-.004	.001	-4.158	-2.826	.007
(Constant)	42.914	12.297		3.490	.001

Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

According to Table 9 the equation of the macro-econometric model of the evolution of the average annual price of a barrel of oil is:

$$Oil\ barrel\ price = 42.914 - 5.810 \cdot t + 0.329 \cdot t^2 - 0.004 \cdot t^3$$

The evolution of the average annual price of a barrel of oil is influenced by oil supply and demand, economic and geopolitical crises during the period under review, and is the result of a complex interaction between these factors, and price fluctuations can be influenced by economic, political and technological factors. Higher oil demand due to the development of the automotive industry generated an upward trend in oil prices per barrel over the period 1987-2019. This phenomenon is caused by strong economic growth in different regions of the world, industrial development, and increased energy consumption in the transport and manufacturing sectors. According to the model equation obtained the evolution of the annual average price of a barrel of oil has two inflection points, the minimum point in 1986 and the maximum point in 2019. Analyzing the data and the equation of the model obtained, it can be seen that the evolution of the average annual price of a barrel of oil has a downward trend for the period 1976-1986, which is the period of the global recession due to the significant economic downturn in many countries around the world, and for the period 2020-2022, which is due to the COVID-19 pandemic that caused a sudden and significant drop in oil demand, as quarantine measures and travel restrictions drastically reduced global economic activity, which also led to lower prices. In April 2020, the price of WTI (West Texas Intermediate) oil fell to an all-time low of negative values as oil stocks exceeded available storage capacity. The average annual price of a barrel of oil is therefore expected to fall to an average of USD 67.4076 per barrel in 2023.
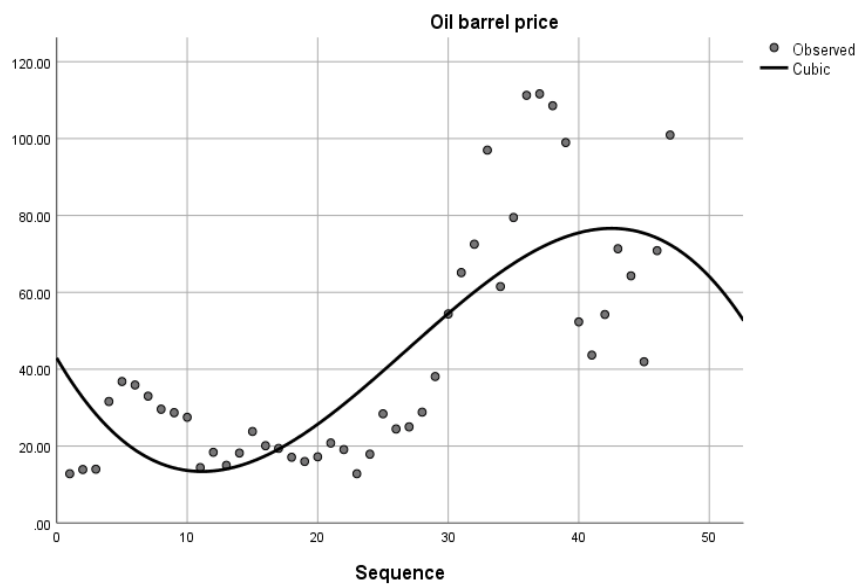

Figure 6. Estimation of the cubic regression model for the annual average price of a barrel of oil
Source: Authors Computation with the aid of IBM SPSS Statistics, version 26

Economic crises and changes in the average price of a barrel of oil are continuously linked and have mainly affected the economies of OPEC member countries and the economies of oil-importing countries. These can result from differences in the economic, political, and social infrastructures of each society, the dependence of budgets on foreign currency revenues from oil sales, or the systems of fiscal authorities in the countries concerned. Accurate forecasting of prices in OPEC member countries' oil portfolios can therefore play an important role in securing their economies against the effects of such fluctuations. The changing trend in oil prices alters the volume of exports and imports over the period under review, due to changes in competitive advantages in domestic and foreign markets as well as production advantages. Governments adopt a range of regulatory measures specific to the oil industry, including taxes (Macovei, 2021) and production and consumption standards, as well as requirements for companies in the sector to inform regulated institutions of their activities.

VI. CONCLUSION

Throughout the period analyzed, and especially during periods of economic growth, global oil demand and the average price per barrel of oil have been on an upward trend, due to economic development through the industrialization of each country, as well as the overall needs of the population through increased consumer spending. The growing population and expanding industries globally have contributed to the increase in demand and consumption of petroleum products. The transport sector is the main consumer of petroleum products, so the growth of the automotive industry has significantly influenced the petroleum industry. In this study, the evolution of oil demand and the average price per barrel of oil over time was analyzed using the cubic model.

The objective of the research on the evolution of oil demand and the average price of a barrel of oil demonstrates the importance of the oil industry globally. Using the statistical data of oil demand and average oil price per barrel, the aim of the research has been achieved. Due to financial crises as well as environmental factors oil demand and the average price of a barrel of oil fluctuated significantly over the period under analysis. Analyzing Figures 3 and 5 shows a significant link between oil demand and the average price of a barrel of oil, as well as the occurrence of economic and geopolitical crises during the period analyzed, such as the 1980-1982 global recession, the 1997 Asian financial crisis, the 2008-2009 global financial crisis, the Eurozone sovereign debt crisis, and the Covid-19 pandemic crisis. During the 2008-2009 global financial crisis and the Covid-19 pandemic crisis, oil demand and the average price per barrel of oil fell due to reduced industrial production and transport. The COVID-19 pandemic had an unprecedented impact on global oil demand and the average price of a barrel of oil. In 2020, travel restrictions and reduced or suspended economic activities led to a sharp reduction in demand and consumption of oil products. Analyzing the period 2020-2022 shows a recovery in oil demand and average oil price per barrel due to global policy measures to restart economies and ease pandemic restrictions. According to the two models of the evolution of oil demand and the average price of a barrel of oil, a decrease is expected in 2023 due to technological progress, government policies, and social changes toward cleaner and more sustainable energy sources.

Government policies and environmental concerns, such as climate change and air pollution, promote the adoption of strategies to reduce oil consumption and promote cleaner energy sources. Governments have initiated and implemented measures such as stricter fuel efficiency standards, oil pricing mechanisms, and incentives to purchase renewable energy. In developed economies, demand for oil has declined, as confirmed by the models, due to factors such as increased energy efficiency and the switch to renewable energy in both households and transport. The adoption of more fuel-efficient hybrid or electric cars and the development of alternative fuels have reduced the demand for oil.

A conclusion related to the objective of the research is that oil demand and the average price of a barrel of oil are influenced by the behavior of producers and consumers of petroleum products depending on the global economic situation, the policies of oil-producing and exporting countries, technological progress, the expansion of renewable energies and other geopolitical factors such as the armed invasion of Ukraine. The oil market is volatile and the application of quantitative methods to forecast the evolution of oil demand and price is necessary for an emerging economy.

REFERENCES

1. Aubuchon, C.P., Wheelock, D.C. (2010). *The Geographic Distribution and Characteristics of U.S. Bank Failures, 2007-2010: Do Bank Failures Still Reflect Local Economic Conditions?*, Federal Reserve Bank of St. Louis Review, https://core.ac.uk/download/pdf/6532393.pdf.
2. Apergis, N., Payne, J.E. (2010). *Structural breaks and petroleum consumption in US states: Are shocks transitory or permanent?*, Energy Policy, vol. 38 (10), pp-6375-6378, https://doi.org/10.1016/j.enpol.2010.06.015.
3. Boudet, H., Clarke, C., Bugden, D., Maibach, E., Roser-Renouf, C., Leiserowitz, A. (2014). *"Fracking" controversy and communication: Using national survey data to understand public perceptions of hydraulic fracturing*, Energy Policy, 65, pp. 57–67, doi:10.1016/j.enpol.2013.10.017.
4. Burbidge J., Harrison A. (1984). *Testing for the Effects of Oil-Price Rises Using Vector Autoregressions*, International Economic Review, vol. 25(2), 459-84, https://doi.org/10.2307/2526209.
5. Campbell, C.J., Laherrere, J.H. (1998). *The End of Cheap Oil, Scientific American*, Vol. 278, no. 3 pp. 8-83, https://www.jstor.org/stable/26057708..

6. Chapman, D., Khanna, N. (2006). *The Persian Gulf, Global Oil Resources, And International Security*, Contemporary Economic Policy, 24 (4), pp. 57-519, https://doi.org/10.1093/cep/byj035.

7. Chichilnisky, G., Heal, G. (1993). *Global Environmental Risks*, Journal of Economic Perspectives, Vol. 7, No. 4, pp. 65-86, DOI: 10.1257/jep.7.4.65, https://www.aeaweb.org/articles?id=10.1257/jep.7.4.65.

8. De Mirabal, M., Gordillo, R., Rojas, G., Rodriguey, H., Huerta, M. (1996). *Impact of foamy oil mechanism on the Hamaca oil reserves, Orinoco belt-Venezuela*, SPE Latin America/Caribbean Petroleum Engineering Conference, Port-of-Spain, https://doi.org/10.2118/36140-MS.

9. Fustic, M., Hubbard, S.M., Spencer, R., Smith, D.G., Leckie, D.A., Bennett, B., Larter, S. (2012). *Recognition of down-valley translation in tidally influenced meandering fluvial deposits*, Athabasca Oil Sands (Cretaceous), Alberta, Canada, Marine and Petroleum Geology, 29 (1), pp. 219-232, https://doi.org/10.1016/j.marpetgeo.2011.08.004

10. Ftiti, Z., Guesmi, K., Teulon, F., Chouachi, S. (2015). *Relationship Between Crude Oil Prices And Economic Growth In Selected OPEC Countries*, Journal of Applied Business Research (JABR), 32(1), 11–22. https://doi.org/10.19030/jabr.v32i1.9483.

11. Gisser M., Goodwin T.H. (1986). *Crude Oil and the Macroeconomy: Tests of Some Popular Notions*, Journal of Money, Credit, and Banking18, pp. 95-103, https://doi.org/10.2307/1992323.

12. Grosu, V., Socoliuc, M., Ciubotariu, M.S., Hlaciuc, E., Tulvinschi, M., Macovei A.G., Melega, A. (2022). *Designing the Profile of Industrial Consumers of Renewable Energy in Romania under the Impact of the Overlapping Crisis*, Frontiers in Energy Research, Vol. 10, https://doi.org/10.3389/fenrg.2022.1016075.

13. Hamilton, J.D. (1983). *Oil and the Macroeconomy Since World War II*, Journal of Political Economy, 91, 228-248, https://www.journals.uchicago.edu/doi/pdf/10.1086/261140.

14. Hamilton, J.D. (2009). *Causes and consequences of the oil shock of 2007-08*, Brooking papers on Economic Activity, spring, 215-261, DOI 10.3386/w15002, https://www.nber.org/papers/w15002.

15. Huntington, H.G. (1984). *Real Oil Prices from 1980 to 1982*, The Energy Journal, https://doi.org/10.5547/ISSN0195-6574-EJ-Vol5-No3-8.

16. Ilaş, N., Radu, S.M., Offenberg, I., Minescu, M., Offenberg, A. (2022).*Sustenabilitatea circulară a resurselor şi energiei*, Creşterea economică în condiţiile globalizării, Vol.2, pp. 239-258, https://doi.org/10.36004/nier.cecg.III.2022.16.20.

17. Iswahyudi, H. (2016). *Back to oil: Indonesia economic growth after Asian financial crisis*. Economic Journal of Emerging Markets, 8(1), 25–44, https://doi.org/10.20885/ejem.vol8.iss1.art3

18. Kalkuhl, M., Von Braun, J., Torero, M. (2016). *Food Price Volatility and Its Implications for Food Security and Policy*, Springer Open, DOI 10.1007/978-3-319-28201-5, file:///C:/Users/User/Downloads/1001906.pdf.

19. Kamal, R.A. (2005). *Overview of the petroleum industry in the Middle East (1869–1950)*, The Leading Edge, 24 (8), pp. 818-822, https://doi.org/10.1190/1.2032256.

20. Macovei, A. G. (2020), *Impact of the consumer price index on gross domestic product in Romania*, ECOFORUM, Vol 9, nr. 2 (22).

21. Macovei, A. G. (2021), *Econometric analysis of the evolution of excisements on fuels during the health crisis in Romania*, The European Journal of Accounting, Finance & Business, Volume 9, Issue 1/ February 2021, DOI: 10.4316/EJAFB.2021.9111.

22. Newaz, S., Tahmid, M.T., Al-Aboody, N., Al Islam, A.B.M.A. (2023). *A ubiquitous method for predicting underground petroleum deposits based on satellite data*, Scientific Reports, 13 (6638), https://doi.org/10.1038/s41598-023-32054-0.

23. Norouzi, N., Fani, M. (2020). *Black gold falls, black plague arise - An Opec crude oil price forecast using a gray prediction model*, Upstream Oil & Gas Technology, Vol. 5, https://doi.org/10.1016/j.upstre.2020.100015.

24. Rasche R., Tatom J. (1981). *Energy price shocks, aggregate supply and monetary policy: the theory and the international evidence*, Carnegie-Rochester Conference Series on Public Policy14 (1), 9-93, https://doi.org/10.1016/0167-2231(81)90002-6.

25. Rutland, P. (2008). *Russia as an Energy Superpower*, New Political Economy , vol. 13 (2), https://doi.org/10.1080/13563460802018547.

26. Trabelsi, M.A. (2012). *The impact of the sovereign debt crisis on the eurozone countries*, Procedia - Social and Behavioral Sciences, 62, pp. 424 – 430, https://doi.org/10.1016/j.sbspro.2012.09.069.

27. Tulvinschi, M. (2021). *Study on the factors influencing fuel prices*, The European Journal of Accounting, Finance & Business, Volume 9, Issue 3 / October 2021, DOI: 10.4316/EJAFB.2021.9316.

28. ** https://www.statista.com/markets/410/topic/444/fossil-fuels/#statistic1

29. ** https://www.statista.com/statistics/271823/global-crude-oil-demand/

30. ** https://www.statista.com/statistics/262860/uk-brent-crude-oil-price-changes-since-1976/