



## MACROECONOMIC ASPECTS OF THE OIL PRICE FORMATION: INFLUENCE ON GLOBAL ECONOMIC SECURITY

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### ABSTRACT

Modern industrial society requires the presence of a particularly important natural resource, such as oil, which is an in-demand energy source. Millions of dollars are invested into oil production, refining and transportation. This study intends to analyze macroeconomic aspects of the oil price formation: influence on global economic security. To do so, a descriptive-analytical method is utilized and several sources are considered. Given the results, low prices threaten the stability of oil industry, which is still the key factor for the world economy performance. On the other hand, speaking of the drivers for oil prices dynamics, it is to mention the increasing role of financial structures, more specifically, hedge funds, banks, and investment companies, because such financial structures hold shares of the largest oil companies and are interested in keeping oil prices high. Therefore, based on the results of the research studies conducted, it can be said that global energy trends show the following key factors: reliability of energy supply, energy security, energy efficiency and harmonization with the environment.

**Key words:** macroeconomics, oil market, investments, energy, oil industry, natural wealth.



## ASPECTOS MACROECONÔMICOS DA FORMAÇÃO DO PREÇO DO PETRÓLEO: INFLUÊNCIA NA SEGURANÇA ECONÔMICA GLOBAL.

### RESUMO

A sociedade industrial moderna requer a presença de um recurso natural particularmente importante, como o petróleo, que é uma fonte de energia em demanda. Milhões de dólares são investidos na produção, refino e transporte de petróleo. Este estudo pretende analisar aspectos macroeconômicos da formação do preço do petróleo: influência na segurança econômica global. Para tanto, utiliza-se um método descritivo-analítico e várias fontes são consideradas. Diante dos resultados, os preços baixos ameaçam a estabilidade da indústria do petróleo, que ainda é o fator chave para o desempenho da economia mundial. Por outro lado, falando dos drivers da dinâmica dos preços do petróleo, é de referir o papel crescente das estruturas financeiras, mais concretamente, hedge funds, bancos e sociedades de investimento, porque tais estruturas financeiras detêm participações nas maiores empresas petrolíferas e são interessados em manter os preços do petróleo altos. Portanto, com base nos resultados das pesquisas realizadas, pode-se dizer que as tendências energéticas globais mostram os seguintes fatores-chave: confiabilidade do fornecimento de energia, segurança energética, eficiência energética e harmonização com o meio ambiente.

**Palavras-chave:** macroeconomia, mercado petrolífero, investimentos, energia, indústria petrolífera, riqueza natural.

### 1. INTRODUCTION

Starting from the end of the 20th century, when oil turned into strategic commodity and predominant energy source, the environment of crude oil and petroleum products market became the focus of interest for global business and politics. As of today, the oil industry is characterized by a high degree of competitiveness and stands at the highest point of its own life cycle. So, the main Top 6 global oil consumers as of 2019 are: The USA (19.5 mln barrels per day), China (14.2 mln barrels per day), India (5.4 mln barrels per day), Japan (3.9 mln barrels per day), Saudi Arabia (3.8 mln barrels per day), Russia (3.4 mln barrels per day) (Welfens, 2020). Countries that only export oil and do not need to import it: The Russian Federation, Saudi Arabia, Iraq, Iran, the United Arab Emirates (UAE), Libya, Kuwait, Venezuela, Mexico, etc.

At another point, the main Top 6 global oil producers as of 2019 are: The USA (12.4 mln barrels per day), Russia (11.1 mln barrels per day), Saudi Arabia (10.2 mln barrels per day), Iraq (4.8 mln barrels per day), China (3.9 mln barrels per day), the UAE (3.5 mln barrels per day). This being said, oil is a fundamental resource for the development of modern society in the industrialized world (Arezki, 2019; Korableva et al., 2020; Silva et al., 2021). At the same time, the global oil market has a dramatic impact on a country's economy and determines the



well-being of oil-producing and oil-consuming countries (Faure-Schuyer, 2017; Elveny, 2021; Flores, & Cruz, 2021; Saychenko et al., 2018; Vecchia et al., 2021). Countries that produce oil on their own but resort to import to compensate the oil deficit in the domestic market are: The United States of America, China, and Great Britain.

Countries that do not produce oil on their own and resort to import: India, Japan, South Korea, countries of the European Union (Estonia, Malta, Slovenia, Bulgaria). In this regard, oil is the most sellable raw material in the world. The petroleum products supply contract is one of the prevailing trading instruments (Bhat, 2021; Nikulin et al., 2021; Pozzett et al., 2020; Severo et al., 2022). Therefore, successful trading of this asset requires defining a market development mechanism, including its structure and factors that have a direct impact on the current pricing process.

## 2. METHODS

To meet the study's aims, a descriptive-analytical method is utilized and several sources are considered. The economists provide different classifications, on the basis of which oil stocks can be recorded:

- a) National Classification.
- b) The American Association of Petroleum Geologists.
- c) UN International Classification and others.

Oil production companies are the main sellers in the oil market. At the same time, oil is produced in separate oil-bearing regions of some countries: In the Russian Federation, the USA, Venezuela, Nigeria, and Canada, in the Middle East and in the North Sea offshore.

Whereas the stock traders have their focus on the following factors:

- a) Political environment in the oil-producing countries.
- b) Economic volatility, instability of official authorities may result in reduction of supplies and, in particular cases, in risk of disruption of supplies.

Sometimes traders start reacting to a simple possibility of reduction in supplies, which results in price surge, and in most cases the politics affects production in Venezuela, Nigeria and in the Middle East (Güntner, 2019). In particular, in 2005, one of the most disastrous hurricanes in the world – the Hurricane Katrina – paralyzed the work of the mining platforms in the Gulf of Mexico. Oil production in this region decreased by 92% resulting in the historical high for WTI crude oil price – more than \$70 per barrel. On the other hand, the USA, during summer motorcar season, show increased demand for gasoline and hence for oil. Winter heating season also has an impact on oil prices following the increased demand for heating oil in cold months.

Increase in oil production and scope of drilling results in oil delivery increase and vice versa (Bordoff, 2018; Dudukalov et al., 2021; Molchanov and Romasheva, 2019). For example, oil production data is published by the U.S. Energy Information Administration (EIA), the Central Dispatch Center of the Fuel and Energy Complex of Russia (part of the Ministry of Energy of the Russian Federation). Data about the quantity of active drilling rigs is published by Baker Hughes – service oil and gas company.

### **Study of general trends in the development of the US oil market.**

From the historical perspective, the USA succeeded in surpassing Saudi Arabia and Russia and becoming the largest producer of oil and petroleum products in the world (Obolenskaya, 2021). The US share of the global oil production increased almost twice for the last 11 years – from 8.9% to 18%. Today, there are five largest oil exporters: Canada, Saudi Arabia, Mexico, Venezuela, and Nigeria.

Analysts note that the USA produce more oil inside the country decreasing its dependence on oil in total (Newell, 2019). Recent recession and slow economic recovery have depressed the demand for petroleum products. Nevertheless, the main reason is that the USA has in fact scaled up production over the past few years. The country has also become more energy-efficient, owing it to manufacturing of cars with lower fuel consumption and pivoting from oil-based energy (Kopteva et al., 2017; Vasilyeva et al., 2021; Movchan et al., 2019, 2021).

In its turn, the dynamics of crude oil stocks according to the data of the U.S. Energy Information Administration (EIA) is a value included into the weekly EIA report of the US Department of Energy. The report includes information about the quantity of barrels of commercial crude oil stored in crude oil terminals of American enterprises. Nevertheless, the EIA report also includes information about deliveries, stocks and prices of crude oil and its further derivatives (Rui, 2017). This report is a trustworthy source of update information regarding energy industry for the production sector, consumers, media, analysts, and federal and local authorities (Nikitin and Safonov, 2021; Smirnova and Rudenko, 2017). This report describes information about crude oil and petroleum products deliveries and flows in major American regions.

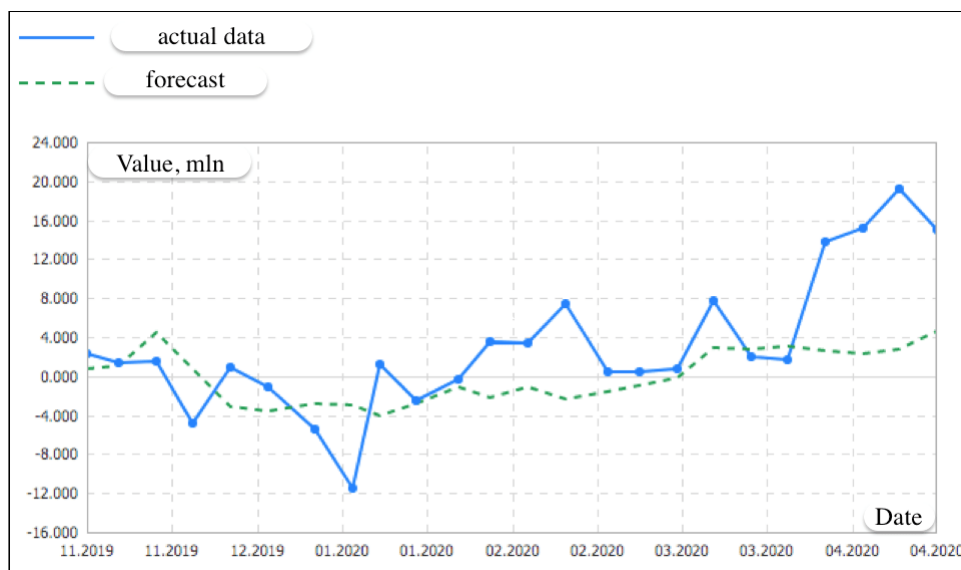
The list of companies providing data for crude oil stocks includes all companies that can store more than 1,000 barrels of crude oil:

- a) Crude oil terminals (to the exclusion of those that are located at oil refineries).
- b) Companies transporting crude oil by water from Alaska to other American states.



- c) Oil pipeline companies (local and main).
- d) Terminal operators.
- e) Crude oil producers.

It is to note that the increase in crude oil stocks in depots in the USA means lower demand for raw material or higher oil production. This situation exerts downward pressure on global oil prices, but this is a short-term price change. Setting a downward trend in the market requires a continuous increase in oil stocks during several consecutive weeks (Figure 1).

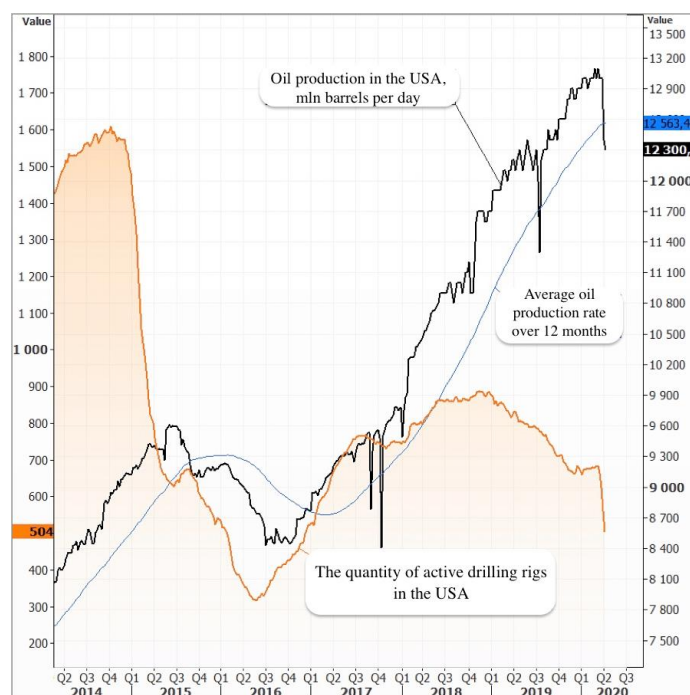


**Figure 1.** Change in crude oil stocks in depots in US depots (mln barrels per day)

Based on the results of the analysis performed in the middle of April 2020, the US crude oil stocks have drastically increased. The stocks appeared to be well above the expected values and comprised approx. 19 mln barrels per day, whereas in contrast, the experts expected 3.7 mln barrels per day (Samargandi, 2021). It is to note that excessive deviation of the actual value from the expected one can result either in weakening or strengthening of the national currency in the foreign exchange market (Forex) (Cust, 2019; Stoianova and Vasilyeva, 2022). Indicators' threshold values, which are shown at the diagram, point at the beginning of a pivotal period in the US economy.

In its turn, Brent crude oil is one of the crude oil benchmarks. Brent has been influencing over the pricing of many other crude oil benchmarks from the 1980s (Samargandi, 2021; Pogosyan, 2021). Let us see the movement in the Brent crude oil price. In the middle of 2014, the oil price comprised approx. \$117 per barrel and then it began its downturn up until 2015. As of today, the oil price is rapidly decreasing. The main reason for this decrease is the OPEC+ deal collapse. The countries could not agree on cutting oil production. Note that in March of

2020, the oil price fell up to \$27.9 per barrel; the similar value was seen in 2016. Brent crude oil price peaked on 9 of February 2021 and comprised \$61.04 per barrel (Figure 2).



**Figure 2.** Oil production in the USA from 2014 to 2020 (mln barrels per day)

Let us now proceed to analyze the oil production values in the USA within the period between 2014 and 2020. As of Q2 of 2020, the oil production in the USA comprised 12.3 mln barrels per day comparing to Q1, when the oil production comprised 13.1 mln barrels per day. Moreover, average oil production level for 12 months comprised approx. 12.6 mln barrels per day. Quantity of active drilling rigs in the USA decreased down to 504. In the Q4 of 2014, the quantity of active drilling rigs comprised approx. 1,590.

In 2020, the largest petroleum company of the USA – ConocoPhillips announced the oil production cut by 225 thsd barrels per day. As early as in May, the company planned to cut by approx. 100 thsd barrels per day in Canada and approx. 125 thsd barrels per day in the USA. ConocoPhillips was the first company that officially announced the oil production cut because of low prices. It is important to note that the US presidential administration was considering a possibility to add additional payments to oil companies that would settle for voluntary oil production cut (Nibedita, 2021; Tesleva and Belkova, 2014; Frolova et al., 2019). At the same time, experts asked by media doubted the implementation of such measures, as they would have been too expensive for the budget (Alayi, 2021; Kuzmin et al., 2016).

According to EIA, the oil production in the USA started decreasing in March 2020. In April, following the negotiations between the OPEC participating countries, the USA announced the oil production cut. The companies had to opt for this step because otherwise

they would have operated at a loss. According to EIA, the shale production in May decreased by less than 600 thousand barrels per day comparing to April. For this May, the International Energy Agency estimated overall world production decrease by 12 million barrels per day. It should be highlighted that Whiting Petroleum, which develops shale deposits in North Dakota, filed for bankruptcy protection and offered its creditors to convert the company's debt in the amount of \$2.3 billion into 96% of their shares, which means that the company cannot fulfil its commitments. Therefore, the current situation with prices lower than normal has created fundamental problems for oil industry. One of them was related to changes that could have been applied in future to the pricing mechanisms. In particular, the US reference oil grade, WTI, could have lost its reference status, the price of which serves as a reference for all the rest of oil grades.

### 3. RESULTS

Based on actual data from the OPEC Monthly Oil Market Report, we shall examine the values for world demand in oil and liquid hydrocarbon production. Let us consider the world oil demand in 2019 and 2020 (Table 1). The studies conducted allowed us to define the following key aspect – common oil demand contraction in the USA. In the Q2 of 2020, the demand for oil was low and comprised 16.52 million barrels per day; by the end of the year, this value increased up to 20.74 million barrels per day.

**Table 1.** World oil demand in 2019 and 2020 (mln barrels per day)

	2019	1Q20	2Q20	3Q20	4Q20	2020	Change 2020/19	Growth %
<b>World oil demand</b>								
Americas	25.62	24.55	20.35	24.78	25.26	23.74	-1.87	-7.30
of which US	20.85	20.34	16.52	20.34	20.74	19.49	-1.36	-6.50
Europe	14.34	13.10	11.37	13.55	13.78	12.96	-1.38	-9.63
Asia Pacific	7.96	7.88	6.65	6.84	7.50	7.22	-0.74	-9.31
<b>Total OECD</b>	<b>47.91</b>	<b>45.53</b>	<b>38.37</b>	<b>45.17</b>	<b>46.55</b>	<b>43.92</b>	<b>-3.99</b>	<b>-8.33</b>
Other Asia	13.86	13.45	12.70	12.70	13.76	13.15	-0.71	-5.13
of which India	4.84	4.74	4.00	4.04	4.93	4.43	-0.41	-8.52
Latin America	6.58	6.25	6.30	6.44	6.22	6.30	-0.28	-4.26
Middle East	8.20	7.81	7.21	8.14	7.72	7.72	-0.48	-5.83
Africa	4.43	4.41	4.35	4.15	4.30	4.30	-0.13	-2.97
<b>Total DCs</b>	<b>33.08</b>	<b>31.92</b>	<b>30.56</b>	<b>31.42</b>	<b>32.00</b>	<b>31.48</b>	<b>-1.60</b>	<b>-4.84</b>
FSU	4.94	4.50	4.38	4.55	4.71	4.53	-0.31	-6.37
Other Europe	0.76	0.71	0.64	0.57	0.66	0.65	-0.12	-15.37
China	13.07	10.27	12.75	12.57	13.38	12.25	-0.83	-6.33
<b>Total "Other regions"</b>	<b>18.68</b>	<b>15.47</b>	<b>17.77</b>	<b>17.69</b>	<b>18.75</b>	<b>17.43</b>	<b>-1.25</b>	<b>-6.71</b>
<b>Total world</b>	<b>99.67</b>	<b>92.92</b>	<b>86.70</b>	<b>94.28</b>	<b>97.30</b>	<b>92.82</b>	<b>-6.85</b>	<b>-6.87</b>
Previous estimate	99.67	97.58	98.20	101.25	101.85	99.73	0.06	0.06
Revision	0.00	-4.66	-11.50	-6.97	-4.54	-6.91	-6.91	-6.93

The oil cartel analysts expected to see decreased American production in 2020 – by 0.2 million barrels per day back to the levels of 2019 – down to 12.04 million barrels per day. The supply forecast for all the non-OPEC countries in 2020 was reconsidered to the decrease by 1.5 million barrels per day. The increased supplies were only expected from Norway, Brazil, Guyana, and Australia.

Liquid hydrocarbon production values in 2019 and 2020 are worth noting (Table 2). In 2020, the liquid hydrocarbon production in the USA decreased comparing to its value in 2019

and comprised 18.25 mln barrels per day. In 2019, the production comprised approx. 18.4 mln barrels per day. For example, consider the oil production values for Russia. In 2020, the value comprised 10.14 mln barrels per day.

**Table 2.** Indicators of production of liquid hydrocarbons in 2019 and 2020 (mln barrels per day)

	2019	1Q20	2Q20	3Q20	4Q20	2020	Change 2020/19	
							Growth	%
Americas	25.74	26.55	25.36	25.09	24.66	25.41	-0.33	-1.29
of which US	18.40	19.05	18.40	18.00	17.55	18.25	-0.15	-0.82
Europe	3.71	4.06	3.91	3.96	4.12	4.01	0.31	8.24
Asia Pacific	0.48	0.52	0.54	0.58	0.58	0.55	0.07	14.09
<b>Total OECD</b>	<b>29.94</b>	<b>31.12</b>	<b>29.82</b>	<b>29.63</b>	<b>29.36</b>	<b>29.98</b>	<b>0.04</b>	<b>0.14</b>
Other Asia	3.48	3.47	3.30	3.34	3.33	3.36	-0.13	-3.62
Latin America	6.01	6.32	6.30	6.33	6.40	6.34	0.33	5.47
Middle East	3.21	3.21	3.01	3.06	3.07	3.09	-0.12	-3.89
Africa	1.50	1.48	1.45	1.45	1.44	1.45	-0.05	-3.58
<b>Total DCs</b>	<b>14.21</b>	<b>14.48</b>	<b>14.06</b>	<b>14.17</b>	<b>14.23</b>	<b>14.24</b>	<b>0.02</b>	<b>0.17</b>
FSU	14.37	14.50	11.82	12.43	12.43	12.79	-1.58	-10.96
of which Russia	11.44	11.50	9.36	9.85	9.85	10.14	-1.30	-11.38
Other Europe	0.12	0.12	0.12	0.12	0.11	0.12	-0.01	-4.32
China	4.05	4.04	4.00	3.99	4.01	4.01	-0.04	-1.00
<b>Total "Other regions"</b>	<b>18.54</b>	<b>18.67</b>	<b>15.94</b>	<b>16.53</b>	<b>16.55</b>	<b>16.92</b>	<b>-1.62</b>	<b>-8.74</b>
Total non-OPEC production	62.69	64.27	59.81	60.33	60.14	61.13	-1.55	-2.48
Processing gains	2.28	2.33	2.33	2.33	2.33	2.33	0.05	2.37
<b>Total non-OPEC liquids production</b>	<b>64.97</b>	<b>66.60</b>	<b>62.15</b>	<b>62.67</b>	<b>62.47</b>	<b>63.47</b>	<b>-1.50</b>	<b>-2.31</b>
Previous estimate	64.97	66.44	66.46	66.74	67.30	66.74	1.76	2.71
Revision	-0.01	0.16	-4.32	-4.08	-4.82	-3.27	-3.26	-5.02

In March of 2020, the OPEC oil production increased by 821 thsd barrels per day driven by Saudi Arabia, Kuwait, and UAE. On the 6th of March, after the OPEC+ deal collapsed, the market share of the OPEC oil increased by 0.6% up to 28.7%. The price of Brent crude oil decreased by 9% and comprised approx. \$45.6 per barrel. New OPEC+ deal was agreed on 12 of April of 2020, became effective on May 1, and will be effective until May 2022. This deal saved energy market from the oil prices falling to negative values. Russia has cut oil production by 17%. In December 2020, Brent oil price comprised \$50 per barrel and in February 2021, it increased up to \$60 per barrel. In its turn, on 4 of March of 2021, the OPEC+ allowed Russia to increase oil production by 130 thsd barrels per day, as increased demand on its domestic market is expected.

In the course of study, it was found that following the slumping oil prices, shale drillers started massively reducing expenses on new drilling, which proved to have a basis in drilling rigs dynamics. In the end, it will contribute to lower rate of oil production in the USA. At the same time, low prices threaten the stability of oil industry, which is still the key factor for the world economy performance (Anikin, 2019). Even with an all-time demand contraction of last year, oil companies are still facing a problem of investments to compensate natural production decline and provide future growth (Chuvashlova et al., 2021). Reduced financial resources affect the oil industry capability to develop some technologies required to switch to clean energy in the world economy.



#### 4. DISCUSSION

Today, in the Russian Federation, the development of innovation-oriented energy complex is defined by the Energy Strategy of the Russian Federation for the Period up to 2035, which not only sets goals and objectives but also actions to reach them for each participant (Duch-Brown, 2020). According to this document, the Phase 2 of the strategy implementation (started in 2018) is related to the transition to innovation-driven growth and development of relevant infrastructure (Lintunen, 2021).

Whereas for EU countries the key factor that determines the future cost of oil production is the stock level and structure. Considering the depletion of conventional deposits in the main oil and gas production basins and lack of significant rise in liquid hydrocarbon stocks, the following decrease in oil production in Europe is expected. Europe is the largest oil refining facility in the world. Oil production in Europe is going to decrease more rapidly than the demand for raw material (Kosov, 2018; Kilian, 2018; Dwijendra, 2021). So that, according to economists' opinion, by 2040 oil supplies to Europe will reduce approx. down to 10 mln barrels per day due to low demand (Höök, 2009; Kharakoz, 2020; Bazi, 2021).

The largest oil supplier for Europe is Russia (in 2018, 145 mln tons of oil were supplied) but more recently the supplies from the USA has drastically increased owing it to a better oil quality with low sulfur content (Lu, 2021; Chen 2022).

According to economists' opinion, it is expected that the Middle East countries may boost exports up to 28 mln barrels per day by 2040 (for example, oil is supplied to the APAC countries (Japan, South Korea, etc.) and to Europe and North America). Over the longer term, the Middle East will dominate the politics and economy since modern economy depends on oil and gas supplies (Jussibaliyeva, 2021; Rahman and Novikova Freyre Shavier, 2018). Global political and economic disbalances can result from the following factors: stiff competition between key oil importers for oil access, political turbulence in oil countries and higher demand for oil from emerging countries. In this regard, efficient way to provide access to petroleum-rich countries is represented by developing strong cooperation ties with oil suppliers, providing them with diplomatic and military support (Jermsittiparsert, 2021; Huang, 2021).

#### 5. CONCLUSION

Oil has become a demanded energy resource. The main reason of the competition for this resource is its deficit in many countries resulting in higher demand for oil import. The oil price movement is determined by a wide range of factors that can be divided into internal and external factors. Main factors leading to increased global oil prices are as follows:



- a) Reduced unused oil production capacities in the producing countries (in Saudi Arabia to begin with) driven by the depletion of oil deposits and reduced oil supplies in the OECD countries,
- b) Further global consumption growth of primary resources (at an accelerating pace in emerging countries, mostly in China and India, and at a modest pace in advanced developed countries),
- c) Frequent disruptions of oil supplies and speculative buying by traders that plan to profit off an oil panic, etc.

It is to mention the increasing role of financial structures, more specifically, hedge funds, banks, and investment companies, because such financial structures hold shares of the largest oil companies and are interested in keeping oil prices high.

However, oil-producing countries try to keep a lid on this process. These primarily include the following countries: Kuwait, Norway, Nigeria, Venezuela, Kazakhstan, and the Russian Federation, which created public investment funds to hedge financial and political risks. At the same time, the development of alternative oil delivery sources is crucial, as over half of the oil consumption is concentrated in transport. So long as global transport industry depends directly on oil, the demand for Persian oil will be increasing.

Meanwhile, increased energy efficiency is a strategic orientation for reduced energy consumption in the economy. The key role in successful energetics development, including meeting increased demand, higher reliability of energy supply, and environmental improvement, will be played by innovative energy technologies.

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